U.S. Department of Energy
in cooperation with
Minnesota Department of Commerce

MESABA ENERGY PROJECT

FINAL
ENVIRONMENTAL IMPACT STATEMENT
VOLUME I

DOE/EIS-0382
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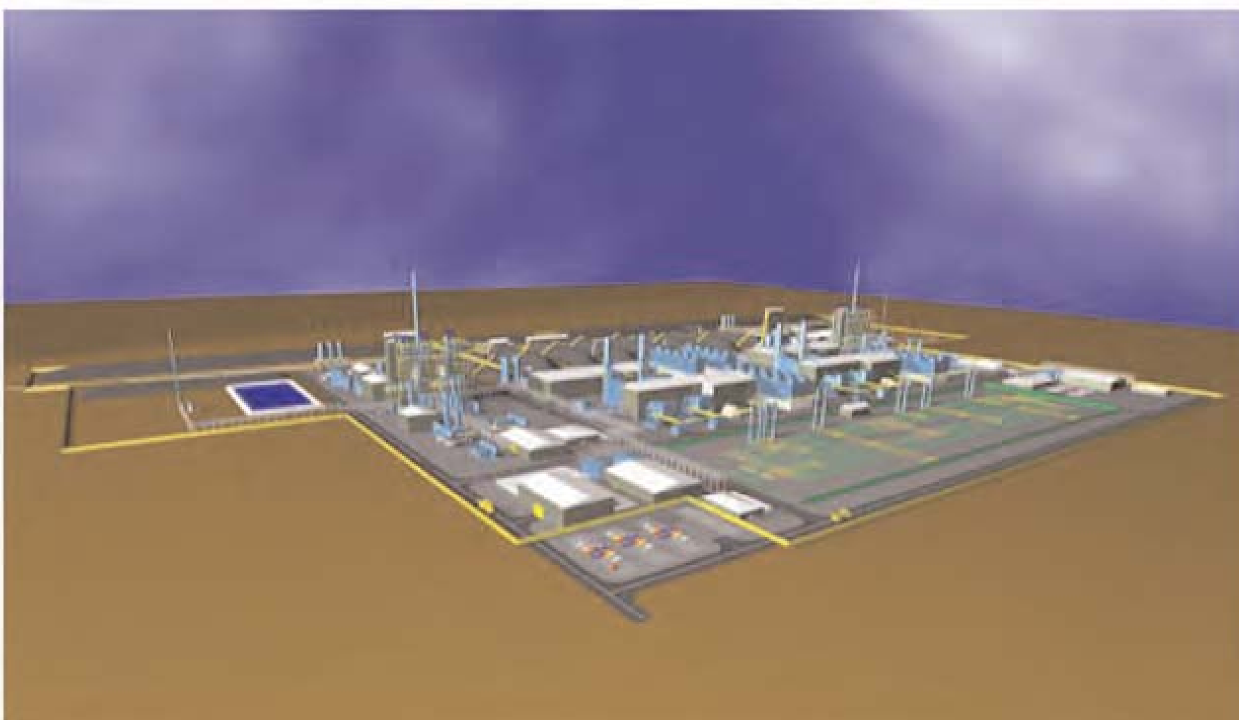

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Office of Fossil Energy
National Energy Technology Laboratory

COVER SHEET

Responsible Federal Agency: U.S. Department of Energy (DOE)

Responsible State Agency: Minnesota Department of Commerce (MDOC)

Cooperating Agencies: U.S. Army Corps of Engineers **(USACE)** and U.S. Department of Agriculture **(USDA)** Forest Service

Title: Mesaba Energy Project, **Final** Environmental Impact Statement (DOE/EIS-0382)

Location: Taconite Tax Relief Area of northeastern Minnesota; Itasca and St. Louis Counties

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Abstract:

This **Final** Environmental Impact Statement (EIS) provides information about the potential environmental impacts of the proposed Mesaba Energy Project, a coal-based Integrated Gasification Combined Cycle (IGCC) electric power generating facility that would be located in the Taconite Tax Relief Area (TTRA) of northeastern Minnesota. Excelsior Energy Inc. (Excelsior) proposes to design, construct, and operate the Mesaba Energy Project in two phases; each phase would nominally generate **600** megawatts of electricity (MWe) for export to the electrical grid, **1,200** MWe total. DOE's Proposed Action is to provide a total of $36 million in co-funding, through a cooperative agreement with Excelsior under the Clean Coal Power Initiative (CCPI) Program, for the design and one-year operational demonstration testing period for Phase I. The total cost of Phase I is currently estimated **in the cooperative agreement** at $2.16 billion. This EIS addresses the impacts of both phases of the Mesaba Energy Project as connected actions, even though only Phase I would be co-funded under the CCPI Program. DOE may also provide a loan guarantee to Excelsior pursuant to the Energy Policy Act of 2005 **for Phase I of the proposed project**. **Approval of the loan guarantee is also considered a major Federal action subject to NEPA review.**

Because the proposed facility is considered a Large Electric Power Generating Plant, the Project is subject to the Minnesota Power Plant Siting Act (Minnesota Statutes Chapter 216E), which requires the preparation of a state-equivalent EIS. The EIS requirements under the National Environmental Policy Act **(NEPA)** and the Minnesota Power Plant Siting Act are substantially similar, and DOE has prepared this EIS in cooperation with the MDOC to fulfill the requirements of both laws.

The *Federal Register* "Notice of Intent to Prepare an Environmental Impact Statement and Notice of Proposed Floodplain and Wetlands Involvement for the Mesaba Energy Project Integrated Gasification Combined Cycle (IGCC) Demonstration Plant Northern Minnesota Iron Range, Itasca County, MN" was published on October 5, 2005 (70 *FR* 58207). DOE held public scoping meetings on October 25, 2005, in Taconite, MN, and on October 26, 2005, in Hoyt Lakes, MN. MDOC held public scoping meetings at the same two locations, respectively, on August 22 and 23, 2006. This EIS evaluates the environmental consequences that may result from the Proposed Action at two possible sites (West Range and East Range Sites). Excelsior's preferred site is the West Range Site in the City of Taconite in Itasca County, MN. The East Range Site is Excelsior's alternative site in the City of Hoyt Lakes in St. Louis County, MN. This EIS also analyzes the No Action Alternative, under which DOE would not provide cost-shared funding to demonstrate the Mesaba Energy Project **or a loan guarantee for the project**, beyond that required to complete the NEPA process.

Public Participation:

DOE encourages public participation in the NEPA process. Comments were invited on the Draft EIS for a period of 63 days after publication of the Notice of Availability in the *Federal Register* on November 9, 2007. DOE considered all comments to the extent practicable. DOE conducted formal public hearings jointly with MDOC to receive comments on the Draft EIS in Taconite, Minnesota, on November 27, 2007, and in Hoyt Lakes, Minnesota, on November 28, 2007. An informational session was held prior to each hearing for the public to learn more about the project. The public was encouraged to provide oral comments at the hearings and to submit written comments to DOE and MDOC by the close of the comment period on January 11, 2008.

Changes from the Draft EIS:

Vertical lines in the left margin of a page indicate where text in the Draft EIS has been deleted, revised, or supplemented for this Final EIS, except for Volume III, which contains the public comments on the Draft EIS and DOE's responses. Additionally, revised and supplemental text in the Summary and Volumes I and II are shown in boldface text (as in this paragraph). Sections that include revisions are also identified in the Table of Contents.

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ACRONYMS AND GLOSSARY

Acronym or Term	Definition
7Q10	seven-day low flow average with a 10-year recurrence interval
A/m	Amperes per meter
AADT	annual average daily traffic
AC	alternating-current
ACHP	**Advisory Council on Historic Preservation**
ADT	average daily traffic
AERA	Air Emission Risk Assessment
AERMOD	AMS/EPA Regulatory MODel (an air dispersion model)
aerodynamic diameter	A term used to describe particles with common aerodynamic properties, which avoids the complications associated with varying particle sizes, shapes, and densities. For example, PM_{10} is defined in 40 CFR Part 50 as consisting of particles 10 micrometers or less in aerodynamic diameter, meaning particles that behave aerodynamically like spherical particles of unit density (1 gram per cubic centimeter) having diameters of 10 micrometers or less.
aerosol	A suspension of fine solid or liquid particles in a gas.
AGR	acid gas removal
air dispersion model	A computer program that incorporates a series of mathematical equations used to predict downwind concentrations in the ambient air resulting from emissions of a pollutant. Inputs to a dispersion model include the emission rate; characteristics of the emission release such as stack height, exhaust temperature, and flow rate; and atmospheric dispersion parameters such as wind speed and direction, air temperature, atmospheric stability, and height of the mixed layer.
air quality	The cleanliness of the air as measured by the levels of pollutants relative to standards or guideline levels established to protect human health and welfare. Air quality is often expressed in terms of the pollutant for which concentrations are the highest percentage of a standard (e.g., air quality may be unacceptable if the level of one pollutant is 150% of its standard, even if levels of other pollutants are well below their respective standards).
alignment	The location of a rail line in a corridor.
alluvium	A general term for the sedimentary material deposited by flowing water.
AMP	Arcturus Mine Pit
anthracite	The hardest type of coal, characteristically black in color, lustrous, with a conchoidal fracture (smoothly curved, irregular breakage surface). Anthracite coal consists of 92-98% carbon and less than 8% volatile constituents by weight.
anticline	A geologic fold that is arch-like in form, with rock layers dipping outward from both sides of the axis, and older rocks in the core. The opposite of syncline.
APE	area of potential effect
AQRV	air quality related value

Acronym or Term	Definition
aquifer	A subsurface saturated rock unit (formation, group of formations, or part of a formation) of sufficient permeability to transmit groundwater and yield usable quantities of water to wells and springs.
area of potential effect (APE)	The geographic region that may be impacted as a result of the construction and operation of the Proposed Action or alternatives.
AREMA	American Railway Engineering and Maintenance of Way Association
artesian	Groundwater conditions in which water in wells rises above its level in the aquifer, including conditions in which groundwater rises to the ground surface or above.
ash	The mineral content of a product remaining after complete combustion.
ASU	air separation unit
attainment	Air quality in the locality that meets the established standards.
BA	**biological assessment**
BACT	best available control technology
baghouse	An air pollution control device that filters particulate emissions, consisting of a bank of bags that function like a vacuum cleaner bag to intercept particles that are mostly larger than 10 micrometers in aerodynamic diameter.
BART	best available retrofit technology
base level	The level below which a stream cannot erode its valley further.
batholith	The largest pluton form, defined as an irregular-shaped mass with a surface exposure greater than 100 square kilometers that has invaded layers of crustal rocks.
BBER	Bureau of Business and Economic Research
BCC	bioaccumulative chemical of concern
bedrock	The rock of Earth's crust that is below the soil and largely unweathered.
beneficiation	The process of washing or otherwise cleaning coal to increase the energy content by reducing the ash content.
berm	A mound or wall of earth.
bgs	below ground surface
biocide	A substance (e.g., chlorine) that is toxic or lethal to many organisms and is used to treat water.
BLM	Bureau of Land Management
blowdown	The portion of steam or water removed from a boiler at regular intervals to prevent excessive accumulation of dissolved and suspended materials.
BMP	best management practice
BNSF	Burlington Northern/Santa Fe (Railway Company)
BOD	biochemical oxygen demand
bottom ash	Combustion residue composed of large particles that settle to the bottom of a combustor from where they can be physically removed.
brackish	Water that has high concentrations of salts (typically 1,000 to 10,000 parts per million of dissolved solids), but that may still be suitable for some uses.
brine	Water saturated with salt.
Btu	British thermal unit

Acronym or Term	Definition
building downwash	The downward movement of an elevated plume toward the area of low pressure created on the lee side of a structure in the wake around which the air flows.
BWCAW	Boundary Waters Canoe Area Wilderness
CAA	Clean Air Act
CAIR	Clean Air Interstate Rule
CAM	Compliance Assurance Monitoring
CAMR	Clean Air Mercury Rule
capacity factor	The percentage of energy output during a period of time, compared to the energy that would have been produced if the equipment operated at its maximum power throughout the period.
CapX2020	Capital Expansion by the year 2020
carcinogenic	Capable of producing or inducing cancer.
CBT	Coleraine – Bovey – Taconite
CCPI	Clean Coal Power Initiative
CCS	carbon capture and sequestration
CCT	clean coal technology
CDT	Central Daylight Time
CE	Cliffs-Erie, LLC
census tract	A small, relatively permanent statistical subdivision of a county. Census tracts, which average about 4,000 inhabitants, are designed to be relatively homogeneous units with respect to population characteristics, economic status, and living conditions.
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
cfs	cubic feet per second
CH_4	methane
CL	centerline
Class I area	Under the Clean Air Act, a Class I area is one in which visibility is protected more stringently than under the national ambient air quality standards, with only a small increase in pollution allowed. Class I areas include national parks, wilderness areas, monuments, and other areas of special national and cultural significance.
Class II area	Under the Clean Air Act, Class II areas are all other clean air regions not designated Class I areas, with moderate pollution increases allowed. See **Class I area**.
CLOMR	conditional letter of map revision
CMP	Canisteo Mine Pit
CN	Canadian National (Railway Company)
CO	carbon monoxide
CO_2	carbon dioxide
coal gasification	A process that converts coal into a gaseous product, which involves crushing coal into a powder and heating the powder in the presence of steam and oxygen. After impurities (e.g., sulfur) are removed, the gas can be used as a fuel or further processed and concentrated into a chemical or liquid fuel.

Acronym or Term	Definition
COC	cycles of concentration
cold box	An air separation cryogenic unit contained in the air separation unit (ASU).
Combined-cycle electric power plant	A power plant that uses both a steam turbine generator and a combustion turbine generator at one location to produce electricity.
combustor	Equipment in which coal or other fuel is burned at high temperatures.
confined aquifer	An aquifer that is bounded by two confining units, and in which the water level in wells usually rises above the top of the aquifer.
confining unit	A geologic formation or bed that has lower permeability than layers above and below it, and therefore restricts vertical water movement. (Confining units are also called aquitards.)
contaminant	A substance that contaminates (pollutes) air, soil, or water. It may also be a hazardous substance that does not occur naturally or that occurs at levels greater than those that occur naturally in the surrounding environment.
contamination	The intrusion of undesirable elements (unwanted physical, chemical, biological, or radiological substances; or matter that has an adverse effect) to air, water, or land.
cooling tower	A structure that cools heated condenser water by circulating the water along a series of louvers and baffles through which cool, outside air convects naturally or is forced by large fans.
cooling water	Water that is heated as a result of being used to cool steam and condense it to water.
COS	carbonyl sulfide
CR	County Road
Cr^{+3}	**trivalent chromium**
Cr^{+6}	**hexavalent chromium**
craton	Ancient crystalline rock that has generally been eroded to a low elevation and relief, forming the stable center of a continent.
CSAH	County State Aid Highway
CTB	cooling tower blowdown
CTG	combustion turbine generator
culm	Coal waste that consists of rock and coal with varying amounts of carbon material remaining after removal of higher-quality saleable coal.
culm bank	A pile or other deposit of culm on the land surface. See **culm**.
CWA	Clean Water Act
D.A.R.E.	Drug Abuse Resistance Education
DAT	deposition analysis threshold
dB	decibel
dBA	decibels as measured on the A-weighted scale
DC	direct current
decibel (dB)	A unit for expressing the relative intensity of sounds on a logarithmic scale from zero for the average least perceptible sound to about 130 for the average level at which sound causes pain to humans.
DMIR	Duluth, Missabe, and Iron Range (Railway Company)
DO	dissolved oxygen

Acronym or Term	Definition
DOE	U.S. Department of Energy
DOT	U.S. Department of Transportation
drawdown	The process by which the water table adjacent to a well is drawn down after active pumping from an aquifer.
dredged material	Material that is dredged or excavated from waters of the United States, including wetlands.
EAW	Environmental Assessment Worksheet
ECS	Ecological Classification System
EERC	Energy and Environmental Research Center
EERE	Energy Efficiency and Renewable Energy
EGU	electric generating unit
EIS	Environmental Impact Statement
electrostatic precipitator	A device that removes particles from a stream of exhaust gas. It imparts an electrical charge to the particles, which causes them to adhere to metal plates that can be rapped to cause the particles to fall into a hopper for disposal.
EMF	electromagnetic field
eminent domain	The right of a government to appropriate private property for public use upon payment of its fair market value to the owner.
EMT	Emergency Medical Technician
endangered species	A species that is in danger of extinction throughout all or a significant part of its range; a formal listing of the U.S. Fish and Wildlife Service under the Endangered Species Act.
environmental justice	The fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. Fair treatment means that no group of people, including racial, ethnic, or socioeconomic groups, should bear a disproportionate share of the negative environmental consequences resulting from industrial, municipal, and commercial operations or the execution of Federal, state, local, and tribal programs and policies. Executive Order 12898 directs Federal agencies to make achieving environmental justice part of their missions by identifying and addressing disproportionately high and adverse effects of agency programs, policies, and activities on minority and low-income populations.
EOR	enhanced oil recovery
EPA	U.S. Environmental Protection Agency
EPAct	Energy Policy Act
epicenter	Area on the earth's surface directly above the focus of an earthquake.
EQB	Environmental Quality Board
ERER	equivalent risk emission rate
evapotranspiration	The amount of water removed from a land area by the combination of direct evaporation and plant transpiration.
EVM	Eveleth-Virginia Municipal Airport
FAA	Federal Aviation Administration
FAC	facultative plant species
FACU	facultative upland plant species

Acronym or Term	Definition
FACW	facultative wetland plant species
fault	A fracture or fracture zone in rock along which the sides have been displaced vertically or horizontally relative to one another.
FEED	Front-End Engineering and Design
FEMA	Federal Emergency Management Agency
FERC	Federal Energy Regulatory Commission
FHWA	Federal Highway Administration
fill material	Material used for the primary purpose of replacing an aquatic or wetland area with dry land, or changing the bottom elevation of a waterway.
FIRM	Flood Insurance Rate Map
Fischer-Tropsch (F-T) synthesis	A process that uses a metal-containing catalyst to convert a mixture of carbon monoxide and hydrogen (known as synthesis gas) into a mixture of carbon dioxide, water, and aliphatic compounds (organic hydrocarbon compounds joined in straight or branched chains), which are used to produce liquid fuels.
FLAG	Federal Land Managers' Air Quality Related Values Work Group
FLM	Federal Land Manager
floodplain	The strip of relatively level land adjacent to a river channel that becomes covered with water if the river overflows its banks.
flue gas	Residual gases after combustion that are vented to the atmosphere through a flue or chimney.
flux	A material (e.g., limestone) that is added to a substance to lower the melting temperature of the substance and promote fluidity.
fly ash	Combustion residue composed of fine particles (e.g., soot) that are entrained with the draft leaving the combustor.
formation	The primary unit associated with formal geological mapping of an area. Formations possess distinctive geological features and can be combined into "groups" or subdivided into "members."
FR	Federal Register
FRA	Federal Railroad Administration
freshwater	Water with a low concentration of salts (typically less than 1,000 parts per million of dissolved solids).
fuel flexible	The ability of a generating station to operate at or near maximum capacity using various fuels or blends of fuels. This allows the station to adapt its fuel mix over the life of the facility thereby minimizing the cost of power.
fugitive dust	Particulate matter composed of soil; can include emissions from haul roads, wind erosion of exposed surfaces, and other activities in which soil is removed and redistributed.
fugitive emissions	Emissions released directly into the atmosphere that could not reasonably pass through a stack, chimney, vent, or other functionally equivalent opening.
FY	fiscal year
G	Gauss
GACT	generally available control technology
Gaussian	Concentrations of pollutants downwind of a source are assumed to form a normal distribution (i.e., bell-shaped curve) from the centerline of the plume in the vertical and lateral directions.

Acronym or Term	Definition
GEP	good engineering practice
GIS	Geographic Information Systems
glacial till	Direct glacial deposits that are unsorted and unstratified.
GLG	Great Lakes Gas (Transmission Company)
GLTZ	Great Lakes Tectonic Zone
GMMP	Gross-Marble Mine Pit
gpd	gallons per day
gpm	gallons per minute
GPS	Global Positioning System
groundwater	Water contained in pores or fractures, in either the unsaturated zone or saturated zone, below ground level.
GTG	Gas Turbine Generator
H_2	hydrogen
H_2O	water
H_2S	hydrogen sulfide
HAMP	Hill-Annex Mine Pit
HAP	hazardous air pollutant
hazardous air pollutant (HAP)	Air pollutants that are not covered by ambient air quality standards, but may present a threat of adverse human health effects or adverse environmental effects, and are specifically listed on the Federal list of 189 hazardous air pollutants in 40 CFR 61.01.
hazardous waste	A category of waste regulated under the Resource Conservation and Recovery Act (RCRA). To be considered hazardous, a waste must be a solid waste under RCRA and must exhibit at least one of four characteristics described in 40 CFR 261.20 through 40 CFR 261.24 (i.e., ignitability, corrosivity, reactivity, or toxicity) or be specifically listed by the Environmental Protection Agency in 40 CFR 261.31 through 40 CFR 261.33.
Henshaw Effect	The interaction of electric fields from power lines with electrical charges on airborne particles, resulting in an increased charge on the particles. This phenomenon may indirectly affect health by increasing the likelihood of inhaled particles that would be deposited on the surface of the lungs and airways, even at considerable distances from the power line. One study found a possible link between the Henshaw Effect and elevated rates of childhood leukemia.
Hg	mercury
HHRAP	Human Health Risk Assessment Protocol
HRSG	heat recovery steam generator
HVTL	high voltage transmission line
hydrology	(1) The study of water characteristics, especially the movement of water. (2) The study of water, involving aspects of geology, oceanography, and meteorology.
hydrotest	hydrostatic pressure-testing
Hz	Hertz
I/I	inflow and infiltration

Acronym or Term	Definition
IGCC	integrated gasification combined cycle; A process that uses synthesis gas derived from coal to drive a gas combustion turbine and exhaust gas from the gas turbine to generate steam from water to drive a steam turbine.
igneous	(1) A type of rock formed from a molten, or partially molten, material. (2) An activity related to the formation and movement of molten rock either in the subsurface (plutonic) or on the surface (volcanic).
IMPROVE	Interagency Monitoring of Protected Visual Environments
infiltration	The process of water entering the soil at the ground surface and the ensuing movement downward. Infiltration becomes percolation when water has moved below the depth at which it can return to the atmosphere by evaporation or evapotranspiration.
IPCC	**Intergovernmental Panel on Climate Change**
IRAP	Industrial Risk Assessment Program
IRNP	Isle Royale National Park
kV	kilovolt
kW	kilowatt
L_{10}	sound pressure level exceeded 10 percent of the time
lacustrine deposit	Deposit associated with lake-level fluctuations.
laydown area	Material and equipment storage area during the construction phase of a project.
L_{dn}	day-night equivalent sound level
leachate	Solution or product obtained by leaching, in which a substance is dissolved by the action of a percolating liquid.
LEDPA	**least environmentally damaging practicable alternative**
LEPGP	large electric power generating plant
L_{eq}	continuous equivalent sound level
LGPO	**Loan Guarantee Program Office**
LGU	local government unit
liquefaction	The process of transforming a gas into a liquid.
lithic scatters	Concentrations of waste flakes resulting from the manufacture of stone tools.
LLC	Limited Liability Company
L_{max}	highest sound pressure level measured
L_{min}	lowest sound pressure level measured
LMP	Lind Mine Pit
loam	A soil composed of a mixture of clay, silt, sand, and organic matter.
LOS	level of service
L_p	sound pressure level
L_w	sound power level
MAAQS	Minnesota Ambient Air Quality Standards
MACT	maximum achievable control technology

Acronym or Term	Definition
magnitude (of an earthquake)	A quantity that is characteristic of the total energy released by an earthquake. Magnitude is determined by taking the common logarithm of the largest ground motion recorded on a seismograph during the arrival of a seismic wave type and applying a standard correction factor for distance to the epicenter. A one-unit increase in magnitude (e.g., from magnitude 6 to magnitude 7) represents a 30-fold increase in the amount of energy released.
makeup pond	Pond used to store makeup for cooling water.
maximum contaminant level goal (MCLG)	The maximum concentration of a substance in drinking water at which there is no known or anticipated adverse effect on human health, and which allows an adequate margin of safety, as determined by the U.S. Environmental Protection Agency.
MBTA	Migratory Bird Treaty Act
MCBS	Minnesota County Biological Survey
MCCAG	**Minnesota Climate Change Advisory Group**
MD	mining district; An area usually designated by name with described or understood boundaries where minerals are found and mined under rules prescribed by the miners, consistent with the General Mining Law of 1872.
MDEA	methyl-diethanolamine
MDH	Minnesota Department of Health
MDOA	Minnesota Department of Administration
MDOC	Minnesota Department of Commerce
MEPA	Minnesota Environmental Policy Act
metamorphic rocks	Rocks that have undergone chemical or structural changes produced by an increase in heat and temperature or by replacement of elements by hot, chemically active fluids.
mG	milligauss
Minority population	A community in which the percent of the population of a racial or ethnic minority is 10 points higher than the percent found in the population as a whole.
MISO	Midwest Independent System Operator
mixing height	The height in the lower atmosphere within which relatively vigorous mixing of pollutant emissions occurs.
MMBtu	Million British thermal units
Mn/DOT	Minnesota Department of Transportation
MNDNR	Minnesota Department of Natural Resources
MOA	**Memorandum of Agreement**
moraine	Glacial deposits of unsorted and unstratified material.
MP	Minnesota Power (Company)
MPCA	Minnesota Pollution Control Agency
mph	miles per hour
MSDC	Minnesota State Demographic Center
MSI	Minnesota Steel Industries**, now known as Essar Steel Minnesota**
msl	mean sea level
MSW	municipal solid waste

Acronym or Term	Definition
MVR	mechanical vapor recompression
MW	megawatt
MWe	megawatt electricity
N	nitrogen
N_2	nitrogen gas
NAAQS	National Ambient Air Quality Standards
NAC	noise abatement criteria
NEPA	National Environmental Policy Act
NERC	North American Electric Reliability Council
NESHAP	National Emissions Standards for Hazardous Air Pollutants
NETL	National Energy Technology Laboratory
new source performance standards (NSPS)	Regulation under Section 111 of the Clean Air Act enforcing stringent emission standards for power plants constructed on or after January 30, 2004.
NH_3	ammonia
NHIS	National Heritage Information System
NI	no indicator
NIEHS	National Institute of Environmental Health Sciences
NIOSH	National Industrial and Occupational Safety and Health
NIR	non-ionizing radiation
NNG	Northern Natural Gas (Company)
NOI	Notice of Intent
noise	Any sound that is undesirable because it interferes with speech and hearing; if intense enough, it can damage hearing.
NO_x	Nitrogen oxides including NO, NO_2, N_2O, N_2O_3, N_2O_4, and N_2O_5
NPDES	National Pollutant Discharge Elimination System
NPS	National Park Service
NPUC	Nashwauk Public Utilities Commission
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
NRPB	National Radiological Protection Board
NSPS	New Source Performance Standards
NWI	National Wetlands Inventory
O&M	operation and maintenance
O_2	oxygen
O_3	ozone
OBL	obligate wetland plant species
OPS	Office of Pipeline Safety
OSHA	Occupational Safety and Health Administration
PA	**Programmatic Agreement**
parent material	The unconsolidated material, from both organic and mineral sources, that is the basis of soil development.

Acronym or Term	Definition
particulate matter	Fine liquid or solid particles such as dust, smoke, mist, fumes, or smog, found in air or emissions.
Pb	lead
PCBs	polychlorinated biphenyls
petroleum coke	A high-sulfur, high-energy product having the appearance of coal, which is produced by oil refineries by heating and removing volatile organic compounds (VOCs) from the residue remaining after the refining process.
pH	A measure of the relative acidity or alkalinity of a solution, expressed on a scale from 0 to 14, with the neutral point at 7. Acid solutions have pH values lower than 7, and basic (i.e., alkaline) solutions have pH values higher than 7.
plume (atmospheric)	A visible or measurable elongated pattern of emissions spreading downwind from a source through the atmosphere.
pluton	A general term for any intrusive igneous rock body.
PM	particulate matter
PM_{10}	particulate matter having an aerodynamic diameter less than 10 microns
POI	point of interconnection
potentiometric surface	Imaginary surface defined by the elevations to which the groundwater in an aquifer would rise in wells completed in the aquifer.
POTW	Publicly Owned Treatment Works
POV	**personally owned vehicle**
ppm	parts per million
ppmvd	parts per million, volumetric dry
PRB	Powder River Basin
PRIME	Plume Rise Model Enhancements
prime farmland	Land that has the best combination of physical and chemical characteristics for producing food, feed, fiber, forage, oilseed, and other agricultural crops with minimum inputs of fuel, fertilizer, pesticides, and labor, and without intolerable soil erosion.
Proposed Action	The activity proposed to accomplish a Federal agency's purpose and need. An EIS analyzes the environmental impacts of the Proposed Action. A proposed action includes the project and its related support activities (preconstruction, construction, and operation, along with post-operational requirements).
PSD	Prevention of Significant Deterioration
PUC	Public Utilities Commission
PWI	Protected Waters Inventory
PWL	sound power level
RACT	reasonable available control technology
RASS	Risk Assessment Screening Spreadsheet
RCRA	Resource Conservation and Recovery Act
recharge	The movement of water from an unsaturated zone to a saturated zone.
reference concentrations	Estimates of continuous inhalation exposure to human population (including sensitive subgroups) that are likely to be without an appreciable risk of deleterious effects during a lifetime.
region of influence (ROI)	The physical area that bounds the environmental, sociologic, economic, or cultural features of interest for the purpose of analysis.

Acronym or Term	Definition
RGGS	RGGS Land & Minerals, LTD., L.P.
Richter scale	A measure of earthquake magnitude developed by Charles Richter.
riparian	Of, on, or pertaining to the bank of a river or stream, or of a pond or small lake.
RLW	Rainbow Lakes Wilderness Area
RO	reverse osmosis
ROD	Record of Decision
ROW	right-of-way
S	sulfur
safe yield	The maximum quantity of water that can be withdrawn continuously from a surface water or groundwater source during a 50-year (or greater) drought without ultimate depletion of the source (considering intrusion of undesirable – quality water, interference with other existing water sources, downstream flow requirements, and other factors).
saline	Describes water with high concentrations of salts (typically more than 10,000 parts per million dissolved solids), making it unsuitable for use.
scf	Standard cubic foot
SCORE	Governor's Select Committee on Recycling and the Environment
scrubber	Chemical or physical devices, also known as flue gas desulfurization systems, that remove sulfur compounds formed during coal combustion by combining the sulfur in gaseous emissions with another chemical medium to form inert sludge, which is removed for disposal.
SEC	sediment and erosion control
secondary drinking water standards	Non-enforceable Federal guidelines regarding cosmetic effects (e.g., tooth or skin discoloration) or aesthetic effects (e.g., taste, odor, or color) of drinking water.
sedimentary rocks	Rocks formed by the accumulation of sediment in water or from air. Sandstone, chert, limestone, dolomite, shale, siltstone, and mudstone are types of sedimentary rocks identified in the EIS. They are differentiated by chemistry and texture.
SEH	Short Elliott Hendrickson, Inc.
seismic	Pertaining to, characteristic of, or produced by earthquakes or earth vibrations.
seismicity	A seismic event or activity such as an earthquake or earth tremor; seismic action.
selective catalytic reduction	A system to reduce NO_x emissions by injecting a reagent, such as ammonia, into exhaust gas to convert NO_x emissions to nitrogen gas and water via a chemical reduction reaction.
sensitive receptor	As used in this EIS, it is any specific resource (i.e., population or facility) that would be more susceptible to the effects of the impact of implementing the proposed action than would otherwise be.
SGCN	**Species in Greatest Conservation Need**
SHPO	State Historic Preservation Office
SIL	Significant impact level; used at the screening level to determine whether a more refined modeling is required to evaluate impacts.
SIP	State Implementation Plan

Acronym or Term	Definition
slag	Molten inorganic material collected at the bottom of a combustor and discharged into a water-filled compartment where it is quenched and removed as glassy particles resembling sand.
slickens	Mine tailings left over from the taconite concentration process. This material is in basins having containment dikes constructed from mine overburden.
sludge	A semi-solid residue containing a mixture of solid waste material and water from air or water treatment processes.
slurry	A watery mixture or suspension of fine solids, not thick enough to consolidate as a sludge.
SO_2	sulfur dioxide
sound pressure	The physical force from a sound wave that affects the human ear, typically discussed in terms of decibels (dB).
sour water	Water with dissolved sulfur compounds and other contaminants condensed from synthesis gas (syngas).
SPCC	Spill Prevention, Control, and Countermeasures
specific yield	The volume of water released from storage in a unit area of an unconfined aquifer per unit decline in the water table. Values are dimensionless (corresponding, for example, to cubic feet of water per square foot of aquifer per foot of water table decline) and typically are between 0.01 and 0.3. In physical terms, the specific yield can be understood as the fraction of the aquifer volume that consists of drainable void space.
SPL	sound pressure level
spring	A location on the land surface or the bed of a surface water body where groundwater emerges from rock or soil without artificial assistance.
SR	State Route
SRU	sulfur recovery unit
steam-stripping	A two-step process in which dissolved gases (CO_2, NH_3, H_2S) and other trace contamination are removed from sour water.
STG	steam turbine generator
sub-bituminous	A type of coal, which is used primarily as fuel for electrical power generation, whose properties range between those of lignite and those of bituminous coal. At the lower end of the range it may be dull, dark brown to black, soft, and crumbly. At the higher end of the range it may be bright, jet black, hard, and relatively strong. Sub-bituminous coal contains 20 to 30% moisture by weight. Heating value varies from 7,000 Btu/lb to slightly over 9,000 Btu/lb.
SWANCC	Solid Waste Agency of Northern Cook County
SWPPP	Storm Water Pollution Prevention Plan
syncline	A geologic fold in which the rock layers dip inward from both sides toward the axis, with younger rocks in the core. The opposite of anticline.
syngas	synthesis gas
synthesis gas (syngas)	A mixture of gases produced as feedstock, especially as a fuel produced by controlled combustion of coal in the presence of water vapor.

Acronym or Term	Definition
tailings pond	An outside water-filled enclosure that receives discharges of wastewater containing solid residues from processing of minerals. The solid residues settle due to gravity and separate from the water.
TDS	total dissolved solids
TH	Trunk Highway
THPO	Tribal Historic Preservation Office
threatened species	A species that is likely to become an endangered species within the foreseeable future throughout all or a significant part of its range.
TMDL	total maximum daily load
TP	total phosphorous
tpd	tons per day
tpy	tons per year
transmission corridor	Area used to provide separation between the transmission lines and the general public and to provide access to the transmission lines for construction and maintenance.
TSP	total suspended particulate matter
TSS	total suspended solids
TTRA	Taconite Tax Relief Area
TVB	tank vent boiler
UIC	**Underground Injection Control (5.1)**
UP	Union Pacific/Wisconsin Central (Railway Company)
UPL	obligate upland plant species
US	U.S. Highway
USACE	U.S. Army Corps of Engineers
USDA	U.S. Department of Agriculture
USDI	U.S. Department of the Interior
USFWS	U.S. Fish and Wildlife Service
USGCRP	**U.S. Global Change Research Program**
USGS	U.S. Geological Survey
V/m	Volts per meter
viewshed	A non-managed area with aesthetic value.
VIP	Value Improving Practices
VNP	Voyageurs National Park
VOC	volatile organic compound
water table	(1) The upper limit of the saturated zone (the portion of the ground wholly saturated with water). (2) The upper surface of a zone of saturation above which the majority of pore spaces and fractures are less than 100 percent saturated with water most of the time (unsaturated zone) and below which the opposite is true (saturated zone).
WCA	Wetland Conservation Act

Acronym or Term	Definition
wetlands	Those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs and similar areas.
WHO	**World Health Organization**
wind rose	A graph in which the frequency of wind blowing from each direction is plotted as a bar that extends from the center of the diagram. Wind speeds are denoted by bar widths and shading; the frequency of wind speed within each wind direction is depicted according to the length of that section of the bar.
WWTF	wastewater treatment facility
WWTP	wastewater treatment plant
ZLD	zero liquid discharge

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SUMMARY

The U.S. Department of Energy (DOE) has prepared this Environmental Impact Statement (EIS) in cooperation with the Minnesota Department of Commerce (MDOC) to evaluate the potential environmental impacts of the Mesaba Energy Project. The project **would demonstrate the commercial-readiness of the ConocoPhillips E-Gas™ gasification technology in a fully integrated and quintessential Integrated Gasification Combined Cycle (IGCC) utility-scale application. The project proponent intends to demonstrate this particular IGCC technology at** a two-phased nominal **600** megawatt electricity ($MWe_{(net)}$) per phase **(1,200** $MWe_{(net)}$ total) generating station proposed to be located in northeastern Minnesota (Figure S-1). This EIS has been prepared in compliance with the National Environmental Policy Act (NEPA) of 1969 as amended (42 USC 4321 et seq.) and the Minnesota Power Plant Siting Act (Minnesota Statutes § 216E.001-.18).

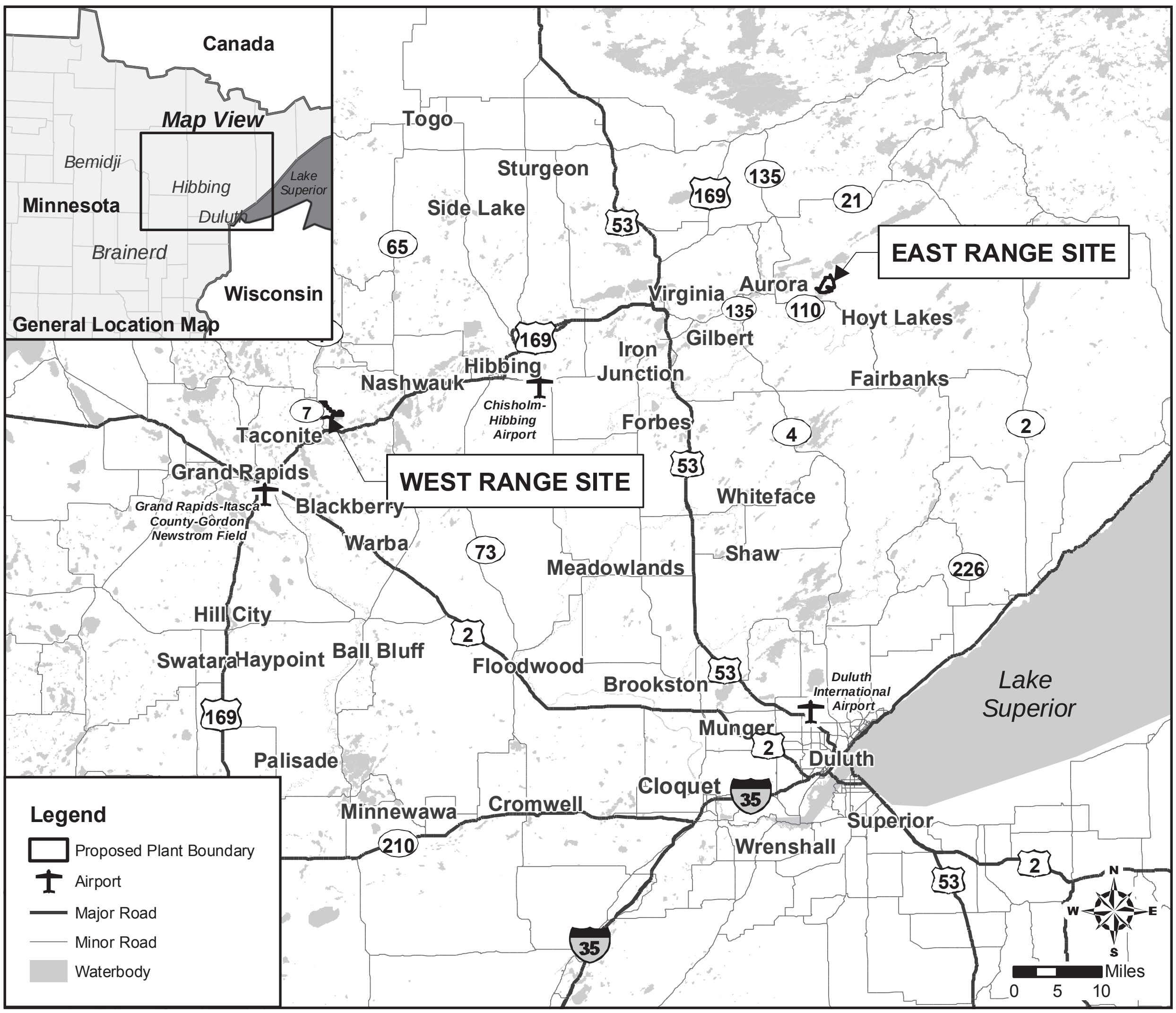

Figure S-1A. General Location Map

DOE is the lead Federal agency for this EIS; MDOC is the lead state agency. Both the U.S. Army Corps of Engineers (USACE) (St. Paul District, Brainerd Office) and the U.S. Department of Agriculture (USDA) Forest Service (Superior National Forest, Laurentian District) have participated as cooperating agencies. USACE agreed to be a cooperating agency because the placement of dredged or fill material in waters of the U.S., including wetlands, associated with the **proposed project** would require its authorization pursuant to Section 404 of the Clean Water Act (CWA). **The USDA Forest Service agreed to be a cooperating agency because, as a Federal Land Manager, the Forest Service has a responsibility to protect air quality-related values of wilderness areas. In its role as a cooperating agency, Forest Service staff has provided technical expertise in the review of air quality impacts on wilderness areas**. The proponent for the project is Excelsior Energy, Inc. (Excelsior), an independent energy development company based in Minnetonka, Minnesota. **Excelsior is proposing the project through and on behalf of its wholly owned project company, MEP-I, LLC (a legal entity established for the purpose of undertaking the Mesaba Energy Project, Phase I).**

PROPOSED ACTION

DOE Proposed Action and Alternatives

The DOE Proposed Action is to provide a total of $36 million in co-funding, through a cooperative agreement with Excelsior **(as MEP-I, LLC)** for the **definition and preliminary** design and one-year operational demonstration testing period for Phase I of the proposed two-phased Mesaba Energy Project**. The project was selected in Round 2 of funding opportunity announcements issued for the Clean Coal Power Initiative (CCPI) as authorized under Pubic Law No. 107-63**. **In addition, DOE may provide a loan guarantee to MEP-I, LLC pursuant to Energy Policy Act of 2005 (EPAct05) Section 1703 for Phase I of the proposed project.** This first phase would be a nominal **600** $MWe_{(net)}$ IGCC power plant with an estimated cost of $2.16 billion **as documented in the cooperative agreement** (NETL, 2006a). Phase II, which would be an identical, co-located **600** MWe plant, would be privately financed and not involve co-funding **or a loan guarantee from** DOE.

A portion ($22,245,505) of the total funding has been made available for cost-sharing in the first budget period under the cooperative agreement, prior to completion of the NEPA process. The activities eligible for cost-sharing during the first period allow for the development of information (such as project definition, preliminary design, and environmental studies and permitting) that provide the basis for this EIS. This is typical both in the amount of funding and the types of allowable activities for a CCPI project of this scope. Making these funds available does not prejudice DOE's ultimate decision on the proposed action and is consistent with DOE and Council on Environmental Quality (CEQ) regulations (10 CFR 1021.211 and 40 CFR 1506.1, respectively), which **permit the DOE to participate in the data collection and analysis necessary to make an informed decision but otherwise** restrict DOE from taking action that would have an adverse environmental impact or limit the choice of reasonable alternatives until the Record of Decision (ROD) has been issued.

Project applications selected for the CCPI may also be eligible to apply for Federal loan guarantees. The EPAct05 established a Federal loan guarantee program for eligible energy projects that employ innovative technologies. Title XVII of the EPAct05 authorizes the Secretary of Energy to make loan guarantees for a variety of projects, including projects that "avoid, reduce, or sequester air pollutants or anthropogenic emissions of greenhouse gases; and employ new or significantly improved technologies as compared to commercial technologies in service in the United States at the time the guarantee is issued" (Section 1703[a][[1], 42 U.S.C. 16513). Excelsior has submitted a formal application to DOE for a loan guarantee. The Loan Guarantee Program Office (LGPO) formally notified Excelsior by letter dated December 19, 2008, that its application under

solicitation DE-PS01-06LG00001 has been judged sufficiently complete for the project to move to the due diligence stage.

This EIS considers the impacts of both phases of the Mesaba Energy Project as connected actions, consistent with NEPA policy, even though only Phase I would be co-funded under the CCPI. A**t the request of USACE, the Final EIS has been revised as appropriate to describe the potential impacts of Phase I separately from the impacts of the combined two-phased project.**

DOE Purpose and Need

The DOE purpose in the context of the CCPI is to demonstrate the commercial-readiness of the ConocoPhillips E-Gas™ gasification technology in a fully integrated and quintessential IGCC utility-scale application. The principal need addressed by DOE**, pursuant to Public Law 107-63 and subsequent legislative appropriations,** is to accelerate the commercialization of clean coal technologies that achieve greater efficiencies, environmental performance, and cost-competitiveness.

The purpose of the DOE action with regard to the proposed issuance of a Federal loan guarantee is to encourage early commercial use in the United States of a new or significantly improved energy technology and to avoid or reduce emissions of greenhouse gases and other air pollutants pursuant to Title XVII of EPAct05. The action is needed to fulfill the DOE mandate under EPAct05 to issue loan guarantees to eligible projects that "avoid, reduce, or sequester air pollutants or anthropogenic emissions of greenhouse gases" and/or "employ new or significantly improved technologies as compared to technologies in service in the United States at the time the guarantee is issued."

The proposed project was selected under the CCPI as one of a portfolio of projects that would represent the most appropriate mix to achieve programmatic objectives and meet legislative requirements. IGCC technology meets the goals of the CCPI by utilizing an estimated 240-year domestic supply of reliable, low-cost coal in an environmentally acceptable manner. **The specific technology that would be deployed in the Mesaba Energy Project represents a significant advancement on the base design of the smaller-scale 262 $MWe_{(net)}$ Wabash River Coal Gasification Re-Power Project (Wabash River Plant) in Terre Haute, Indiana, which was a project completed under the DOE Clean Coal Technology Demonstration Program, a predecessor to the CCPI. The advancements would include enhanced environmental performance, greater capacity, increased efficiency and availability, as well as fuel flexibility and enhanced integration of IGCC plant systems.** The technologies would be more efficient, economical, reliable, and environmentally favorable than conventional coal-**fired** steam electric generating plants. After a one-year demonstration period, if economically **viable**, the Mesaba IGCC power plant may be operated commercially for a period of 20 years or longer.

Alternatives Determined to be Reasonable by DOE

Section 102 of NEPA requires that agencies discuss the reasonable alternatives to the proposed action in an EIS. The term "reasonable alternatives" is not self-defining, but rather must be determined in the **programmatic** context of the statutory purpose expressed by the underlying legislation.

Congress established the CCPI with a specific goal — to accelerate commercial deployment of advanced coal-based technologies that can generate clean, reliable, and affordable electricity in the United States. The CCPI legislation (Pubic Law No. 107-63) has a narrow focus in directing DOE to demonstrate **the commercial viability of** technology advancements related to coal-based power generation designed to reduce the barriers to continued and expanded use of coal. Technologies capable of producing any combination of heat, fuels, chemicals, or other use byproducts in conjunction with power generation were considered; however, coal is required to provide at least 75 percent of the fuel for power generation. Other technologies that cannot serve to carry out the goal of the CCPI (e.g., natural gas, wind power, conservation) are not relevant to DOE's decision of whether or not to provide cost-shared funding support for the Mesaba Energy Project, and therefore, are not reasonable alternatives.

The CCPI only allows for **Federal co-funding** of proposed **private sector/industry** projects **for which an application has been prepared, submitted, selected, and awarded in response to a formal funding opportunity announcement issued by DOE.** DOE issued the CCPI **Round 2 funding opportunity announcement in 2004**. **Thirteen applications for co-funding of proposed industry project demonstrations from across the nation were received and evaluated in response to the CCPI Round 2 funding opportunity announcement. These applications represented diverse technologies and proposed the use of a variety of coals consistent with the requirements embodied in the funding opportunity announcement. Pursuant to Federal regulations, the choices available to DOE were limited to those applications submitted in response to the funding opportunity announcement. Two of the 13 applications were for co-funding of proposed archetypal IGCC projects. In all, four of the 13 applications were selected, including both proposed archetypal IGCC projects, one of which was the Mesaba Energy Project (NETL, 2006a). The two archetypal IGCC projects that were selected for co-funding involved the demonstration of different gasifier types, which is important in achieving a diversity of technology approaches and methods in the CCPI. They also involved different coal types, operating environments, and environmental considerations, all of which enhance the potential for widespread commercialization of IGCC technology in a competitive marketplace. The Mesaba Energy Project was selected because of the opportunity to demonstrate the specific technology proposed—the Conoco-Phillips E-Gas™ gasification technology—in a fully integrated and quintessential large commercial utility-scale IGCC setting. No other applicants proposed this specific IGCC technology.** Other projects that proposed to demonstrate other technologies are not alternatives to the proposed project for NEPA purposes.

Congress not only prescribed a narrow goal for the CCPI, but also directed DOE to use a process to accomplish that goal that would involve a more limited role for the Federal government. Instead of requiring government ownership of the **CCPI** demonstrations, Congress provided for cost-sharing in a project sponsored by the private parties **as a means to provide incentive for accelerated deployment**, with the provision for repayment of the public funds invested. Therefore, rather than being responsible for the siting, construction and operation of the projects, DOE is in the more limited role of evaluating CCPI project applications to determine if they meet the **requirements and national goals embodied in the** CCPI. **The same is true of the DOE role with regard to applications under the Federal loan guarantee program.** It is well established that an agency should take into account the needs and goals of the applicant in determining the scope of the EIS for the applicant's project. When an applicant's needs and goals are factored into the deliberations, a narrower scope of alternatives may emerge than would be the case if the agency is the proprietor responsible for all project-related decisions.

DOE's preferred alternative is to provide financial assistance in the form of co-funding under the CCPI cooperative agreement and possibly a loan guarantee under Title XVII of the EPAct 05 to the Mesaba Energy Project, assuming that one of the two sites proposed by Excelsior (see below) would be found acceptable and granted a site permit by the Minnesota Public Utilities Commission (PUC). DOE tentatively finds both sites to be acceptable. DOE does not have a preference among the alternatives considered for utility and transportation infrastructure necessary to support the project. These routing decisions are also under the jurisdiction of the PUC in its permitting process. If DOE ultimately selects the preferred alternative, DOE would then determine for each

site whether mitigation of specified potential impacts would be required. DOE is also free, however, to ultimately determine in the ROD that only one of the two sites is acceptable, or to select no action.

No Action Alternative

Under the No-Action Alternative, DOE would not provide cost-shared funding **or a loan guarantee** to **the Mesaba Energy Project to** demonstrate the commercial readiness of the Conoco-Phillips E-Gas™ gasification technology in a fully integrated and quintessential IGCC utility-scale application (beyond funding required to complete the NEPA process). DOE assumes that if Excelsior were to proceed with development in the absence of DOE funding **or loan guarantee**, the project would include all of the features, attributes and impacts as described for the Proposed Action. However, without DOE participation, it is possible that the proposed project would be canceled. Therefore, for the purposes of analysis in this EIS, the DOE No Action Alternative is assumed equivalent to a "No Build" Alternative, meaning that environmental conditions would remain in the status quo (no new construction **and no change in localized** resource utilization, emissions, discharges, or wastes generated).

If the project were canceled, the proposed technology may not be demonstrated elsewhere. Consequently, eventual commercialization of the integrated technologies would probably not occur because utilities and industries tend to use known and demonstrated technologies rather than unproven technologies. This scenario would not contribute to the **legislative mandate embodied in the** CCPI goal of accelerating commercial deployment of advanced coal-based technologies that can generate clean, reliable, and affordable electricity in the United States. **Similarly, the No Action Alternative would not contribute to the Federal loan guarantee program goals to make loan guarantees for energy projects that "avoid, reduce, or sequester air pollutants or anthropogenic emissions of greenhouse gases; and employ new or significantly improved technologies."**

Alternative Sites

The DOE Proposed Action to co-fund the Mesaba Energy Project as an application selected under CCPI Round 2 constitutes a decision only to select a specific technology for commercial-scale operational demonstration. DOE has not participated in the identification or selection of alternative sites or alignments for the Mesaba Energy Project. Excelsior Energy was founded in the State of Minnesota because of the experience of the firm's leadership team with the electric power industry in Minnesota. Therefore, the initial consideration of potential sites by the project proponent (Excelsior) was limited to the State of Minnesota.

As described in Section 1.2.2, Excelsior decided to locate the Mesaba Energy Project within the Taconite Tax Relief Area (TTRA) of northeastern Minnesota (Figure S-1B) in advance of submitting an application to DOE for co-funding in response to the CCPI Round 2 funding opportunity announcement. Excelsior decided on that area because the funding provided by the Iron Range Resources Rehabilitation Board required that the project be located within the TTRA and because the company believes the incentives created by the Minnesota Legislature in the Innovative Energy Project statute (Minnesota Statutes § 216B.1694) are necessary for project viability. Excelsior has stated that it has no intention to locate the Mesaba Energy Project elsewhere in the State of Minnesota or anywhere other than the TTRA and that it would not have submitted an application in response to the CCPI Round 2 funding opportunity announcement if it did not intend to locate the Mesaba Energy Project in the TTRA. Therefore, if the project would not be located in the TTRA, the project would not exist, since no other applicants to CCPI Round 2 proposed the same technology in any other location. From the DOE perspective, any consideration

of an alternative location outside of the TTRA would be the equivalent of the No Action Alternative for this EIS.

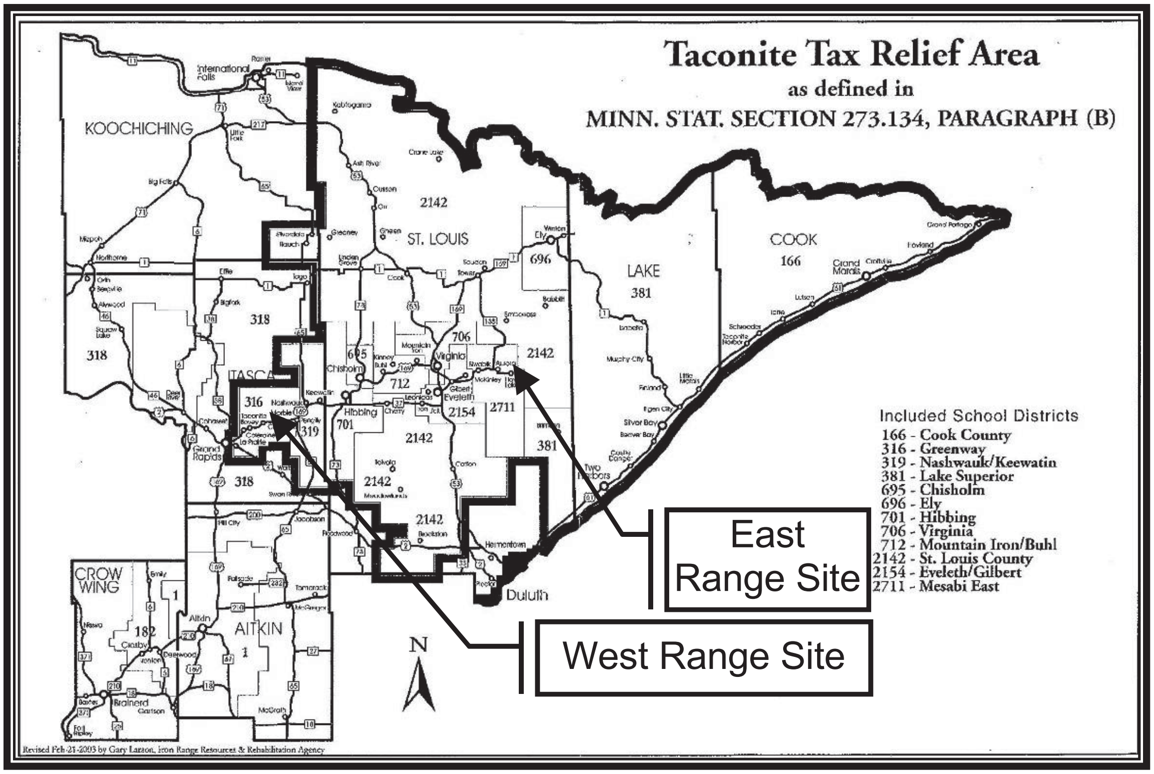

Figure S-1B. Potential Project Locations in Taconite Tax Relief Area

As described in Section 1.5, Excelsior is required by state regulations to consider at least two potential sites for the proposed plant and two potential alignments for high voltage transmission lines (HVTLs). Excelsior's preferred and alternative sites and alignments are described in Section 2.3. **At the specific request of USACE in its role as a cooperating agency under NEPA and as the Federal agency responsible for compliance with Section 404 of the CWA, Excelsior provided an analysis of the range of alternative sites it considered within the TTRA (see Appendix F1). Excelsior concluded from the analysis that the West Range and East Range sites are the only practicable alternative sites available to Excelsior. DOE has reviewed Excelsior's siting analysis and found it to be adequate for purposes of determining reasonable site alternatives for this EIS. Accordingly, DOE has evaluated the West and East Range sites in detail as reasonable alternatives in this EIS. The USACE will make a determination on the practicability of alternative sites within the context of the Section 404 permitting process.** Figure S-1**B** shows the boundary of the TTRA and the two alternative locations (West Range Site and East Range Site) for the proposed project.

Alternatives Eliminated from Further Consideration

DOE considered the following alternatives in addition to the Proposed Action and No Action Alternative.

Alternative Sizes

No other applicant proposed a smaller-sized plant **using this specific technology. Further, a smaller plant** would not be sufficiently large to demonstrate the large utility-scale commercial viability of the IGCC technology advancements, which is the central purpose of this CCPI project. The smaller-sized, single process system IGCC plant was successfully demonstrated as part of the predecessor Clean Coal Technology (CCT) **Demonstration P**rogram at the Wabash River Plant located in Terre Haute, Indiana. Following the Wabash River Plant demonstration, a Value Improving Practices (VIP) process – a formal industry process applying nine separate practices – was applied to examine lessons learned, identify options to improve cost and performance, and optimize the design for application to large utility-scale commercial plant configurations. An availability target above 85 percent would be needed to successfully compete against older technology base load facilities in the power generation industry. Multiple process systems would be required to meet this availability requirement, including a more cost-effective redundancy within the plant, low-cost back-up systems of conventional technologies, and the integration of these features throughout the plant. The proposed project would demonstrate the large utility-scale commercial design configuration resultant from the Wabash River Plant VIP process and subsequent research and development consistent with the DOE IGCC Roadmap.

Alternative Technologies

DOE could demonstrate other coal gasification technologies instead of the Proposed Action; however, such alternatives would not demonstrate the commercial readiness of the Conoco-Phillips E-Gas™ gasification technology, which is DOE's purpose for this demonstration project. **As already stated, DOE selected both applications proposing IGCC technology under the CCPI Round 2 funding opportunity announcement, but only the Mesaba Energy Project proposed the E-Gas™ technology.**

Other Alternatives

Federal legislation authorizing and funding CCPI specifically directs DOE to demonstrate technology advancements related to coal-based power generation. Therefore, other technologies that cannot serve to carry out the goal of the CCPI (e.g., natural gas, wind power, solar energy, and conservation) are not reasonable alternatives in this EIS. However, DOE conducts various other programs that support those technologies.

The alternative of incorporating technologies to reduce the "carbon footprint" of the Mesaba Energy Project was also considered. DOE recognizes that **the use of** fossil fuel**s** is **a** primary contributor to increasing carbon dioxide (CO_2) concentrations in the atmosphere (IPCC, **2007**). CO_2 is a significant greenhouse gas, and increasing concentrations of greenhouse gases show correlation with global warming. DOE recognizes that there are concerns about the effects of fossil fuel use on global climate change **as most recently evidenced by U.S. EPA's "Proposed Endangerment and Cause or Contribute Findings for Greenhouse Gases under Section 202(a) of the Clean Air Act" signed on April 17, 2009 and published in the *Federal Register* (74 FR 18886) on April 24, 2009 (http://edocket.access.gpo.gov/2009/pdf/E9-9339.pdf)**. Therefore, DOE oversees other **synergistic** research programs aimed at reducing the cost of electricity associated with power production and proving the viability of technologies for carbon capture and **storage** (CCS)**, or beneficial reuse,** to reduce CO_2 emissions from fossil fuel use. DOE expects that the combined efforts of these programs will enable large-scale plants to come on-line by 2020 that offer 90 percent carbon capture with 99 percent storage permanence at less than a 10 percent increase in the cost of energy services (NETL, 2007). The planned in-service date for the Mesaba Energy Project is well in advance of the timeline for achieving the DOE CCS goal.

Based on an analysis of the current feasibility of carbon capture and **storage (geologic sequestration)** provided in Appendix A2, CCS is not considered a reasonable alternative to **the** DOE Proposed Action. However, because CCS could become feasible during the commercial lifetime (at least 20 years) of the facility, DOE has evaluated the impacts of implementing CCS during commercial operation of the project in Section 5.1.2.1 of this EIS based on the most current and representative information about available technologies.

Alternatives Available to the Minnesota Public Utilities Commission

The Minnesota PUC, as supported by the MDOC, has the responsibility for siting power plants having the capacity to operate at 50 MWe or greater (i.e., Large Electric Power Generating Plants [LEPGPs]) and transmission lines designed or capable of operation at a voltage of 100-kilovolts (kV) or greater (i.e., HVTLs). The Minnesota legislature directed the PUC to designate sites that minimize adverse human and environmental impacts while ensuring electric power system reliability and integrity and ensuring that electric energy needs are met and fulfilled in an orderly and timely fashion. Minnesota Rules Chapter **7849** establishes the requirements for submitting and processing a permit application. In the application, the applicant must identify the preferred site for the power plant and one alternative site. As part of the permitting process, the MDOC prepares an EIS on the project and holds a contested case hearing. The PUC has up to one year from the time the application is accepted to complete the process and make a decision on the permit**, unless the applicant agrees to a delay of this statutory time limit.**

In accordance with these requirements, and after considering the potential impacts of the project, the PUC has the responsibility for taking one of the following actions:

(1) Approve and issue permits for Excelsior's preferred West Range Site and corridors.
(2) Approve and issue permits for Excelsior's alternative East Range Site and corridors.
(3) Disapprove the joint permit application submitted by Excelsior.

Excelsior's Proposed Project and Alternatives

As the project proponent, Excelsior proposes to construct and operate a **nominal 1,200**-$MWe_{(net)}$ Mesaba Generating Station, together with its associated support structures and utility lines, within the TTRA. The TTRA (see Figure S-1**B**) is a geographic area in northeastern Minnesota that encompasses approximately 13,000 square miles and stretches from Crosby, Minnesota across the state's Cuyuna, Mesabi, and Vermilion iron ore ranges to the north shore of Lake Superior. This area was the site of some of the largest iron mines in the world, but is now economically depressed. Excelsior's project siting efforts centered on the TTRA in part to qualify for favorable consideration as an "innovative energy project" under Minnesota Statutes § 216B.1694. Excelsior focused particularly on potential sites within the Mesabi Iron Range due to the existing infrastructure system developed in response to earlier industrial mining activities.

At the request of, and in consultation with, USACE regulatory staff, Excelsior developed a purpose statement to satisfy USACE NEPA and CWA Section 404 requirements. The project purpose provided in Appendix F1 will be carried into the CWA Section 404 permit evaluation, and will be the basis for the alternatives analysis required by USACE regulations.

The Mesaba Generating Station would consist of the Mesaba Energy Project (Phase I) and an identical facility (Phase II) on the same site. Each phase would be rated nominally at peak to deliver **600** $MWe_{(net)}$ to the **point of interconnection with the regional electric grid.**

The project would employ ConocoPhillips E-Gas™ technology. Gasification is the process of converting coal, petroleum coke, or blends of these resources to a gaseous fuel called synthesis gas (syngas). A combined-cycle electric power plant is one that uses both **combustion turbine generator(s) and** steam turbine generator**(s)** at one location to produce electricity. Combining (integrating) the gasification process with the combined-cycle power plant is known as IGCC, which is an inherently lower-polluting and more energy-efficient technology for producing electricity from solid feedstocks. Key aspects of the project are presented in Table S-1.

In the E-Gas™ process, coal, petroleum coke, or blends of coal and petroleum coke would be crushed, slurried with water, and pumped into a pressurized vessel (the gasifier) along with purified oxygen. In the gasifier, controlled reactions take place, thermally converting feedstock materials into syngas. The syngas is cooled, cleaned of contaminants, and then combusted in a combustion turbine, which is directly connected to an electric generator. The assembly of the combustion turbine and generator is known as a combustion turbine generator (CTG). The expansion of hot combustion gases inside the combustion turbine creates rotational energy that spins the generator and produces electricity. The hot exhaust gases exiting the CTG would pass through a heat recovery steam generator (HRSG), a type of boiler, where steam is produced. The resulting steam is piped to a steam turbine that is connected to an electric generator. The expansion of steam inside the steam turbine spins the generator to produce an additional source of electricity. Electric power for each phase of the project would be produced in two CTGs (about 220 $MWe_{(gross)}$ each) and in one steam turbine generator (STG) (up to 300 $MWe_{(gross)}$), for a total production of 740 $MWe_{(gross)}$ per phase, or 1480 $MWe_{(gross)}$ for Phases I and II.

Table S-1. Key Technology Aspects of the Mesaba Energy Project

Two-Stage Gasifier	Gasifier consists of two stages: a slagging first stage, and an entrained flow, non-slagging second stage. Unlike traditional pulverized coal power plants, where fuel is actually combusted, in an IGCC power plant, slurry is fed to the gasifier along with oxygen (O_2) at an elevated temperature and pressure. The feedstock would be almost totally gasified in this environment to form syngas consisting principally of hydrogen (H_2), carbon monoxide (CO), CO_2, and water.
Syngas Cleanup	Syngas cleanup and desulfurization systems that include the processes for syngas cooling, particulate matter removal, syngas scrubbing, acid gas removal, mercury removal, and potential future retrofit for carbon capture.
Mercury Removal	For mercury removal, the syngas would pass through fixed beds of activated carbon prepared with a special impregnate to remove mercury. Multiple beds would be used to obtain optimized adsorption.
Carbon Capture Adaptable	The IGCC power plant would be designed to allow for future carbon capture, if required. Technologies currently exist that could allow the removal of CO_2 from the syngas, reducing CO_2 emissions by roughly 30 percent **(when using sub-bituminous coal)**. Future technologies are expected to be demonstrated that could capture up to 90 percent of the CO_2 emission from the combustion gases. Once captured, the CO_2 could be used for enhanced oil recovery or stored in appropriate geologic (saline) formations. As part of its Power Purchase Agreement approval process, Excelsior has submitted a carbon capture and sequestration plan to the PUC (see Appendix A).

Excelsior is required by state regulations to consider at least two potential sites for the proposed plant and, under certain conditions, two potential alignments for HVTLs. Excelsior's site selection process required several years of study that included a three-tiered siting process to identify the most favorable location for the Mesaba Generating Station. The first tier was conducted under a state statute enacted in 2003 (Minnesota Statutes § 216B.1694, Subdivision. 1(3)) that included, among other things, a provision allowing up to three "innovative energy projects" to be located in the TTRA. Excelsior then determined which regions throughout the TTRA have the necessary minimum infrastructure (e.g., HVTLs, water, and gas), rail access, road access, and other necessary components to develop the project. Once the initial candidate areas of the TTRA were identified, a second tier of evaluation was performed that included a review of engineering feasibility, environmental compatibility, community support and acceptance, and other criteria. The third tier of evaluation consisted of a detailed analysis of the candidate project sites in Excelsior's joint permit application.

Excelsior documented the site screening and selection process (see revised Appendix F1) in support of its application to USACE for a CWA Section 404 wetlands permit. Using the selection process, Excelsior identified 17 candidate sites within the TTRA. As explained in Appendix F1, Excelsior eliminated 14 sites from further consideration based on issues relating to water availability, rail access, nearby residences, wetland acreage, constructability, and property size and availability. Of the three remaining sites, one was subsequently eliminated by Excelsior, because it was deemed unavailable due to conflicting development plans for the property. Excelsior thus identified its preferred (West Range) and alternative (East Range) sites from the two remaining properties.

Expected operational characteristics of the project would generally be the same for the alternative sites**. As explained in the Draft EIS, the East Range Site is located in the Lake Superior Watershed of the Great Lakes Basin, while the West Range Site is in the Upper Mississippi River Basin. Because of severe restrictions on discharges of mercury to surface waters in the Great Lakes Basin, the generating station at the East Range Site would include an enhanced zero liquid discharge (ZLD) system to process cooling tower blowdown, thus eliminating all discharges. As considered in the Draft EIS, the generating station at the West Range Site would discharge cooling tower blowdown water to surface waters, while meeting water quality standards for these discharges. However, after publication of the Draft EIS, Excelsior announced its intent in January 2008 to employ enhanced ZLD at the West Range Site, thereby eliminating discharges to surface waters at either site.** Thus, at either site the generating station would employ a ZLD system to remove contaminants in the discharge from the gasification process.

The expected operational characteristics for **Phase I and the combined Phases I and II** are summarized in Table S-2 **(which has been updated for the Final EIS)**. **The operational characteristics would be generally the same at either site except where indicated. In particular, the lower quality of process water sources at the East Range Site would cause:**

- **Greater amounts of particulate matter emissions from the cooling towers;**
- **Increased power load by the ZLD system reducing the net generating capacity by 1 MWe per phase; and**
- **Increased solid waste disposal requirements for ZLD filter cake.**

[Text in the Draft EIS describing differences in plant operations between the West Range Site and East Range Site was deleted as no longer applicable based on Excelsior's announcement to employ an enhanced ZLD system at the West Range Site.]

Pollution prevention, recycling, and reuse features are presented in Table S-3. The location and extent of HVTLs, water sources, rail, gas pipelines, and other infrastructure requirements are dependent upon each of the sites under consideration by Excelsior. Information on these project features as they relate to the sites being considered is provided in the following sections.

Table S-2. Expected Operating Characteristics – Mesaba Energy Project (Values for West and East Range Sites are equal except where noted)

Operating Characteristics	Phase I	Phase I & II
Net Generating Capacity - megawatts electricity (MWe)[1]		
West Range (WR)	605	1,210
East Range (ER)	604	1,208
Load output		
Capacity Factor - percent	92	92
Coal consumption[2] - tons per day (tpd)		
Sub-bituminous (SB)	8,550	17,100
Bituminous (B)	6,120	12,240
Sub-bituminous/petroleum coke (50:50 blend)	6,450	12,900
Water requirements - gallons per minute (gpm)		
Average water use	3,500	7,000
Peak water use	5,000	10,000
Air emissions - tons per year (except CO_2)		
Sulfur dioxide (SO_2)	695	1,390
Oxides of nitrogen (NO_x)	1,436	2,872
Particulate matter $\leq$10 microns (PM_{10}) – WR[3]	266	532
Particulate matter $\leq$10 microns (PM_{10}) – ER[3]	355	709
Carbon monoxide (CO)	1,270	2,539
Mercury (Hg)	0.014	0.027
Lead (Pb)	0.015	0.030
Volatile organic compounds (VOCs)	99	197
Carbon dioxide[4] (CO_2) - million tons per year	5.3(SB)/4.7(B)	10.6(SB)/9.4(B)
Effluent discharges		
Sanitary wastewater[5] in gallons per day	3,750	7,500
Cooling tower blowdown discharge (gpm)	0	0
Solid wastes[6] - tons per year		
Mercury removal carbon (hazardous [H])	7	14
Sour water sludge (H)	15	30
Sour water carbon (H)	24	48
Syngas treatment carbon (H)	30	60
Waste char and ash (non-hazardous)	80	160
Zero Liquid Discharge (ZLD) filter cake – WR[7]	~2,200(GI)[H]/<2,500(PB)	~4,400(GI)[H]/<5,000(PB)
Zero Liquid Discharge (ZLD) filter cake (H) – ER[7]	~2,200(GI)[H]/<12,250(PB)	~4,400(GI)[H]/<24,500(PB)
Marketable byproducts – tons per day		
Slag	500 – 800	1,000 – 1,600
Sulfur	30 – 165	60 – 330

[1] The generating capacity at the East Range Site is expected to be approximately 1 MWe less than the West Range Site per phase because the lower source water quality at the East Range Site increases the load from the enhanced zero liquid discharge system.
[2] Peak use of alternative feedstocks in partial slurry quench (PSQ) mode. Fuel flexibility allows the IGCC power plant to operate on sub-bituminous coal, bituminous coal, or a coal/petroleum coke blend.
[3] Because of the lower quality of water used for cooling at the East Range Site, PM10 emissions from cooling towers would be greater than for the West Range Site.
[4] CO2 emissions are a function of the feedstock consumed and of the Mesaba Generating Station's net heat rate. SB = Sub-bituminous coal, such as Power River Basin Coal; B = Bituminous coal, such as Illinois Basin Coal.
[5] Discharged to publicly owned treatment works; the discharge rate shown is conservatively assumed to equal the expected use of water for domestic purposes.
[6] Fuel dependent; highest values listed.
[7] Because of the lower quality of water used for cooling at the East Range Site, solid waste production of ZLD filter cake from the power block would be greater than for the West Range Site; GI = Gasification Island; PB = Power Block.

Table S-3. Key Pollution Prevention, Recycling and Reuse Features

Spill Prevention Control and Countermeasure (SPCC) Plan	The SPCC Plan would develop measures to take in the event of a spill, thereby insulating environmental media from the effect of accidental releases. All aboveground chemical storage tanks would be lined or paved, curbed/diked, and would have sufficient volume to meet all regulatory requirements. A site drainage plan would also be developed that would isolate routine, process-related operations from affecting the surrounding environment.
Feed Material Handling	The coal storage area would be paved or lined so that runoff can be collected, tested, and treated as necessary. The coal storage area has facilities to control fugitive dust emissions. The coal conveyors would be covered.
Coal Grinding and Slurry Preparation	The coal grinding equipment would be enclosed and any vents would be routed to the tank vent incinerator/auxiliary boiler. The water used to prepare the coal slurry would be stripped process condensate (recycled).
Gasification, High Temperature Heat Recovery, Dry Char Removal and Slag Grinding	The char produced in gasification would be removed and returned to the first stage of the gasifier (recycled). This improves the carbon conversion in the gasifier and reduces the amount of carbon contained in the gasifier slag. Reduced carbon content makes the slag more marketable and reduces the likelihood that it must be disposed in a landfill.
Slag Handling	The slag dewatering system would generate some flash gas that contains hydrogen sulfide (H_2S). The flash gas would be recycled back to the gasifier via the syngas recycle compressor. Water that is entrained with the slag would be collected and sent to the sour water stripper for recycling.
Sour Water System	Sour water would be collected from slag dewatering and the low temperature heat recovery system, and the ammonia and H_2S would be stripped out and sent to the Sulfur Recovery Unit (SRU). The stripped condensate would be used to prepare coal slurry. Surplus stripped condensate would be sent to the zero liquid discharge system.
Zero Liquid Discharge (ZLD) System	The ZLD system would concentrate and evaporate the process condensate. The ZLD would produce high purity water for reuse and a solid filter cake for disposal off site. The ZLD would concentrate and dispose of heavy metals and other contaminants in the process condensate. The ZLD would also be a recycle unit because the recovered water would be reused, reducing the total plant water consumption. **An enhanced ZLD system would also recover and treat cooling tower blowdown water for recycle and reuse within the plant, thereby eliminating all discharges to surface waters.**
Carbonyl Sulfide (COS) Hydrolysis	The gasifier would produce small quantities of COS that cannot be absorbed in the Acid Gas Removal (AGR) system. The COS hydrolysis unit would convert COS to H_2S, which would then be removed in the AGR unit. The COS hydrolysis unit would improve the sulfur recovery efficiency and reduce the total amount of sulfur in the syngas, and ultimately, the release of sulfur dioxide (SO_2) from the heat recovery steam generator (HRSG)stacks.
Mercury Removal Features	The mercury removal unit would use specially formulated activated carbon to capture trace quantities of mercury that may remain in the syngas. Mercury in the sour water handling system would be captured via activated carbon filters strategically placed prior to potential release points.
Acid Gas Removal (AGR)	The AGR system would remove H_2S from the raw syngas and produce a sweet (low sulfur) syngas for use in the combined cycle power block. The AGR would produce concentrated H_2S feed for the SRU.
Sulfur Recovery Unit (SRU)	The SRU would convert the H_2S to elemental sulfur that would be marketed for use as a fertilizer additive or for production of sulfuric acid. The tail gas from the SRU would be recycled back to the gasifier.

Table S-3. Key Pollution Prevention, Recycling and Reuse Features

Fuel Gas Moisturization	The fuel gas moisturization system would improve the recovery of low level heat from the gasification process and serve as a diluent for the syngas used in the combustion turbines. Nitrogen from the air separation unit would also be used as a diluent. Dry, clean syngas typically has a heating value in the range of 250 to 300 British thermal units per standard cubic foot. If the dry syngas was used directly in the combustion turbines, the thermal NO_x formed would be too high. Earlier IGCC plants used steam injection for NO_x control, which is less efficient than using fuel moisturization and nitrogen.
Integration of the air separation unit (ASU) and Power Block	The ASU would produce nitrogen as a by-product; this is an effective diluent for NO_x control. The ASU would require large amounts of electrical power for air compression. Part of the air compression requirements would be provided by the combustion turbine compressors, further integrating the gasification and combined cycle power block portions. This integration reduces the ASU auxiliary power requirement and increases the net power output by the plant.
Boiler Blowdown and Steam Condensate Recovery	Boiler blowdown and steam condensate would be recovered from the combined cycle power block and gasification facilities and would be reused as cooling tower makeup.
Training and Leadership	All corporate and plant personnel would be trained on continuous improvement in environmental performance especially as such training and programs apply to: (1) setting, measuring, evaluating and achieving waste reduction goals, and (2) reporting the results of such programs in annual reports made available to the public.

West Range Site and Corridors

Excelsior proposes to locate the Mesaba Generating Station on an approximately 1,**708-**acre site in the City of Taconite within Iron Range Township in Itasca County. The project's generating facilities would connect to the power grid via new and existing HVTL corridors to a substation near the unincorporated community of Blackberry. Excelsior or a local public utility would construct, own, and operate a new natural gas pipeline connecting to two existing 36-inch pipelines owned by Great Lakes Gas Transmission Company (GLG) to provide start-up and backup fuel for the station. Key features of the West Range Site and corridors, including Excelsior's preferred choices for utilities and transportation components and alternatives they considered, are listed in Table S-4 and illustrated in **Figures S-2A and S-2B**. **Note that disused mine pits shown on these figures have been filling with surface water and groundwater. Therefore, the areas within these pits shown as surface waters based on available geographic information system data may not represent the actual extent of surface waters currently in these pits.**

East Range Site and Corridors

Excelsior's alternative East Range Site for the proposed Mesaba Generating Station is an approximately **1,322-**acre site within the city limits of Hoyt Lakes in St. Louis County, approximately 1 mile north of the downtown area. The project's generating facilities would connect to the grid via existing HVTL corridors that lead to a substation near the unincorporated community of Forbes. Northern Natural Gas (NNG) would construct, own, and operate a gas pipeline as an extension of the company's interstate pipeline system to provide start-up and back-up fuel for the station. Key features of the East Range Site and corridors, including Excelsior's preferred choices for utilities and transportation components and alternatives they considered, are listed in Table S-5 and shown in **Figures S-3A and S-3B**. **The same comment above for the West Range Site and Corridors relating to the extent of surface waters within mine pits also applies to the East Range Site and Corridor maps.**

Table S-4. West Range Site Features

Feature	Description	Alternatives Considered by the Project Proponent
Rail Access	Coal could be delivered to the West Range Site by either BNSF Railway or CN Railway, which operate on a single track located less than 2 mi from the West Range Site. Direct access to the site would be provided by the construction of short spurs from the mainline tracks onto the site boundary. Construction of 2 mi of new track would be required between the existing mainline track and the boundary of the West Range Site; an additional 4 mi of new track would be required for the portion of the rail loop within the site boundaries. Three alternative rail access alignments were considered **in the Draft EIS** for the West Range Site, identified as Alternatives 1A, 1B, and 2. **Two additional alternatives were considered based on agency comments on the Draft EIS; one of which was identified as Excelsior's new preferred alignment (3B).** Permanent rights-of-way for the rail alignments would be 100 feet wide. Limits of construction could range from 60 to 760 feet in width depending upon topography.	Alternative 1A (**Excelsior** preferred **in Draft EIS**). Requires **15** ac of **off-site** right-of-way (ROW) and **21,539 feet** of track. Three residences within 1,000 feet and one residence within **470** feet. Alternative 1B. **[Eliminated from further consideration based on analysis documented in the Draft EIS.]** Alternative 2. **[Screened in the Draft EIS and eliminated from detailed evaluation as documented in the Draft EIS.]** **Alternative 3A. [Eliminated from consideration based on a screening-level analysis following publication of the Draft EIS; see Appendix F2.]** **Alternative 3B (Excelsior preferred in Final EIS). Developed in collaboration by DOE and Excelsior with objective of minimizing wetland impacts. Requires 15 ac of off-site right- ROW and 22,070 feet of track. Three residences within 1,000 feet and one residence within 470 feet.**
Roadway Access	The West Range Site is located about 1.5 mi north of U.S. Highway (US) 169 and about 0.25 mi to the east of Itasca County Road (CR) 7. Other roadways include the Cross-Range Heavy Haul Road, which is a gravel road used to allow heavy or slow loads to be transported between mines across the Iron Range. The Cross-Range Heavy Haul Road also provides access to a cluster of homes in the Big Diamond Lake/Dunning Lake area. Excelsior considered two access road alternatives **in the Draft EIS** (Access Road 1 and Access Road 2) to provide access to the West Range Site. **Following publication of the Draft EIS, Itasca County deferred the realignment of CR 7, which required Excelsior to consider a new Access Road 3 alignment.**	Access Road 1. **[Eliminated from consideration following Draft EIS based on Itasca County's decision to defer the realignment of CR 7 due to changes in state highway funding priorities.]** Project would use the realignment of CR 7 to serve as the primary access road (Access Road 1). Access Road 2. **[Eliminated from consideration following Draft EIS based on Itasca County's decision to defer the realignment of CR 7 due to changes in state highway funding priorities.]** This segment is an extension of Access Road 1 into the site using the CR 7 **realignment.** **Access Road 3 (Excelsior preferred in Final EIS). Developed in collaboration by DOE and Excelsior with objective of minimizing wetland impacts. Would connect the plant footprint with existing CR 7 alignment near the southwestern corner of the site; 2 residences within 1,250 ft.**
Process Water Supply	Excelsior initially considered three alternatives for providing process water to the West Range Site, including the use of nearby abandoned mine pits, the Mississippi River, and groundwater sources.	Alternative 1 (**Excelsior** preferred). Involves pumping water from nearby abandoned mine pits, including the Canisteo Mine Pit (CMP), the Lind Mine Pit (LMP), and the Hill Annex Mine Pit (HAMP) Complex. Alternative 2. Use of the Mississippi River; eliminated due to extensive infrastructure requirements to convey water. Alternative 3. Use of groundwater sources; eliminated due to extensive infrastructure requirements to accommodate low pumping yields.

Table S-4. West Range Site Features

Feature	Description	Alternatives Considered by the Project Proponent
Process Wastewater	Process wastewater would consist primarily of cooling tower blowdown blended with relatively low-flow additional wastewater streams from other plant systems. All other contact process water would be managed and treated in the ZLD system. All sanitary wastewater would be treated separately.	**Excelsior** Proposed Plan. **Following publication of the Draft EIS, Excelsior announced its intention to employ an enhanced ZLD system at the West Range Site (comparable to the East Range Site) to additionally treat cooling tower blowdown water. Therefore, Outfalls 001 and 002 to the Canisteo Mine Pit and Holman Lake proposed in the Draft EIS were eliminated from consideration in the Final EIS.**
Potable Water Supply	During construction, the Mesaba Generating Station would require a peak of 45,000 gpd of potable water based on 1,500 personnel using 30 gallons of potable water per day each. After construction of Phase I and II, the water demand would drop to about 7,500 gpd assuming 250 individuals on site year around. Two alternatives were considered to provide potable water to the West Range Site.	Alternative 1 (**Excelsior** preferred). Obtain potable water from the City of Taconite, located 2.5 mi southwest of the project site, which would require construction of an 8-inch diameter pipeline from the Taconite system to the site and a booster station. The Taconite system currently has adequate capacity for the project during the operational phase, but the requirements during construction exceed existing capacity. Planned water system improvements will provide the necessary capacity, otherwise Excelsior will need to provide potable water via truck during construction. Alternative 2. Construct an on-site water treatment facility with the capacity to treat 7,500 gpd of water from the CMP and HAMP Complex. Excelsior would own the water treatment facility and be responsible for the operation and maintenance of the facility.
Domestic Wastewater Treatment	The sanitary wastewater discharge from the plant during construction and during operation would be comparable to the volume of daily potable water use. Two alternatives were considered for disposal of domestic wastewater.	Alternative 1. Construct and operate a wastewater treatment facility, discharging to Little Diamond Lake. Alternative 2 (**Excelsior** preferred). Discharge domestic wastewater to the Coleraine-Bovey-Taconite **(CBT)** wastewater collection and treatment system. Consists of constructing approximately 10,000 feet of 12-inch gravity sewer, a pump station, and 2,400 feet of force main from the West Range Site to the City of Taconite's main pump station. Also requires a 50-foot construction ROW and a permanent 30-foot ROW affecting approximately 14 ac and 8 ac, respectively. Alternative would avoid the discharge of treated domestic effluent to public waters impaired for dissolved oxygen (DO) and nutrients. **In conjunction with its announced intention to employ an enhanced ZLD system at the West Range Site, Excelsior proposed to fund improvements in the CBT collection and treatment system to reduce wet-weather capacity problems and improve effluent quality.**

Table S-4. West Range Site Features

Feature	Description	Alternatives Considered by the Project Proponent
Natural Gas Facilities	Excelsior or a local public utility proposes to construct, own, and operate one 16-inch (or potentially 24-inch) diameter gas pipeline to supply natural gas to the Mesaba Generating Station that would tap the two existing 36-inch GLG pipelines approximately 12 mi due south of the West Range Site. Three potential natural gas pipeline alternatives were initially considered by Excelsior to provide natural gas to the West Range Site.	Alternative 1 (**Excelsior** preferred). Includes 2.5 mi and 10.7 mi of new pipeline, in existing and new corridors, respectively. Four water crossings and three residential units within 300 feet. Pipeline would be licensed/permitted, constructed, owned, and operated by Excelsior **or a local public utility**. Alternative 2. Includes 10.5 mi and 4.5 mi of new pipeline, in existing and new corridors, respectively. Four water crossings and five residential units within 300 feet. Pipeline would be licensed/permitted, constructed, owned, and operated by NNG (as an interstate pipeline operator). Alternative 3. Includes 7 mi and 5.5 mi of new pipeline, in existing and new corridors respectively. Four water crossings and 29 residential units within 300 feet. Pipeline would be licensed/permitted, constructed, owned, and operated by NNG (as an interstate pipeline operator).
HVTL – Plan A	Excelsior's Plan A assumes the use of 345-kV circuits. Plan A provides for a preferred route (WRA-1) and an alternative route (WRA-1A). Both routes would share two common segments (one existing and one new ROW), and each route would include two unique segments (one existing ROW and one new ROW). The major difference between the routes is that WRA-1A would run east of and parallel to Twin Lakes Road, while WRA-1 would run west of and parallel to Twin Lakes Road. Both routes would avoid residences located on the road. Excelsior prefers WRA-1, because it would have fewer water crossings, would cross fewer open fields, would avoid gravel mining operations, and would generally be less visible. Both routes are similar in that they traverse areas that have similar residential densities and provide the shortest and most direct routes to the substation.	**HVTL Alternative** 1 (**Excelsior** preferred). Excelsior would acquire 100-foot ROWs, which would result in a total permanent ROW of approximately 134 ac **in alignment WRA-1**. Existing HVTL ROWs would not require widening of corridors. Approximately 66 residences would be located within 0.5 mi of the centerline of the preferred alignment, of which 17 would be located within 0.25 mi of the alignment. One residence would be located within 300 feet of the alignment and three others would be located within 500 feet. **HVTL Alternative** 1A. Excelsior would acquire 100-foot ROWs, which would result in a total permanent ROW of approximately 121 ac **in alignment WRA-1A**. Existing HVTL ROWs would not require widening of corridors. Approximately 62 residences would be located within 0.5 mi of the centerline of the preferred alignment, of which 21 would be located within 0.25 mi of the alignment. Two residences would be located within 300 feet of the alignment and five others would be located within 500 feet.

Table S-4. West Range Site Features

Feature	Description	Alternatives Considered by the Project Proponent
HVTL – Plan B	Excelsior's Plan B provides a contingency to allow the use of 230-kV circuits. If the Midwest Independent System Operator (MISO) determines that the 345-kV transmission infrastructure is incompatible with regional transmission planning initiatives, or if the timetable for building 345-kV transmission in the region would not be acceptable, Excelsior would implement a 230-kV transmission contingency plan. Plan B would begin with two 230-kV HVTL circuits mounted on a single steel pole structure, which would accommodate the full 60**5**-MWe output of Phase I and meet the single failure criterion. Although the double-circuit 230-kV HVTLs could accommodate the entire 1,21**0**-MW output of the combined Phases I and II, they would not meet the single failure criterion. Therefore, Plan B would provide for an additional HVTL with the construction of Phase II.	**HVTL Alternative** 1 (**Excelsior** preferred). Double-circuit 230-kV HVTLs would follow the same alignment **(WRB-1)** as the preferred route (WRA-1) of Plan A. However, the single-pole HVTL structures required for 230-kV HVTLs would be shorter. The new alignment segments would require a ROW with a minimum width of approximately 73 feet. Existing HVTL ROWs would not require widening. **HVTL Alternative** 1A. Would follow the same alignment as the alternative route (WRA-1A) of Plan A for Phase I. WRB-2 (**Excelsior** preferred). The preferred route for Phase II of Plan B would be the route not selected for the double-circuit 230-kV HVTL in Phase I of Plan B. The structures and new ROW requirements would be comparable to those described for WRB-1, but the poles would be shorter (by approximately 20 feet). In the segments where the double-circuit 230-kV HVTL alignment would coincide with the single-circuit 230-kV alignment, a minimum permanent ROW width of approximately 138 feet would be required for the parallel pole structures (affecting approximately 1.7 mi of new ROW). The new alignments for Plan B, Phases I and II (including both routes) would require permanent ROWs affecting approximately 255 ac. Existing HVTL ROWs would not require widening. **HVTL Alternative Phase 2 Plan B (**WRB-2A**)**. The alternative route proposed for Phase II of Plan B would combine segments from two existing HVTL corridors, one of which traverses the northern section of the West Range Site. WRB-2A would follow an alignment including portions of the ROWs for the Minnesota Power (MP) 45L/28L and 62L/63L HVTLs. Because of the 18-mi length, Excelsior proposes to use HVTLs rated at 345-kV on this route to avoid excessive line losses and elaborate switching requirements that would be required for 230-kV. Excelsior proposes to use delta configuration 345-kV structures with an underbuild feature that would carry the existing MP 115-kV HVTLs below the arms holding the 345-kV conductors. The delta configuration structures would require a minimum permanent ROW width of 106 feet, generally within the parameters of the existing ROWs. Therefore, the new alignments for Plan B, Phases I and II (including both routes) would require permanent ROWs affecting approximately 134 ac. Approximately 214 residences are located within 0.5 mi of the ROWs that would be used for Alternative WRB-2A; 98 are located within 0.25 mi of the ROWs. Eight residences are located within 300 feet and 21 others are located within 500 feet.

Acronyms: ac = acre(s); BNSF = formerly Burlington Northern/Santa Fe (Railway Company); CMP = Canisteo Mine Pit; CN = Canadian National (Railway Company); COC = cycles of concentration; CR = County Road; DO – dissolved oxygen; GLG = Great Lakes Gas (Transmission Company); gpd = gallons per day; HAMP = Hill Annex Mine Pit; HVTL = high voltage transmission line; LMP = Lind Mine Pit; mi = mile(s); MISO = Midwest Independent System Operator; MP = Minnesota Power (Company); NNG = Northern Natural Gas (Company); ROW = right-of-way; US = U.S. Highway; ZLD = zero liquid discharge

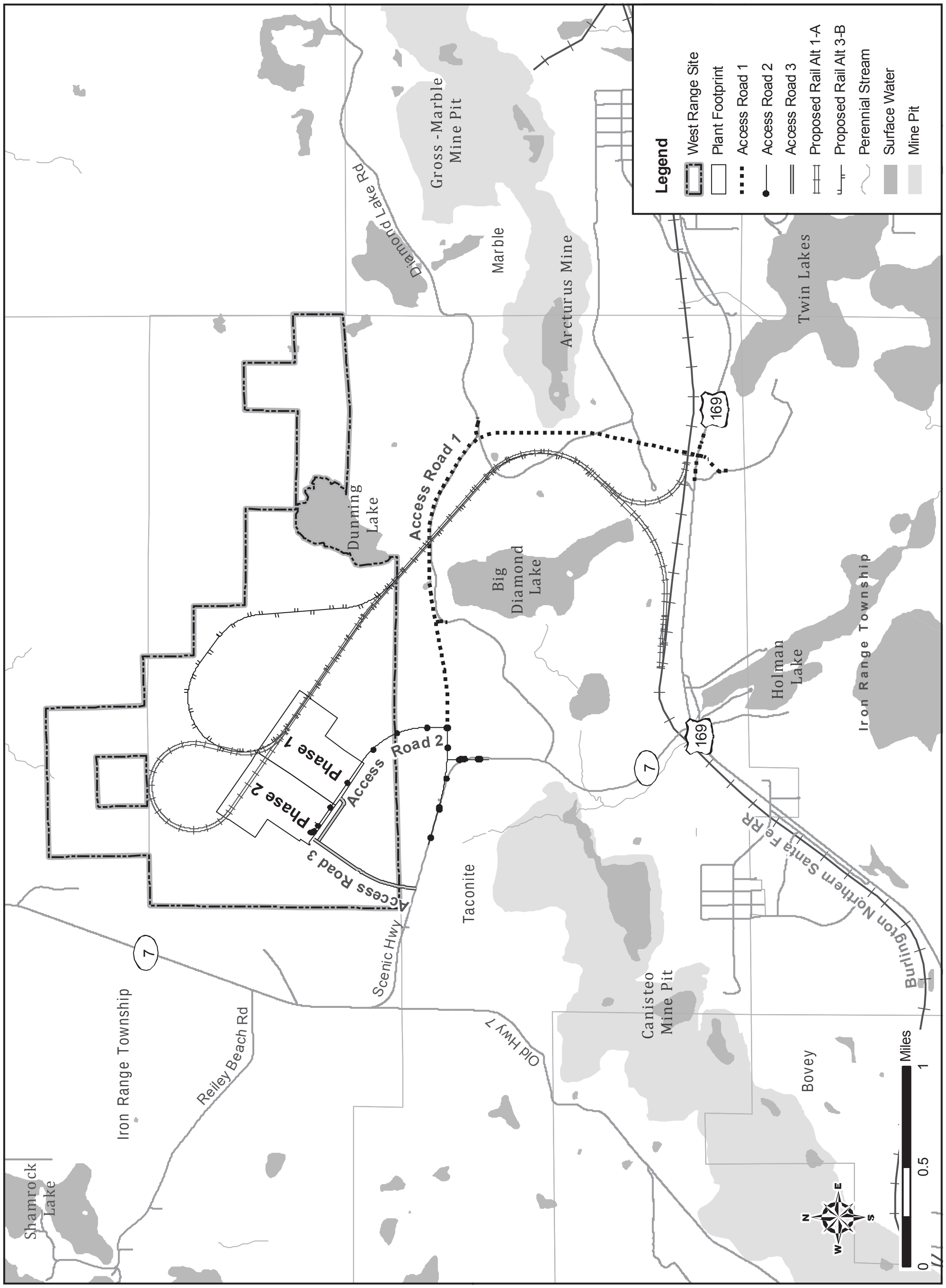

Figure S-2A. West Range Site

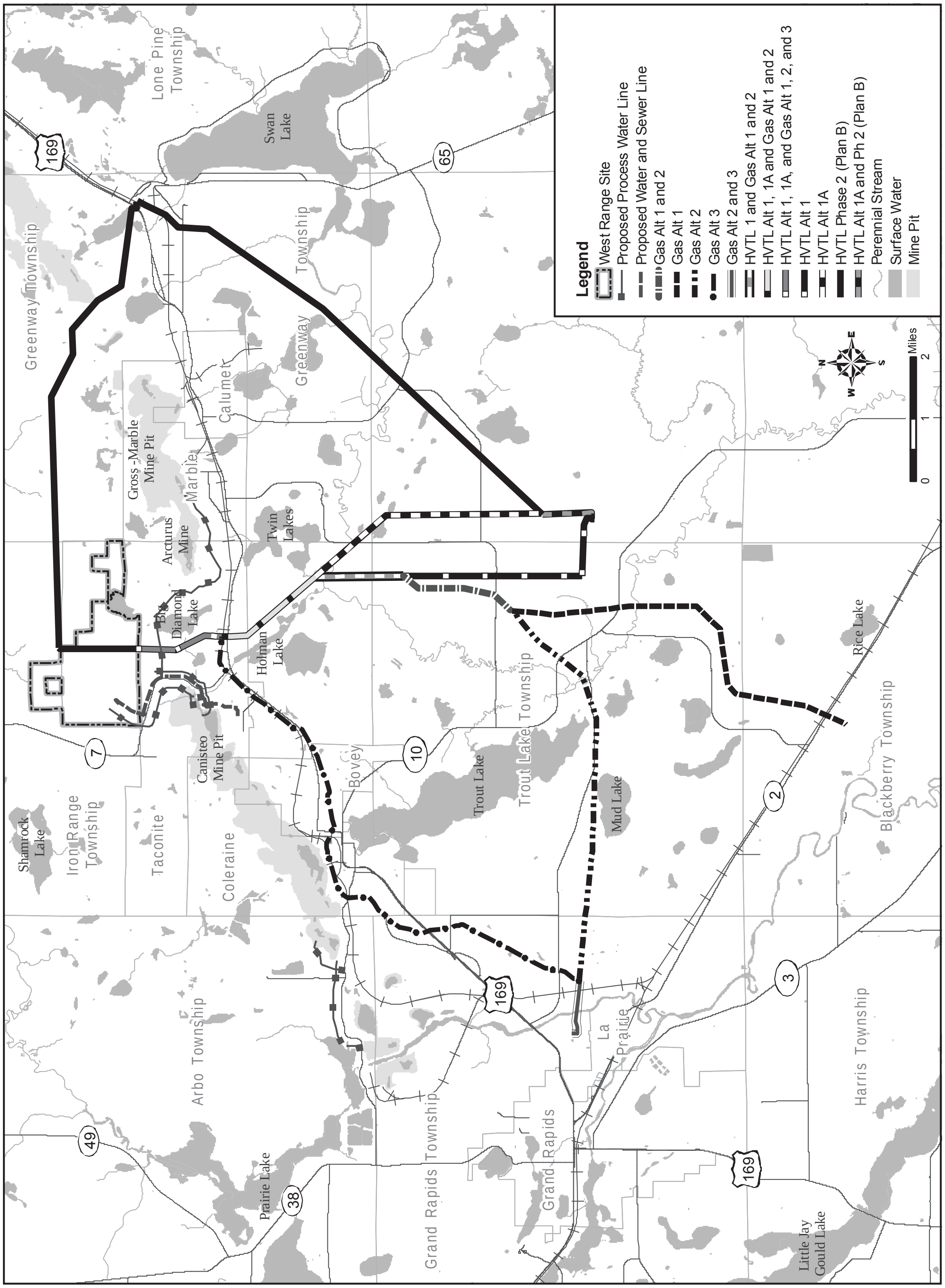

Figure S-2B. West Range Site and Corridors

Table S-5. East Range Site Features

Feature	Description	Alternatives Considered by the Project Proponent
Rail Access	Coal would be delivered to the East Range Site by a subsidiary of CN Railway that serves the area. The nearest access to the BNSF Railway is at Hibbing, 40 mi from the East Range Site. Therefore, the CN would be the only feasible near-term rail provider to the East Range Site. The power plant footprint is located approximately 1 mi north and 1 mi west of two CN railroad tracks. The east-west track runs from Eveleth, Minnesota, to Two Harbors, Minnesota. The north-south track connects with the east-west track at Wyman Junction (about 1.7 mi southeast of the East Range Site) and extends north to Embarrass, Minnesota. Permanent ROWs for the rail alignments would be 100 feet wide. Limits of construction could range from 60 to 500 feet in width depending upon topography.	Alternative 1 (**Excelsior** preferred). Alternative 1 would provide a traditional rail loop to accommodate a unit train that would return in the same direction. The track would originate near MP's Syl Laskin Energy Center rail spur and travel east-northeast to the Mesaba Generating Station. The track would be about 17,800 feet long. No residential dwellings are located near the proposed alignment. Alternative 2. Alternative 2 would cross the site (rather than looping within it) and connect to the CN north-south track just north of Wyman Junction. This track would be about 18,500 feet long to accommodate a unit train with the rotary coal dumper near the midpoint. To maintain a workable grade, the track would need to cross under CR 666, which would require construction of a roadway bridge.
Roadway Access	The proposed access road would consist of a looped roadway intersecting CR 666 at two locations to provide gradual curves and good sightlines. Traffic would enter the site from the north access point. During construction and other periods of peak volumes, traffic would exit the site at the south access point. Providing two access points from CR 666 would allow flexibility in accessing the station during construction and when maintenance work is performed on CR 666.	**Excelsior** Proposed Plan. CR 666 adjoins the proposed East Range Site and is the most practical choice for public road system access. **In the Draft EIS, Excelsior proposed a looped access road connecting at both a northern and a southern intersection with CR 666.** **In the Final EIS, based on agency comments on the Draft EIS, Excelsior eliminated the northern intersection and road section from consideration.**
Process Water Supply	**Based on Excelsior's** new proposal **to employ an enhanced ZLD system at the West Range Site comparable to the East Range Site, the water demands at either site would be the same. The water quality in the mine pits on the East Range Site is lower than in the pits on the West Range Site, which would result in increased particulate matter emissions by the cooling towers and increased solid waste from ZLD filter cake.**	**Excelsior** Proposed Plan. Process water for the East Range Site would be drawn from numerous mine pits located in the vicinity. Excelsior proposes to link the various mine pits using water intakes, pump stations, and pipelines. In the event of high inflow rates into Colby Lake during spring runoff or during high precipitation events, water also may be pumped from Colby Lake into Mine Pit 2 West Extension. Mine Pit 2 West Extension would serve as the primary source. A permanent pumping station would be added to this mine pit. The pit would receive input from one or more of the following pits: Mine Pit 6, Mine Pit 2 West, Mine Pit 2 East, Mine Pit 3, Stephens Mine Pit, Knox Mine Pit, Mine Pit 9S, **Mine Pit 5N,** Mine Pit 1 Effluent, PolyMet Mining Dewatering Operations, and/or Colby Lake. **In the event that mining takes place in Mine Pit 2 West Extension, either the Knox and/or Stephens Mine Pits could serve as alternative receiving reservoirs and permanent pump station sites.**

Table S-5. East Range Site Features

Feature	Description	Alternatives Considered by the Project Proponent
Process Wastewater	The East Range Site is located within the Lake Superior Basin watershed, which is regulated for bioaccumulative chemicals of concern (BCCs), such as mercury, in discharges. Excelsior concluded that there are no proven technologies to remove mercury at such low concentrations at the high flow rates of the Mesaba Generating Station (the peak discharge from Phase I and II would approach 3,500 gpm). Therefore, **enhancing** the **existing** ZLD is the preferred alternative.	**Excelsior** Proposed Plan. Excelsior's preferred method for dealing with the mercury discharge limitations at the East Range Site would be to totally eliminate the discharge of cooling tower blowdown by **augmenting** the ZLD system to handle all of the generating station's process wastewater streams. The system would evaporate any water that could not be reused in the plant processes leaving only a solid stream of salts for disposal at a licensed treatment/disposal facility. Excelsior considered discharging process wastewater to the Hoyt Lakes POTW as an alternative, but the POTW does not have sufficient capacity to manage the daily volumes of cooling tower blowdown.
Potable Water Supply	During construction, the Mesaba Generating Station would require a peak of 45,000 gpd of potable water based on 1,500 personnel using 30 gallons of potable water per day each. After construction of Phase I and II, the water demand will drop to about 7,500 gpd assuming 250 individuals on site year around. Two alternatives were considered to provide potable water.	Alternative 1 (**Excelsior** preferred). Obtain potable water from the City of Hoyt Lakes by constructing a 6-inch diameter pipeline approximately 11,000 feet from the East Range Site connecting to a 12-inch water main that serves MP. The city would own and maintain the pipeline and sell water to the station. Alternative 2. Construct an on-site treatment facility with the capacity to treat 7,500 gpd of water from nearby mine pits. Excelsior would own the water treatment facility and be responsible for operation and maintenance.
Domestic Wastewater Treatment	The sanitary wastewater discharge from the plant during construction and during operation would be comparable to the volume of daily potable water use. Two alternatives were considered for disposal of domestic wastewater.	Alternative 1. Construct an on-site wastewater treatment facility comparable to the facility described for the West Range Site. A 12-inch gravity sewer would be constructed to convey treated effluent to the mine drainage stream running from northeast to southwest through the site and discharging into Colby Lake. Would require NPDES permit and licensed operator, and would discharge to Colby Lake, which is the source for the Hoyt Lakes drinking water treatment plant. Alternative 2 (**Excelsior** preferred). Discharge domestic wastewater to the City of Hoyt Lakes' wastewater collection and treatment system. Consists of constructing approximately 9,500 feet of 12-inch diameter gravity sewer, a pump station, and about 2,500 feet of 4-inch force main. The wastewater piping would parallel the existing HVTL easement along the west side of the proposed property boundary, south to Colby Lake. A pump station would be located on the north side of Colby Lake. The City of Hoyt Lakes would operate and maintain the sewer line and would be compensated through sewer user fees.

Table S-5. East Range Site Features

Feature	Description	Alternatives Considered by the Project Proponent
Natural Gas Facilities	NNG is the only pipeline company serving the immediate vicinity of the East Range Site. A 10-inch diameter branch of NNG's pipeline from Iron Junction, Minnesota serves the nearby **plant, formerly owned by** Cliffs-Erie (CE) and directly adjoins the eastern boundary of the East Range Site. However, this branch line lacks adequate capacity to supply the Mesaba Generating Station demand. Therefore, to provide natural gas in the quantity and at the pressure required to supply the station, the following infrastructure would be required.	**Excelsior** Proposed Plan. Installation of approximately 33 mi of new, 16- to 24-inch pipeline placed within the existing ROW for the 10-inch CE branch line; addition of a new compressor at the existing point where the GLG and NNG pipelines interconnect; and installation of an ultrasonic meter facility to serve the Mesaba Generating Station. As an interstate pipeline, it would be permitted by NNG under the Federal Energy Regulatory Commission (FERC) review process. Approximately 856 residences are located within 0.5 mi of the existing pipeline ROW, 46 of which are located within 300 feet of the ROW.
HVTL	Excelsior would configure the high voltage switchyard for the East Range Site at 345-kV for both phases of the Mesaba Generating Station. The option to operate the switchyard at 345-kV at the start of Phase I was based on a 5-MW lower net line loss than would occur if the facilities were operated at 230-kV. Over the project life, the capacity gain associated with the 345-kV option would offset its higher capital cost. The high voltage switchyard required to transmit the entire output from Phase I and Phase II to the point of interconnection with minimum line loss would be installed during construction of Phase I. No further development would be required to accommodate Phase II. Excelsior is proposing to construct new HVTLs to the Forbes Substation, approximately 30 mi directly west-southwest of the East Range Site. The Forbes Substation is a major electrical hub on the east end of the Iron Range that has 500-kV, 230-kV, and 115-kV buses owned by both MP (115/230-kV) and Xcel Energy (500-kV). Excelsior proposes to use two existing corridors, the 39L/37L corridor and the 38L corridor, as routes for its two 345-kV HVTLs. To avoid the high cost and dangerous conditions associated with "hot line" construction methods, Excelsior proposes to acquire an additional 30 feet of ROW along one of the routes between the Laskin and Forbes Substations.	**HVTL Alternative 1 -** Widen 38L Route. Acquire an additional 30 feet of ROW along the 38L corridor on the north side of the existing structures. This route conflicts with three to four short sections of existing 38L ROW where single family residences are located on the north side of the existing 115-kV ROW. The ROW in these locations is too narrow for a 30-foot expansion. Therefore, Excelsior would propose constructing these sections during short, scheduled line outages, or under hot line conditions on the existing 38L 115-kV centerline. Approximately 271 residences are located within 0.5 mi of the centerline of the existing ROWs of the 38L, of which 116 are located within 0.25 mi of the alignment. Approximately 11 residences are located within 300 feet of the ROWs and 11 others are located within 500 feet. **HVTL Alternative 2 -** Widen 39L/37L Route (**Excelsior** preferred). Acquire 30 feet of additional ROW on the south side of the existing ROW from the Laskin Substation to CR 97, then move to the north side from CR 97 to and across the Thunderbird Mine. The 39L has single-family residential conflicts in three potential locations and potentially one industrial site conflict. These narrow sections of ROW would necessitate either hot line construction or construction in short, scheduled outage windows on the existing line in affected ROWs. The 37L could be widened on either side of the ROW since the only conflicts involve existing transmission lines, which may require outage windows for construction. Approximately 962 residences are located within 0.5 mi of the centerline of the existing ROWs of the 39L and 37L, of which 369 are located within 0.25 mi of the alignment **(many of these residences are located in the city of Eveleth, MN)**. Approximately 16 residences are located within 300 feet of the ROWs and 33 others are located within 500 feet.

Acronyms: ac = acre(s); BCCs = bioaccumulative chemicals of concern; BNSF = formerly Burlington Northern/Santa Fe (Railway Company); CE = Cliffs-Erie; CN = Canadian National (Railway Company); CR = County Road; FERC = Federal Energy Regulatory Commission; GLG = Great Lakes Gas (Transmission Company); gpd = gallons per day; gpm = gallons per minute; HVTL = high voltage transmission line; mi = mile(s); MP = Minnesota Power (Company); NNG = Northern Natural Gas (Company); NPDES = National Pollutant Discharge Elimination System; POTW = Publicly Owned Treatment Works; ROW = right-of-way; ZLD = zero liquid discharge

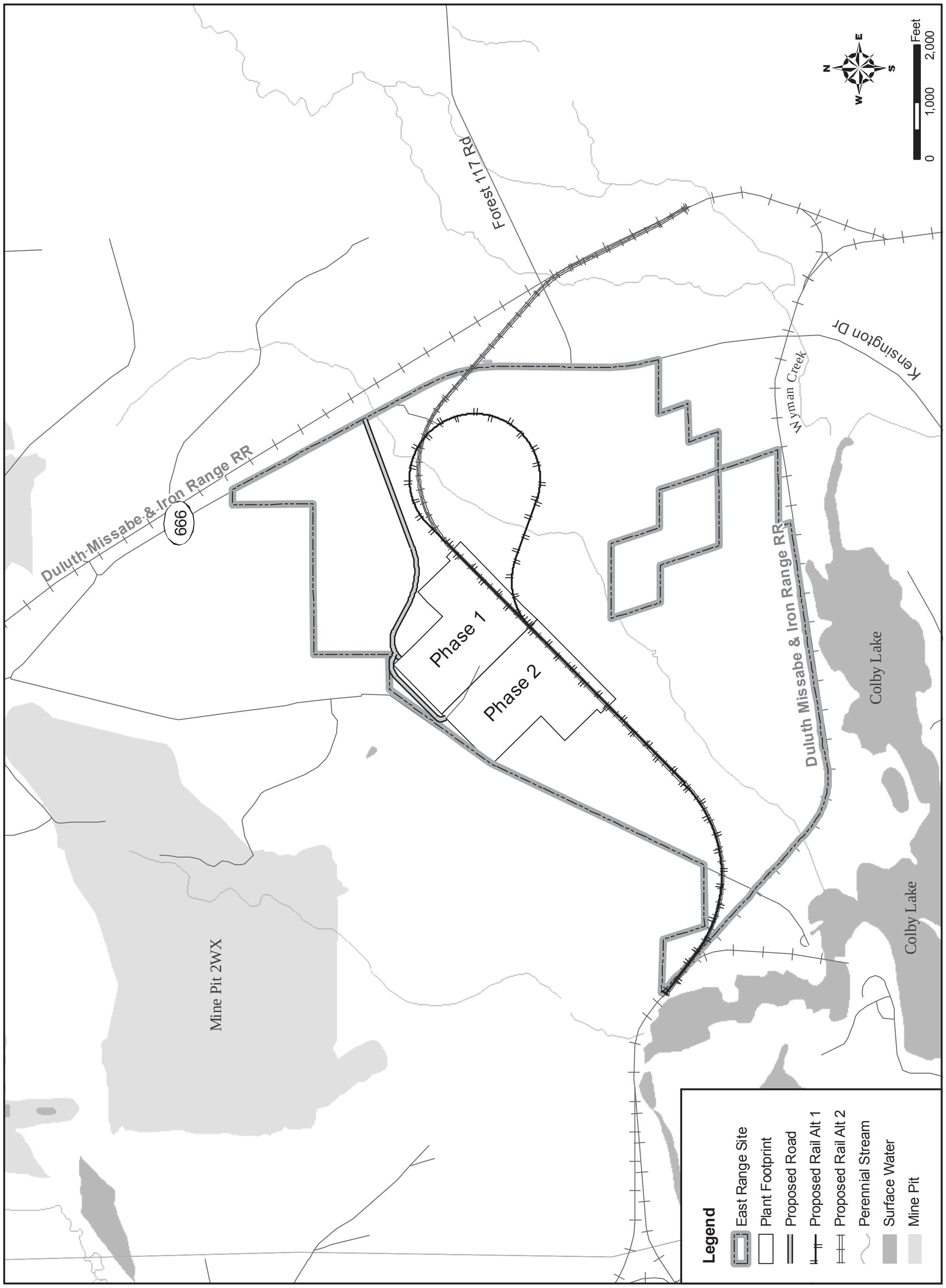

Figure S-3A. East Range Site

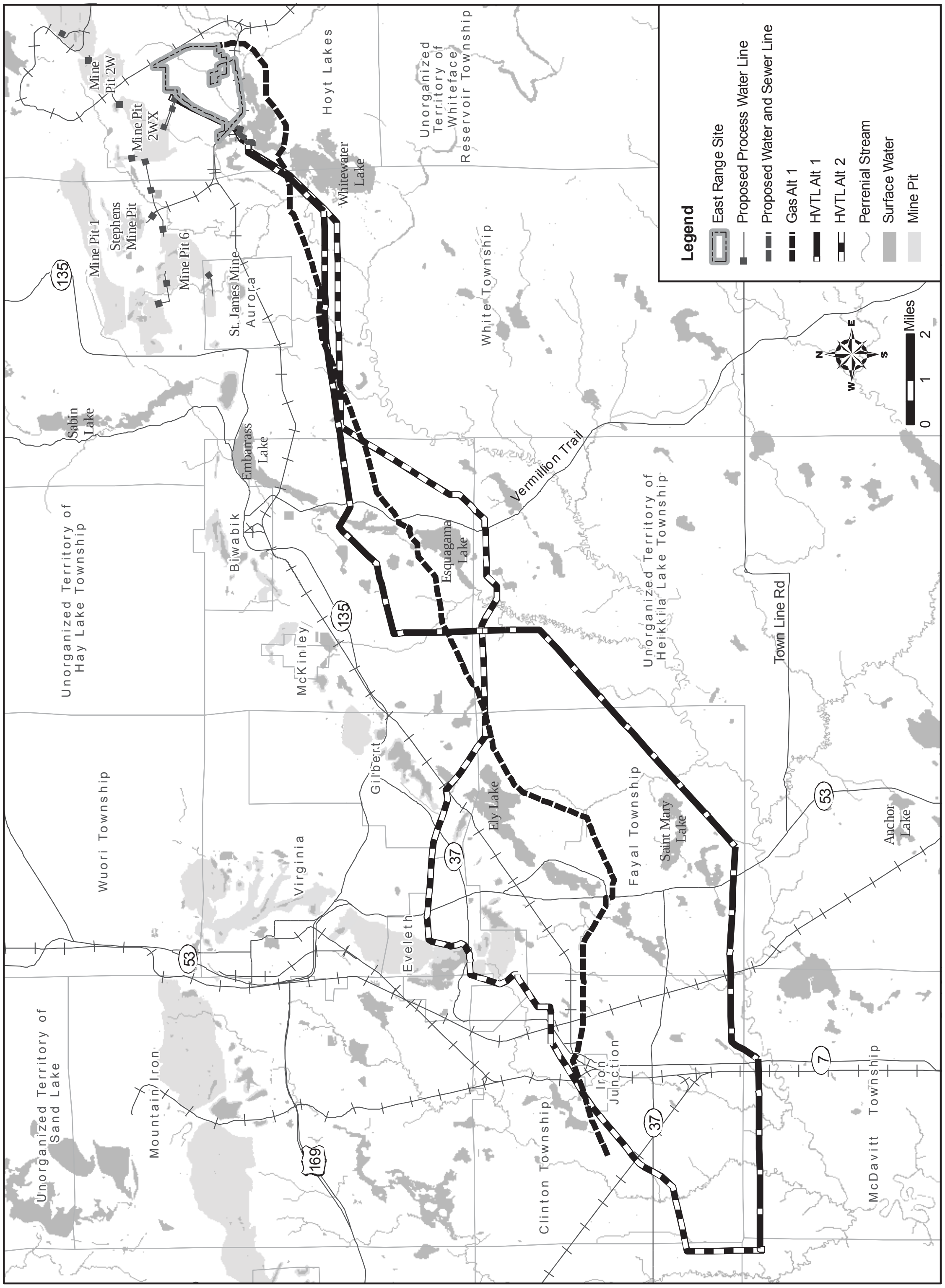

Figure S-3B. East Range Site and Corridors

EIS SCOPING

Because the EIS for the Mesaba Energy Project has been prepared as a joint Federal and state document to satisfy the requirements of NEPA and the Minnesota Power Plant Siting Act, the scoping requirements of both Federal and state legislation were applicable. The DOE public scoping process – including two public scoping meetings – was conducted early in the process as required by NEPA regulations. However, as required under state regulations, MDOC could not conduct public scoping meetings until after receipt of the joint permit application. Therefore, separate DOE and MDOC scoping meetings and scoping periods were held. However, representatives from DOE and MDOC attended all scoping meetings, and the agencies considered scoping comments received during both scoping periods.

DOE Scoping Process

DOE published the Notice of Intent (NOI) to prepare this EIS in the *Federal Register* on October 5, 2005 (70 *FR* 58207), and sent copies to Federal and state agencies. Publication of the NOI initiated the EIS process with a public scoping period (40 Code of Federal Regulations [CFR] Part 1501.7) for soliciting public input. The Federal EIS scoping period extended through November 14, 2005, and included two scoping meetings, one on October 25, 2005, in Taconite, Minnesota, and one on October 26, 2005, in Hoyt Lakes, Minnesota. These locations were selected for their close proximity to Excelsior's respective preferred and alternative sites.

DOE announced the public scoping meetings in the NOI and local newspapers. DOE also notified Federal, state, and local agencies; public officials; non-governmental organizations; and 26 Native American tribal governments, about the meetings. The public was encouraged to provide oral comments at the meeting and to submit comments to DOE by the close of the EIS scoping period. The NOI and announcements provided appropriate addresses and telephone numbers where comments could be communicated to DOE by U.S. Mail, e-mail, toll-free telephone, or facsimile. Collectively, 157 individuals attended the public scoping meetings. Twenty-nine individuals presented oral comments, and six comment sheets were submitted at the meetings. Additionally, 18 comments were submitted by e-mail, five letters were received by mail, four comments were received by facsimile, and two comments were received by telephone.

MDOC Scoping Process

The MDOC held two public scoping meetings for the project on consecutive nights, August 22 and 23, 2006, at the same facilities as the DOE public scoping meetings in Taconite and Hoyt Lakes, respectively. The scoping meetings were announced in the Environmental Quality Board (EQB) Monitor on July 31, 2006, and notices were published in local newspapers. Additionally, notice was sent to those persons whose names are on the EQB general notification list, regional and local governments, and each person whose property is adjacent to any of the proposed sites or routes. Approximately 300 individuals attended the public scoping meetings. All attendees were invited to provide comments, either written or oral, on the proposed project. In all, 50 comments were stated publicly at the meetings and 49 comments were submitted via e-mail, U.S. Mail, or facsimile. All of the various comment submissions were reviewed to characterize specific issues, concerns, and questions to ensure the consideration of all substantive concerns.

Additionally, a Citizens Advisory Task Force was established by the PUC to provide input to the scope of the EIS for the Mesaba Energy Project. The Task Force was requested to: (1) determine whether local site or route specific information as presented within the joint permit application is inaccurate or has missing information; (2) recommend which site- or route-specific impacts and issues of local concern should be assessed in the EIS; and (3) express a preference for either the preferred or alternative site contained within the joint permit application if a consensus can be reached. Task Force members were selected by the MDOC based on the responses to a solicitation letter, and the Task Force met three times during August 2006 at locations near the West and East Range Sites.

During the final meeting of the Task Force, several members expressed an interest in developing statements related to the project that could be supported by all members. A unanimous consensus was not reached on any of the proposed statements, but a majority of the members voted affirmatively on the following statements (note that the recommendations of the Task Force on limitations to the scope are not binding on DOE):

- *This Task Force recommends that a site or sites be permitted and built on the Iron Range, assuming that all environmental concerns are considered and adequately addressed in the Environmental Impact Statement.*
- *This Task Force recommends that any analysis of cumulative impacts only be conducted on projects that have the necessary permits in place to proceed with the construction of the facility.*

The Commissioner of MDOC issued the EIS Scoping Decision on September 13, 2006 (MDOC, 2006). The EIS Scoping Decision is contained in Appendix G of the EIS.

Outreach to Native American Tribes

During scoping, it was and remains DOE's goal that all Federally recognized tribes with historic or current affiliation to Minnesota and the project area would be invited to participate in the consultation process. DOE contacted the Minnesota Indian Affairs Council to inform the council of the project and elicit any support that it might provide in facilitating consultation with tribal organizations. In September 2005, DOE contacted representatives of 26 regional Native American tribes and reservations by letter to inform them of the project and initiate formal consultation.

DOE received responses from the Tribal Historic Preservation Offices (THPOs) of the Keweenaw Bay Indian Community, Flandreau Santee Sioux Tribe, the Lac Vieux Desert Band of Lake Superior Chippewa Indians, the Mille Lacs Band of the Ojibwe Indians, and the Leech Lake Band of Ojibwe Indians. Because not all tribes responded to the initial consultation letters sent in September 2005, follow-up consultation letters were sent to the tribes listed above in May 2006 inviting them again to submit any concerns they might have that had not as yet been submitted. Following scoping and before issuing the Draft EIS, DOE had discussions with representatives of 13 tribes and organizations by telephone in May and June of 2007.

Since publication of the Draft EIS, DOE has held eight meetings between February 2008 and October 2009 with a group of tribal representatives usually lasting two to three days each at locations in northern Minnesota recommended by the tribes. DOE also met separately with the Upper Souix Community on three occasions between September 2008 and September 2009. DOE has also held conference calls with tribal representatives. The purposes of these meetings were to understand the concerns and interests of the tribes in the Mesaba Energy Project. DOE invited the tribes to consider participation in a possible Programmatic Agreement (PA) between DOE and the Minnesota State Historic Preservation Office that would be necessary to satisfy DOE's responsibilities under Section 106 of the National Historic Preservation Act. At the request of the tribes, DOE has also participated in discussions regarding a separate Memorandum of Agreement among DOE, Excelsior, and the tribes.

Consultation with the tribes regarding the PA will continue beyond the distribution of this Final EIS. The consultations with Native American tribes are outlined in Sections 1.6 and 1.8 of this Final EIS. DOE expects that the efforts made in the consultation process described in this EIS will result in execution of the agreement by tribes involved in the process.

Scoping Issues

The scope of issues to be addressed in this EIS, and the significant issues related to the action, were determined through several means including:

- The preliminary identification of issues by DOE as a part of the early project planning and internal scoping;
- Additional issues identified by DOE as a result of state and Federal agency consultation and coordination with representatives of Native American tribes;
- The identification of issues and concerns expressed in comments received from the public and interested parties during the NEPA scoping process; and
- Additional issues and concerns expressed in comments received from the public and interested parties during the Minnesota Power Plant Siting Act scoping process.

The Mesaba Energy Project has been assigned PUC Docket Number E6472/GS-06-668. Documents submitted by Excelsior in conjunction with the state permitting process, including the joint permit application (Excelsior, 2006a) and the environmental supplement (Excelsior, 2006b), as well as other documents relating to the state review process, and copies of all comments submitted in response to the DOE and MDOC scoping meetings can be accessed at the PUC website:

http://energyfacilities.puc.state.mn.us/Docket.html?Id=16573

Comments received by DOE and MDOC during the respective public scoping periods, and which have been considered appropriately in this EIS, generally aligned in the following categories:

General Comments

Among the general comments received during the DOE scoping period, respondents raised concerns about the absence of direct notification to all adjacent landowners about the meeting, the limited amount of material available about the project before the meetings, the desire for more written information to be available about the project that could be taken home from the meetings, and questions about how the process would proceed after the meetings. Other comments emphasized that the project should meet all regulatory requirements, expressed concerns regarding the project's emission of greenhouse gases, and raised concerns about the protection of Native American tribal interests.

During the MDOC scoping period, similar concerns were raised. Also, a number of comments contained statements of opinion and rhetorical questions, such as the desirability of a particular site. Such comments were not assimilated into the MDOC Scoping Decision in all cases; however, the EIS has attempted to address the subjects raised to the extent appropriate.

Comments on the Purpose and Need

During the DOE scoping period, respondents expressed concerns about the need for the proposed facility, both from the perspective of electricity demand (e.g., exemption from the Certificate of Need) and from the perspective of whether coal use is the best choice to meet that demand. Others conveyed concerns about the long-term operation and viability of the demonstration plant. Respondents questioned whether the envisioned economic benefits of the proposed facility are valid, and whether economics should outweigh the potentially adverse environmental and human effects.

Many of the same comments were expressed during the MDOC scoping period. However, because Minnesota Statutes § 216B.1694, Subdivision 2, item 1 has exempted this facility from demonstrating need and because this facility qualifies as an "innovative energy project," issues related to the need, size, or type of the facility are excluded from consideration by the MDOC staff. Such issues are not within the scope of the state EIS.

Comments on the Proposed Action (Project Features)

During both the DOE and MDOC scoping periods, respondents recommended project information and details to be provided in the EIS, including process information, information about the expected efficiency and reliability of the plant, feedstocks, utility and resource requirements, emissions, and controls. Other comments addressed the size of the plant and the expected "footprint," rail alignments, transmission corridors, and various other features. This information has been incorporated into the project/process description sections of the EIS.

Comments on the Alternatives

Respondents during both scoping periods expressed concerns about the range of alternatives to be considered in the EIS. Specific comments were made regarding DOE's "No Fund" Alternative, as well as alternative site and technology selection (e.g., **G**reenfield versus **B**rownfield sites and the applicability of carbon sequestration technologies). Other respondents indicated that the project should include alternatives for renewable energy sources, such as wind and solar power that would reduce air pollutants, greenhouse gas emissions, and impacts on global climate change, or that the alternative of avoiding plant construction through increased energy efficiency and conservation should be considered. The range of alternatives available to DOE to satisfy DOE's purpose and need and to satisfy the goals of the CCPI is explained in this EIS; careful consideration was given to alternative technologies **within the context of CCPI**, including carbon sequestration. MDOC has determined that the project proponent has considered siting and routing alternatives as required by state law. MDOC will not, as part of its environmental review, consider whether a different size or different type of plant should be built instead, nor can the MDOC consider the "No Build" option.

Comments Related to Specific Environmental Resources

Numerous comments were received during both scoping periods with respect to specific natural and human environmental resources. The majority of the comments were related to the use of natural resources (e.g., coal, land, and water), the discharge of pollutants to the natural environment (e.g., air, water, and national parks), and the socioeconomic impacts of the project (e.g., jobs, taxes, and property values). Comments were also received relating to eminent domain, wetlands destruction, increased vehicular and rail traffic, the potential for adverse health effects, and demands on local community services (e.g., emergency responders, local water and sewer systems, and tourism/recreation). Native American tribal issues that were raised related to the following areas: surveys to identify cultural resources; protection of treaty rights to hunt, fish, and gather (i.e., potential impacts to wild game species, fisheries, and wild rice); avoidance or minimization of negative impacts to natural resources such as air quality, water quality, and wetlands; and cumulative effects. Concerns were also expressed by the public about connected actions and the cumulative effects of current industrial activities and future projects planned within the vicinity of the Mesaba Energy Project. MDOC incorporated these issues, along with the typical LEPGP, HVTL, and pipeline routing and siting impacts, into the proposed Order on the EIS

Scoping Decision. DOE has addressed these comments in respective resource sections throughout Chapter 4 of this EIS.

COMMENTS ON THE DRAFT EIS

The Draft EIS for the Mesaba Energy Project was published in November 2007. DOE and MDOC distributed copies of the Draft EIS to officials, agencies, Native American tribes, organizations, libraries and members of the public identified in the distribution list (Chapter 8 of the Draft EIS). MDOC announced the availability of the Draft EIS in the *EQB Monitor* on November 5, 2007 (Volume 31, Number 23, Page 9); DOE announced the Notice of Availability of the Draft EIS in the *Federal Register* on November 8, 2007 (72 *FR* 63169); and EPA published the Notice of Availability in the *Federal Register* on November 9, 2007 (72 *FR* 63579).

DOE and MDOC jointly held two public hearings for the Draft EIS, one in Taconite on November 27, 2007, and one in Hoyt Lakes on November 28, 2007 (at the same locations as the scoping meetings). DOE and MDOC advertised the hearings in the same regional newspapers as for the scoping meetings. Based on sign-in sheets, 107 individuals attended the Taconite hearing, and 34 individuals attended the Hoyt Lakes hearing. The public was encouraged to provide oral comments at the hearings and to submit written comments to DOE or MDOC by January 11, 2008.

Oral comments were given by 28 individuals at the Taconite hearing and by six individuals at the Hoyt Lakes hearing. In addition, DOE and MDOC received 88 written comments, including five from Federal agencies, four from state agencies, five from Native American tribal organizations, and several from national and regional non-governmental organizations and other affiliations.

The 122 oral statements and comment documents submitted by agencies, tribes, organizations, and individuals were subdivided into 770 comments distributed by subject area as listed in Table S-6. The distributions of comments by subject area are approximate, as numerous comments touched on two or more subjects. However, the distributions fairly depict the subject matters of concern to the 122 comment submitters. Representative concerns and issues expressed in the comments are summarized for the comments in each subject area. Volume 3 includes scanned images of the comment documents, beginning with the transcripts from both public hearings, and provides responses to all comments. DOE and MDOC considered all comments to the extent practicable in preparing the Final EIS.

Table S-6. Summary of Comments on the Draft EIS

Subject	Representative Issues and Concerns	Number of Comments
General	Inclusive of comments that could not be assigned to a particular subject area; general unfavorable and favorable comments about the project; concerns about the scope of the EIS; contentions that the EIS did not evaluate public scoping issues adequately; requests for corrections of claimed errors; and other comparable issues.	73
Cost	Cost of the project to taxpayers and rate payers; costs to residents and communities of adverse effects on recreational and natural resources.	13
Purpose & Need	Contentions about whether the need for the project has been adequately demonstrated; whether generation of electric power in northern Minnesota is justified by local need versus the needs of cities elsewhere.	41

Table S-6. Summary of Comments on the Draft EIS

Subject	Representative Issues and Concerns	Number of Comments
Proposed Action & Alternatives	Size and scope of the proposed action; justification for the proposed locations of sites and corridors; insufficient consideration of other potential sites; the reliance on coal and the lack of consideration for alternative energy sources or conservation measures.	43
Aesthetics	Visual impact of the proposed power plant to the surrounding communities.	4
Air Quality – General	Pollutant emissions by the proposed power plant and effects on local and regional air quality; adequacy of air modeling.	87
Air Quality – Climate Change	Volume of CO_2 and other greenhouse gases to be emitted by the proposed power plant and the effects on global climate.	19
Air Quality – Visibility	Potential for haze and visibility impacts in Class I areas; local visibility effects of emission plume.	26
Geology & Soils	Effects of plant siting on future mining of iron ore deposits; potential adverse effects on farmland soils.	7
Water Resources	Potential adverse effects of discharges to the Canisteo Mine Pit, Holman Lake, and the Swan River; effects of water withdrawals on mine pits; potential impacts on potable water wells.	124
Floodplains	No comments.	0
Wetlands	Potential loss or permanent conversion of wetlands for siting of plant facilities, transportation infrastructure, and utility corridors; impairment of wetland functions and quality; temporary impacts on wetlands.	37
Biological Resources	Potential loss or fragmentation of habitat and wildlife travel corridors; adverse effects on fisheries and aquatic resources from water withdrawals and effluent discharges; loss of woodland vegetation from clearing of site and corridors.	67
Cultural Resources	Need for surveys of corridors for potential archaeological resources; need for survey of East Range Site for potential archaeological resources; potential impacts on tribal heritage sites.	11
Land Use	Concerns about ownership of lands affected by utility corridors; questions about whether the sites provide adequate infrastructure for a project of its size.	7
Socioeconomics	Questions about the validity of predicted economic benefits and employment; concerns that beneficial effects won't accrue to the local communities; concerns about effects on housing; request to consider cost/benefit of proposed project.	52
Environmental Justice	Concerns about the impacts of the project on low income populations; disagreement with the geographic areas addressed in the environmental justice analysis.	9
Community Services	Effects of anticipated power plant demands on emergency response capacity in local communities; concerns about costs for emergency response being passed on to local taxpayers; effects on recreational resources and access.	5
Utility Systems	Need for new natural gas pipelines and HVTL corridors to serve the respective sites; potential need for extensive pipelines to transport CO_2 in the event of future capture and storage; effects of wastewater discharges on regional wastewater treatment plant that overflows during wet weather; effects on groundwater wells.	23
Traffic & Transportation	Effects of coal deliveries on rail traffic; questions about numbers of trains and effects of delays at crossings on local traffic.	17

Table S-6. Summary of Comments on the Draft EIS

Subject	Representative Issues and Concerns	Number of Comments
Materials & Waste Management	Potential for large quantities of slag and sulfur requiring landfill if no commercial markets are found; impacts on regional landfills; potential for spills of hazardous materials and effects on local responders.	24
Safety & Health	Health risks of plant emissions, especially particulates and mercury; bioaccumulation of mercury in fish; disagreement with characterization of at-risk receptors and impact areas.	39
Noise	Adverse noise levels from trains; effects of plant and rail operations on wilderness solitude.	2
Cumulative Impacts	Cumulative impacts analysis should use results of Minnesota Steel Final EIS; cumulative effects of industrial projects on treaty rights of Native American tribes to the use of natural resources;	11
Sequestration	Insufficient consideration for CO_2 capture and sequestration in EIS; energy expenditure required to build extensive CO_2 pipelines; potential amount of CO_2 that could be stored would not be significant in comparison to the amount of CO_2 that would be discharged under Excelsior's sequestration plan.	29

PRINCIPAL CHANGES BETWEEN THE DRAFT AND FINAL EIS

Table S-7 (new in the Final EIS) summarizes the principal changes in the project between the Draft EIS and Final EIS and explains how these changes affected respective sections in the Final EIS. The changes occurred as a result of comments on the Draft EIS as well as other circumstances not foreseen in the Draft EIS.

Table S-7. Changes Between Draft and Final EIS

Major Change to Final EIS	Site Affected	Basis and Description of Change	Section(s) of EIS Affected
Phase I versus Phase I and II	Both	At the request of USACE, the FEIS has been revised to describe the potential impacts of Phase I separately from the impacts of the combined two-phased project. In general, the separation of Phase I-only impacts results in the following changes: • Phase I-only plant would require half the footprint of the combined phases; • Material inputs/outputs for Phase I generally half of Phase II; • Not all water supply pipelines would be the same for Phase I and the combined phases: at West Range Site, water supply pipeline for Lind Mine Pit is only required for Phase II; similarly at East Range Site, not all Phase II waterlines would be constructed during Phase I, however, exact locations are unknown at this time due to uncertainties with nearby mining projects; • Domestic wastewater pipelines and potable water supply pipelines would be the same for both phases;	In Chapter 2, where necessary, the characteristics of Phase I are defined more specifically for differentiation from the combined phases I and II. (See Section 2.2 for descriptions of resource requirements, plant outputs, construction, and operations. See Section 2.3 for descriptions of plant and infrastructure features.) In Chapter 4, quantifiable impacts are presented separately for Phase I in comparison to the totals for both phases. Qualitative impacts are also discussed separately for Phase I only versus both phases.

Table S-7. Changes Between Draft and Final EIS

Major Change to Final EIS	Site Affected	Basis and Description of Change	Section(s) of EIS Affected
		• Length of natural gas pipelines would be the same for both phases; • Road and rail alignments would be the same for both phases; • Rail traffic would be half of Phase II rail traffic; vehicular traffic would be reduced but not half of Phase II traffic; • Noise would be reduced, but not half of Phase II noise; and • HVTL corridors would be as described in Sections 2.3.1.5 and 2.3.2.5 for respective sites.	
Avoidance and Minimization of Wetland Impacts	Both	Efforts were made by Excelsior/SEH to avoid and minimize wetland impacts at West Range property by adjusting plant footprint, rail, and road alignments Efforts were also made to avoid and minimize wetland impacts at East Range property. (These items are listed later in this table).	Appendix F2 (DOE Wetland and Floodplain Assessment) revised to explain the footprints and alignments considered and eliminated from further consideration based on the efforts taken to avoid and minimize wetland impacts. Only the alternatives listed later in this table were discussed in Volume 1 (main text) of the FEIS.
Enlarged Property Boundary	East Range	Excelsior acquired options on additional land between prior southern boundary and the CN rail alignment near Colby Lake. Additional property would increase the buffer land between the plant footprint and Hoyt Lake residences. The additional acreage at the East Range Site would remain undeveloped as buffer land.	References to East Range Site property acreage revised throughout document. Section 2.3.1.1 revised to describe Excelsior's option to acquire additional acreage at the East Range Site primarily to increase buffer land. In the event that any of the additional acreage would be disturbed for construction of facilities on the East Range Site, the impacts of the additional disturbance were identified where appropriate in Chapter 4 and affected acreage were considered in Section 5.2. Appendices D4 and D5 have been updated.

Table S-7. Changes Between Draft and Final EIS

Major Change to Final EIS	Site Affected	Basis and Description of Change	Section(s) of EIS Affected
Construction Laydown Areas	Both	Phase I construction: Phase II footprint would be used as staging/laydown area. Phase II construction: Several candidate locations near project site have been identified to serve as off-site staging and lay-down areas. Properties are owned by mineral extraction firms or tax forfeiture lands that have been cleared or disturbed, such properties and lands for which use as construction/laydown areas would not pose threats to surface waters, wetlands, or sensitive natural resources.	Section 2.2.4.1 revised to describe construction staging/laydown areas to be used for Phases I and II at both sites. Discussions of construction staging/laydown areas added to Sections 2.3.1.1 and 2.3.2.1, respectively, for the West Range and East Range sites. Resource sections in Chapter 4 edited as appropriate to identify impacts attributable to staging/laydown areas. Primarily affects Aesthetics, Wetlands, Biological Resources, Transportation, Noise, and to a lesser extent Land Use. Cumulative impacts analyses in Section 5.2 and Appendices D4 and D5 updated to reflect the revised acreages affected by construction staging/laydown areas.
Updates from System Impact Studies MISO Studies, Updates, and Actions affecting Network Upgrades	Both	West Range: An Optional System Impact Study confirmed that plans to construct a new 230 kV HVTL between the Clay Boswell and Wilton Substations (the latter near Bemidji, MN) and the Essar Minnesota steel plant – the latter of which is undergoing construction – would eliminate the need for network upgrades required to interconnect and inject 600 MWe of power from Mesaba Phase I to the regional electric grid at the Blackberry Substation (such upgrades including construction of a new 230kV HVTL between the Clay Boswell and Riverton Substations). East Range: The System Impact Study concluded that no network upgrades are required; however, the study was based on a maximum winter output of 552 MWe. A sensitivity analysis demonstrated that no injection limits requiring network upgrades were identified if the East Range IGCC Power Station would distribute 600 MWe.	Sections 2.2.2.4 and 4.14 updated to address the current status of MISO studies and decisions affecting Mesaba HVTLs.
Air Modeling for BACT and Visibility Analysis	Both	At the request of agencies and FLMs, Excelsior has provided a new modeling protocol by which impacts on air quality and visibility in Class I areas have been identified. Impacts of potential air emission scenarios based on modeling and visibility analysis results have been updated.	Discussions added to Sections 2.2.1.3 and 2.2.3.1 to explain the air emission control scenarios addressed by Excelsior in revised modeling and visibility analyses. Section 4.3 and Appendix B updated to discuss impacts of potential air emission scenarios based on modeling and visibility analysis results. Cumulative impact analysis updated in Section 5.2.2 and Appendix D1 based on revised air modeling.

Table S-7. Changes Between Draft and Final EIS

Major Change to Final EIS	Site Affected	Basis and Description of Change	Section(s) of EIS Affected
AERA Updates for Health Effects	Both	Based on agency comments on the DEIS, Excelsior and its consultants have conducted additional AERA analyses (independently reviewed by DOE) that generally increases the level of conservatism in the analysis and now addresses dioxin and furan emissions.	Sections 4.3 and 4.17 and Appendix C updated based on new AERA analysis. Cumulative impact analysis in Section 5.2.3 and Appendix D2 updated based on latest AERA results.
Implementation of enhanced ZLD system	West Range	After publication of the Draft EIS, Excelsior announced its commitment to implement an enhanced ZLD system for the West Range Site. Implementation of the enhanced ZLD system would eliminate all process wastewater discharge and reduce water demand. Process water requirements now the same as East Range Site: annual average of 3,500 gpm (Phase I) and 7,000 gpm (Phases I and II); annual peak of 5,000 gpm (Phase I) and 10,000 gpm (Phases I and II).	Sections 2.2.2.3 and 2.3.1.3 revised to discuss changes in process water requirements for the West Range Site. Section 2.2.3.2 revised to discuss elimination of process water effluents for West Range Site. Sections 4.5, 4.7, and 4.8 revised (and elsewhere as appropriate) to explain impacts of process water discharges would be avoided by ZLD. Cumulative impacts analyses in Section 5.2 and Appendices D3, D4, and D5 updated to reflect the elimination of the discharge pipelines and water quality improvements.
Plant Footprint Adjustment	West Range	West Range Site's plant footprint shifts approximately 280 feet to the northwest from the existing footprint outline. No change in size of footprint (same affected acreage amount); however, the Phase I and Phase II footprints would be reversed because of new Rail Alternative 3. Change in plant base elevation (rail yard is changed from 1,390 ft msl to approximately 1,405 ft msl; elevation from other plant tiers is minimally affected). Revised grading outside the plant footprint has increased fill slightly; however, amount of cut reduced is greater than amount of fill increased.	Section 2.3.1.1 revised to explain the shifting of the plant footprint toward the northwest and change in base elevation. Resource sections in Chapter 4 revised as appropriate to identify changes in impacts attributable to the footprint shift. Primarily affects Aesthetics, Wetlands, Biological Resources, and to a lesser extent Air, Land Use, and Noise. Cumulative impacts analyses in Section 5.2 and Appendices D4 and D5 updated to reflect the revised acreages affected by the plant footprint adjustment.

Table S-7. Changes Between Draft and Final EIS

Major Change to Final EIS	Site Affected	Basis and Description of Change	Section(s) of EIS Affected
Rail Alignment Alternative 3B	West Range	In response to agency comments on the DEIS to avoid and minimize impacts on wetlands, a new rail alignment, Alternative 3B, is now the preferred alternative. New alignment results in the following changes: • Routes rail loop around hill located to the northeast of the plant footprint avoiding substantial wetland acreage; • Adjustment in rail elevation affects base elevation of plant footprint by several feet resulting in reduced grading requirements (only the active coal yard would incur changes in elevation, not the entire footprint); and • Relocation of coal unloading point (nearly 2,000 feet closer to Diamond Lake Road) required by new rail loop would affect the duration of rail cars being located and moved in the vicinity of Diamond Lake Road residences.	Section 2.3.1.2 revised to explain the development and selection of Rail Alignment Alternative 3B as the new preferred rail alignment for the West Range Site. Resource sections in Chapter 4 edited as appropriate to identify impacts attributable to Alternative 3B. Primarily affects Aesthetics, Wetlands, Biological Resources, Transportation, Noise, and to a lesser extent Land Use. Cumulative impacts analyses in Section 5.2 and Appendices D4 and D5 updated to reflect the revised acreages affected by the new preferred rail alignment.
Proposed Access Road 3	West Range	In response to agency comments on the DEIS to avoid and minimize impacts on wetlands, a new road alignment, Access Road 3, is now the preferred alternative. The new alternative also avoids reliance on the proposed realignment of CR 7 by Itasca County, which has been deferred for the foreseeable future due to funding priorities. New road results in the following changes: • Locates access road at southwest corner of property and connecting with existing alignment of CR7 west of the Itasca County Solid Waste Transfer Station; • Places alignment within approximately 1000 feet of 2 residences north of CR7 outside western property boundary; and • Affects routing of utilities.	Section 2.3.1.2 revised to explain the development and selection of Access Road Alternative 3 as the new preferred alignment for the West Range Site. Resource sections in Chapter 4 edited as appropriate to identify impacts attributable to Alternative 3. Primarily affects Aesthetics, Wetlands, Biological Resources, Transportation, Noise, and to a lesser extent Land Use. Cumulative impacts analyses in Section 5.2 and Appendices D4 and D5 updated to reflect the revised acreages affected by the new preferred access road alignment.
Nashwauk Natural Gas Pipeline	West Range	After publication of the Mesaba Draft EIS, the Minnesota PUC issued a Pipeline Route Permit dated April 16, 2008 for Nashwauk Public Utilities Commission to construct and operate a 24-inch natural gas pipeline that would follow essentially the same route as the natural gas pipeline proposed by Excelsior for the Alternative 1 alignment between Blackberry and Taconite.	Sections 1.6.4, 2.1.2.1, and 2.3.1.4 updated to discuss planned construction of natural gas pipeline by Nashwauk PUC and potential purchase of natural gas by Mesaba in lieu of constructing a natural gas pipeline for the West Range Site. Where appropriate, resource sections in Chapter 4 updated.

Table S-7. Changes Between Draft and Final EIS

Major Change to Final EIS	Site Affected	Basis and Description of Change	Section(s) of EIS Affected
Access Road Alignment 2	East Range	After publication of the Draft EIS, Excelsior reconsidered the need for a looped access road based on comments received from USACE regarding potential impacts on wetlands. Therefore, as shown in revised Figure 2.3-6, only the southern portion of the access road described in the following paragraph would be constructed. Locates access road south of original proposed alignments to avoid wetlands and eliminates dual access roads originally proposed for improving traffic flow during construction.	Section 2.3.2.2 revised to explain the development and selection of Access Road Alternative 2 as the new preferred alignment for the East Range Site based on efforts made by DOE and Excelsior to avoid and minimize impacts on wetlands in response to agency comments on the DEIS. Resource sections in Chapter 4 edited as appropriate to identify impacts attributable to Alternative 2. Primarily affects Aesthetics, Wetlands, Biological Resources, Transportation, Noise, and to a lesser extent Land Use. Cumulative impacts analyses in Section 5.2 and Appendices D4 and D5 updated to reflect the revised acreages affected by the new preferred access road alignment.
Potential Water Use Conflicts with Neighboring Projects	East Range	Since publication of the Draft EIS, potential conflicts with other industrial users over Mine Pit 2 West Extension have developed. However, the Knox and Stephens Mine Pits are potential alternative reservoirs that could be used. Also, PolyMet Mining has proposed to reuse water from its dewatering activities instead of discharging it to the watershed (thus, not available for use by Excelsior).	Sections 2.3.2.3 and 4.5 revised to be consistent with updated water use plans of neighboring projects at the East Range Site. Appendix D3 also updated.

ENVIRONMENTAL IMPACTS

Chapter 3 of this EIS describes the baseline conditions for environmental resources that may be affected in the regions of influence for the preferred West Range and alternative East Range Sites. Chapter 4 analyzes the potential impacts or consequences that the Proposed Action and No Action Alternative may have on the respective environmental resources at the preferred and alternative sites. All substantive comments received during the public scoping process were considered in the impact analysis. Table **S-8** summarizes the impacts for the No Action Alternative and the Proposed Action at the West Range and East Range Sites for the 17 principal environmental resource subjects considered in this EIS. Chapter 5 provides discussions of mitigation, irreversible and irretrievable commitments, the relationship between short-term uses of the environment and the maintenance and enhancement of long-term productivity, and the potential for cumulative impacts resulting from the Proposed Action.

Table S-8. Summary Comparison of Impacts (Phases I & II)

No Action	West Range	East Range
Aesthetics		
No change in existing conditions; no change in viewsheds or aesthetic resources.	**Power Plant Site:** Change in viewshed for properties within sightline of power plant location. Security lighting and aircraft warning lights for power plant may be visible to closest residences (~50 within 1 mi). Three public lands are located within 20 mi, where vapor plumes may be visible at times (Hill Annex Mine State Park, Forest History Center, and Chippewa National Forest). See also: Noise. **Mesaba Generating Station (Phases I and II) would be twice the size of Phase I only and have 8 emission stacks instead of 4.** **No substantial differences in utility and transportation corridors for 2-phased plant compared to Phase I only.** **Transportation Facilities:** Aesthetic impacts from rail and road construction and operation for closest residences. See also: Noise. • Rail alt. 1A within 0.5 mi of 16 residences (closest within **470** ft). • Rail alt. 1B **eliminated based on Draft EIS.** • **Rail alt. 3B within 0.5 mi of 16 residences (closest within 470 ft).** • **Access Roads 1 and 2 eliminated after Draft EIS (CR 7 realignment deferred by Itasca County).** • **Access Road 3 within 0.5 mi of 2 residences (both within 1,250 ft).** **Water Sources and Discharges:** Temporary aesthetic impacts during construction. • Process water pipelines within 0.5 mi of 104 residences (4 within 500 ft). • Cooling water effluent pipelines **avoided using enhanced ZLD system.** • Potable/sanitary pipelines within 0.5 mi of 114 residences (4 within 500 ft). **Natural Gas Facilities:** Temporary aesthetic impacts during construction. Permanently cleared ROW (low-growing vegetation) • Alt. 1 within 0.5 mi of 153 residences (3 within 300 ft). • Alt. 2 within 0.5 mi of 339 residences (5 within 300 ft). • Alt. 3 within 0.5 mi of 935 residences (29 within 300 ft).	**Power Plant Site:** Change in viewshed for properties within sightline of power plant location. Security lighting and aircraft warning lights for power plant may be visible to closest residences (none within 1 mi). Site is on private land within Superior National Forest boundary, and two other public lands are located within 20 mi, where vapor plumes may be visible. See also: Noise. **Mesaba Generating Station (Phases I and II) would be twice the size of Phase I only and have 8 emission stacks instead of 4.** **No substantial differences in utility and transportation corridors for 2-phased plant compared to Phase I only.** **Transportation Facilities:** Aesthetic impacts from rail and road construction and operation for closest residences. See also: Noise. No residences within 0.5 mi of either rail alignment alternative (closest, ~1 mi). No residences within 0.5 mi of site access road (closest, >1 mi). **Water Sources and Discharges:** • No residences within 0.5 mi of process water pipeline segments (closest residence >0.75 mi). • No cooling water effluent pipeline (enhanced ZLD system). • No residences within 0.5 mi of potable/sanitary pipelines (closest >0.75 mi). **Natural Gas Facilities:** Temporary aesthetic impacts during construction. Proposed natural gas pipeline on existing pipeline ROW within 0.5 mi of 856 residences (46 within 300 ft).

Table S-8. Summary Comparison of Impacts (Phases I & II)

No Action	West Range	East Range
	HVTL Corridors: Change in viewshed for properties within sightline of new HVTLs (permanently cleared ROW with low-growing vegetation). Increased height and visibility of power poles in existing HVTL ROWs. • **HVTL Alt 1 (WRA-1 or WRB-1)** within 0.5 mi of 66 residences (4 within 500 ft). • **HVTL Alt 1A (WRA-1A or WRB-1A)** within 0.5 mi of 62 residences (7 within 500 ft). • **HVTL Phase 2 Plan B (WRB-2A)** existing HVTL ROW within 0.5 mi of 214 residences (29 within 500 ft).	**HVTL Corridors:** HVTLs on existing HVTL ROWs (<4 mi of new ROW); widening of one corridor required (permanently cleared ROW with low-growing vegetation). Increased height and visibility of power poles for properties within sightline of HVTLs. **Note that taller poles would be required for all HVTLs, but ROW widening would only occur on one of the two alignments.** • **HVTL Alt 1 (widen 38L ROW)** within 0.5 mi of 271 residences (22 within 500 ft). • **HVTL Alt 2 (widen 39L/37L ROW)** within 0.5 mi of 962 residences (49 within 500 ft).
	Air Quality	
No change in existing conditions; no new emissions affecting air quality.	**Power Plant Site:** The facility would be a major source of SO_2, NO_X, CO, PM_{10}, and VOCs (for both Phase I-only and combined Phases I and II) under the PSD regulations (Table 4.3-7). Annual emissions of criteria pollutants **for combined Phases I and II** would include **(emissions for Phase I-only would be halved in comparison to the levels that would occur during the combined phase):** • 1,390 tons of SO_2, • 2,872 tons of NO_X, • 2,539 tons of CO, • 0.03 tons of Pb, • **532** tons of PM_{10}, and • 197 tons of VOCs; Predicted concentrations for each pollutant would be below allowable levels under NAAQS and MAAQS. The plant would potentially emit 0.026 tons per year (tpy) of mercury (below the HAP threshold of 25 tpy)**. EPA recently decided to develop emissions standards for power plants consistent with the D.C. Circuit's 2008 ruling to vacate CAMR. Although the final MACT is unknown at this time, the Mesaba Energy Project would implement mercury control technology, which would meet or exceed any anticipated regulatory requirement as activated carbon beds to treat pre-combustion syngas would be state-of-the art technology.**	**Power Plant Site: Similar to the West Range Site, the facility at the East Range Site would be a major source of SO_2, NO_X, CO, PM_{10}, and VOCs (for both Phase I-only and combined Phases I and II) under the PSD regulations (Table 4.3-7). Annual emissions of criteria pollutants for the East Range Site would be the same as the West Range Site, except for PM_{10}, which would be 709 tons.** Because of the source water quality at the East Range Site, emissions of PM_{10} would be higher than at the West Range Site. Similar to the West Range Site, predicted concentrations for each pollutant would be below allowable levels under NAAQS and MAAQS. The plant would potentially emit 0.026 tpy of mercury (below the HAP threshold of 25 tpy). **EPA recently decided to develop emissions standards for power plants consistent with the D.C. Circuit's 2008 ruling to vacate CAMR. Although the final MACT is unknown at this time, the Mesaba Energy Project would implement mercury control technology, which would meet or exceed any anticipated regulatory requirement as activated carbon beds to treat pre-combustion syngas would be state-of-the art technology.**

Table S-8. Summary Comparison of Impacts (Phases I & II)

No Action	West Range	East Range
	Class II PSD increment analysis: Because the highest predicted impacts were significant (i.e., above PSD Significant Impact Levels [SILs]), increment and NAAQS compliance modeling was necessary for SO_2, PM_{10}, and NO_X (Table 4.3-9). Class II PSD increment analysis indicates that the project would comply with all state and Federal Class II increment limits **(for both the single and combined phases)**. **Results of Class II PSD increment analysis for Phases I and II combined (emissions for Phase I-only would be halved in comparison to the levels that would occur during the combined phase) are as follows:** • **SO_2 - 118.2 µg/m^3 for 1-hr averaging time; 71.2 µg/m^3 for 3-hr averaging time; 21.0 µg/m^3 for 24-hr averaging time; and 4.2 µg/m^3 for annual averaging time** • **PM_{10} – 24.8 µg/m^3 for 24-hr averaging time; and 1.7 µg/m^3 for annual averaging time** • **NO_2 – 7.6 µg/m^3 for annual averaging time**	**Class II PSD increment analysis: Because the highest predicted impacts were significant (i.e., above PSD Significant Impact Levels [SILs]), increment and NAAQS compliance modeling was necessary for SO_2, PM_{10}, and NO_X (similar to West Range Site) (Table 4.3-9). Class II PSD increment analysis indicates that the project would comply with all state and Federal Class II increment limits for both the single and combined phases. Results of Class II PSD increment analysis for Phases I and II combined (emissions for Phase I-only would be halved in comparison to the levels that would occur during the combined phase) are as follows:** • **SO_2 – 294.3 µg/m^3 for 1-hr averaging time; 200.4 µg/m^3 for 3-hr averaging time; 52.5 µg/m^3 for 24-hr averaging time; and 2.9 µg/m^3 for annual averaging time** • **PM_{10} – 26.3 µg/m^3 for 24-hr averaging time; and 0.7 µg/m^3 for annual averaging time** • **NO_2 – 8.1 µg/m^3 for annual averaging time**
	NAAQS/MAAQS evaluation calculated the maximum impact of the Mesaba Generating Station, combined with all other regional sources and background concentrations. For Phase I-only and Phases I and II combined, the following predicted concentrations are below allowable levels, and the results demonstrate compliance with all MAAQS and NAAQS (Tables 4.3-10 and 4.3-11): • **SO_2 – 521.9 µg/m^3 for 1-hr averaging time; 237.6 µg/m^3 for 3-hr averaging time; 73.3 µg/m^3 for 24-hr averaging time; and 8.6 µg/m^3 for annual averaging time** • **PM_{10} – 126.1 µg/m^3 for 24-hr averaging time; and 37.9 µg/m^3 for annual averaging time** • **$PM_{2.5}$ – 31.7 µg/m^3 for 24-hr averaging time; and 8.1 µg/m^3 for annual averaging time** • **NO_2 – 17.0 µg/m^3 for annual averaging time** • **CO – 8,959 µg/m^3 for 1-hr averaging time**	**NAAQS/MAAQS evaluation calculated the maximum impact of the Mesaba Generating Station, combined with all other regional sources and background concentrations. Similar to West Range Site, for Phase I-only and Phases I and II combined, the following predicted concentrations are below allowable levels, and the results demonstrate compliance with all MAAQS and NAAQS (Tables 4.3-10 and 4.3-11):** • **SO_2 – 565.1 µg/m^3 for 1-hr averaging time; 360.4 µg/m^3 for 3-hr averaging time; 166.5 µg/m^3 for 24-hr averaging time; and 30.8 µg/m^3 for annual averaging time** • **PM_{10} – 112.2 µg/m^3 for 24-hr averaging time; and 32.9 µg/m^3 for annual averaging time** • **$PM_{2.5}$ – 30.1 µg/m^3 for 24-hr averaging time; and 7.5 µg/m^3 for annual averaging time** • **NO_2 – 32.5 µg/m^3 for annual averaging time** • **CO – 11,565 µg/m^3 for 1-hr averaging time**

Table S-8. Summary Comparison of Impacts (Phases I & II)

No Action	West Range	East Range
	<u>Class I PSD increment analysis</u>: Class I PSD increment modeling for West Range Site was based on Phase I and Phase II both operating at the "proposed" emission rates. Class I area impacts analysis indicates that the project impacts would be below allowable increments for all pollutants in Class I areas (i.e., BWCAW, VNP, and RLW) for both the Phase I-only emissions and Phases I and II combined emissions (Table 4.3-13). Long-term impacts are also below the SILs, indicating that impacts would not be significant, with no further analysis necessary. However, impacts are indicated to exceed the SILs for short-term SO_2 and PM_{10} at both BWCAW and VNP; therefore, a cumulative impact analysis (includes other regional SO_2 and PM_{10} increment sources, as well as reasonably foreseeable sources) was conducted to quantify total PSD increment consumption at both sites. The cumulative air impacts analysis indicates that there would be no exceedance of state/Federal standards (including applicable SIL) in any Class I area. Additionally, the cumulative impacts analyses demonstrate that there would be minor differences in cumulative impacts between the West Range Site versus East Range Site (Section 5.2.2.2; Table 5.2.2.-2).	<u>Class I PSD increment analysis</u>: Because the East Range Site is in closer proximity to the Class I areas, the Class I PSD increment modeling for the East Range Site was based on Phase I operating at the "proposed" emission rates and Phase II was operating at the "enhanced" emission rates. Similar to the West Range Site, Class I area impacts analysis indicates that the project impacts would be below allowable increments for all pollutants in Class I areas (i.e., BWCAW, VNP, RLW, and IRNP – note, IRNP was analyzed for East Range Site due to proximity) for both the Phase I-only emissions and Phases I and II combined emissions (Table 4.3-14). Long-term impacts are also below the SILs, indicating that impacts would not be significant, with no further analysis necessary. However, impacts are indicated to exceed the SILs for short-term SO_2 and PM_{10} at BWCAW and short-term SO_2 at VNP; therefore, a cumulative impact analysis (includes other regional SO_2 and PM_{10} increment sources, as well as reasonably foreseeable sources) was conducted to quantify total PSD increment consumption at both sites. Similar to the West Range Site, the cumulative air impacts analysis indicates that there would be no exceedance of state/Federal standards (including applicable SIL) in any Class I area. Additionally, the cumulative impacts analyses demonstrate that there would be minor differences in cumulative impacts between the West Range Site versus East Range Site (Section 5.2.2.2; Table 5.2.2-2).
	<u>Class I Visibility/Regional Haze Analysis</u>: Visibility/regional haze analysis in Class I areas using Method 2 predict that there would be days with ≥5% change in light extinction or ≥10% change in light extinction (Table 4.3-15). Results based on Method 8, indicate that emissions associated with Phases I and II would have the potential to produce impacts above the 5% limit at BWCAW and VNP (Table 4.3-15). The following summarizes the visibility impacts analysis results for both Method 2 and Method 8: <u>BWCAW</u> • Method 2 (in a given year): 1 to 21 days of ≥5% light extinction and 0 to 6 days of ≥10% light extinction, depending on operating scenario.	<u>Class I Visibility/Regional Haze Analysis</u>: The visibility modeling analysis results for the East Range Site reflect the influence of the site's closer proximity to BWCAW by the commensurate higher predicted number of days with a change in light extinction above 5% and 10% for the same operating scenarios (Table 4.3-16). The following summarizes the visibility impacts analysis results for both Method 2 and Method 8: <u>BWCAW</u> • Method 2 (in a given year): 10 to 86 days of ≥5% light extinction and 0 to 29 days of ≥10% light extinction, depending on operating scenario. • Method 2 (2002-2004): 71 to 193 days of ≥5% light

Table S-8. Summary Comparison of Impacts (Phases I & II)

No Action	West Range	East Range
	• Method 2 (2002-2004): 5 to 54 days of ≥5% light extinction and 0 to 13 days of ≥10% light extinction, depending on operating scenario. • Method 8 (annual): 8th highest values would exceed the 5% limit for "proposed" / "proposed" (highest value, 5.13%). • Method 8 (20%): 8th highest values would exceed the 5% limit for "proposed" / "proposed" (highest value, 7.4%) and "proposed" / "enhanced" (highest value, 5.75%). **VNP** • Method 2 (in a given year): 1 to 22 days of ≥5% light extinction and 0 to 7 days of ≥10% light extinction. • Method 2 (2002-2004): 9 to 51 days of ≥5% light extinction and 1 to 12 days of ≥10% light extinction, depending on operating scenario. • Method 8 (annual): 8th highest values would exceed the 5% limit for "proposed" / "proposed" (highest value, 5.95%). • Method 8 (20%): 8th highest values would exceed the 5% limit for "proposed" / "proposed" (highest value, 8.57%) and "proposed" / "enhanced" (highest value, 6.64%).	extinction and 7 to 43 days of ≥10% light extinction, depending on operating scenario. • Method 8 (annual): 8th highest values would exceed the 5% limit for all operating scenarios modeled (highest value, 10.28%). • Method 8 (20%): 8th highest values would exceed the 5% limit for all operating scenarios modeled (highest value, 14.69%). **VNP** • Method 2 (in a given year): 1 to 7 days of ≥5% light extinction and 0 to 2 days of ≥10% light extinction. • Method 2 (2002-2004): 4 to 14 days of ≥5% light extinction and 0 to 3 days of ≥10% light extinction, depending on operating scenario. • Method 8 (annual): 8th highest values would exceed the 5% limit for none of the operating scenarios modeled. • Method 8 (20%): 8th highest values would exceed the 5% limit for "proposed" / "proposed" (highest value, 5.49%). **IRNP** • Method 2 (in a given year): 0 to 2 days of ≥5% light extinction and 0 to 1 days of ≥10% light extinction. • Method 2 (2002-2004): 1 to 2 days of ≥5% light extinction and 0 to 1 days of ≥10% light extinction, depending on operating scenario. • Method 8 (annual): 8th highest values would exceed the 5% limit for none of the operating scenarios modeled. • Method 8 (20%): 8th highest values would exceed the 5% limit for none of the operating scenarios modeled.

Table S-8. Summary Comparison of Impacts (Phases I & II)

No Action	West Range	East Range
	Odors from H_2S and NH_3 would be negligible, because associated processes would be enclosed. Sulfur and Nitrogen Deposition: The National Park Service (NPS) has established a Deposition Analysis Threshold (DAT) of 0.01 kg/hectare/yr for both sulfur (S) and nitrogen (N) deposition in Class I areas, which is the level below which adverse impacts are not anticipated. **No exceedances of the DAT for nitrogen would occur under any of the operating scenarios (Table 4.3-20). No exceedances of the DAT for sulfur would occur under the Phase I-only scenario; exceedances of the DAT for sulfur would occur at BWCAW for the "proposed"/"proposed" scenario and at VNP for the "proposed"/"proposed" and "proposed"/ "enhanced" scenarios.**	Odors from H_2S and NH_3 would be negligible, because associated processes would be enclosed. Sulfur and Nitrogen Deposition: The DAT of 0.01 kg/hectare/yr established by NPS for both S and N deposition in Class I areas would apply to the East Range Site. **DAT exceedances for nitrogen would occur at the BWCAW for all operating scenarios (Table 4.3-20). DAT exceedances for sulfur would occur at BWCAW for all operating scenarios and at VNP for the "proposed"/ "proposed" scenario. Further cumulative analysis on nitrogen and sulfur deposition impacts are discussed in Section 5.2.2.**
	Modeled mercury concentration over lakes and watershed (from AERMOD modeling) = 1.3 x 10^{-5} µg/m^3. The deposition rate for mercury would be **1.3 x 10^{-9} µg/m^2 per** sec over lakes and **6.5 x 10^{-9} µg/m^2 per** sec over the rest of the watershed. Big Diamond Lake would be within the release plume of future facility emissions; therefore, the concentration and rate of deposition was used to determine the incremental contribution of mercury in fish tissues caught from Big Diamond Lake (see Section 4.17, Health and Safety). Mercury emissions and subsequent deposition would be reduced by the high efficiency IGCC technology combined with the design-added mercury removal carbon absorption beds to ensure that mercury emissions from the facility would be less than 10 percent of the mercury in the feedstock. **Maximum predicted concentration of elemental mercury concentration in Class I areas due to operation of Phase I and Phase II is 1.6 x 10^{-6} µg/m^3 at VNP (0.11% of background concentration of elemental mercury). See Table 5.2.2-5. Phase I impacts would be roughly halved.** **Transportation Facilities:** Fugitive dust emissions during construction and operations from vehicle traffic, transportation of materials, and material handling. The impacts would be localized and would decrease with distance from site and alignments. **Relative to plant-wide emissions and considering sources are mobile, transportation-related emissions are considered negligible for both the single and combined phases; estimated transportation-related emissions are as follows (Phase I-only**	**Modeled mercury concentration over lakes and watershed (from AERMOD modeling) = 1.3 x 10^{-5} µg/m^3. The deposition rate for** would be **1.3 x 10^{-9} µg/m^2 per** sec over lakes and **6.5 x 10^{-9} µg/m^2 per** sec over the rest of the watershed. Colby Lake would be within the release plume of future facility emissions; therefore, the concentration and rate of deposition was used to determine the incremental contribution of mercury in fish tissues caught from Colby Lake based on the analytical results for Big Diamond Lake (see Section 4.17, Health and Safety). Mercury emissions and subsequent deposition would be reduced by the high efficiency IGCC technology combined with the design-added mercury removal carbon absorption beds to ensure that mercury emissions from the facility would be less than 10 percent of the mercury in the feedstock. **Maximum predicted concentration of elemental mercury concentration in Class I areas due to operation of Phase I and Phase II is 4.1 x 10^{-6} µg/m^3 at BWCA (0.28% of background concentration of elemental mercury). See Table 5.2.2-6. Phase I impacts would be roughly halved.** **Transportation Facilities:** Fugitive dust emissions during construction and operations from vehicle traffic, transportation of materials, and material handling. The impacts would be localized and would decrease with distance from site and alignments. **Relative to plant-wide emissions and considering sources are mobile, transportation-related emissions are considered negligible for both the single and combined phases; estimated transportation-related emissions are as follows (Phase I-only**

Table S-8. Summary Comparison of Impacts (Phases I & II)

No Action	West Range	East Range
	emissions would be half of levels occurring under the combined phase): • **Emissions from personally owned vehicles (POVs): During peak construction activities, the following daily emission rates (lb/day) would occur: 0.8 NO_x; 11 CO; 0.48 NMOC (non-methane organic compounds); and 0.2 PM. Peak traffic counts from project (during Phase I and II construction overlap) would still be minor fraction of existing AADT threshold and, therefore, impacts are considered negligible.** • **Emissions from rail deliveries: During operation, the following annual emissions would occur (tpy): 150,000 CO_2; 1.5 SO_2; 2,300 NO_x; 80 PM; and 410 CO.** • **Emissions from truck deliveries: During operation, the following annual emissions would occur (tpy): 7,700 CO_2; 0.1 SO_2; 60 NO_x; 0.8 PM; and 7 CO.** **Water Sources and Discharges, Natural Gas Facilities, and HVTL Corridors:** Fugitive dust emissions during construction related to the respective lengths of potential alignments.	**emissions would be half of levels occurring under the combined phase):** • **Emissions from POVs: During peak construction activities, the daily emission rates and impacts would be similar to those of West Range Site.** • **Emissions from rail deliveries: During operation, the following annual emissions would occur (tpy): 170,000 CO_2; 1.7 SO_2; 2,600 NOx; 90 PM; and 460 CO.** • **Emissions from truck deliveries: During operation, the following annual emissions would occur (tpy): 8,100 CO_2; 0.1 SO_2; 61 NOx; 0.8 PM; and 7 CO.** **Water Sources and Discharges, Natural Gas Facilities, and HVTL Corridors:** Fugitive dust emissions during construction related to the respective lengths of potential alignments.
Geology and Soils		
No change in existing conditions; no new land disturbance.	**Power Plant Site:** The plant footprint (Phases I & II) would occupy approximately **202** ac. Site grading and preparation for the plant footprint would require approximately **3,100,000** yd^3 of cut land and approximately **2,350,000** yd^3 of fill land. **The Phase II footprint would be cleared to serve as a laydown area for Phase I construction. Therefore, the amount of disturbed soil on site would not dramatically change between Phase I and Phase II construction. Offsite laydown areas for Phase II construction would be established on 85 ac of lands at 4 potential sites that have been disturbed from prior mining activities.** **All utilities and transportation infrastructure would be developed for operation of Phase I (no difference in impacts for Phase I-only outcome).** Although the site is situated on **152** ac of soils classified as prime farmland or prime farmland if drained, no agriculture uses currently occur on the property. The Minnesota Prime Farmland Exclusion Rule does not apply to the site which is within 2 mi of a statutory city **(Taconite)**.	**Power Plant Site:** The plant footprint (Phases I & II) would occupy approximately **182** ac. Based on site topography, grading and preparation for the plant footprint would require **approximately 3,349,000** yd^3 **of cut volume and less fill than the West Range Site**. **The Phase II footprint would be cleared to serve as a laydown area for Phase I construction. Therefore the amount of disturbed soil on site would not dramatically change between Phase I and Phase II construction. Offsite laydown areas for Phase II construction would be established on 85 ac of lands at 2 potential sites that have been disturbed from prior mining activities.** **All utilities and transportation infrastructure would be developed for operation of Phase I (no difference in impacts for Phase I-only outcome).** There are no areas designated as prime farmland within the East Range Site boundary and no agriculture uses currently occur on the property. The Minnesota Prime Farmland Exclusion Rule does not apply to the site which is within 2 mi of a statutory city.

Table S-8. Summary Comparison of Impacts (Phases I & II)

No Action	West Range	East Range
	Transportation Facilities: Construction impacts from rail and road alignments. No long-term operational impacts. • Rail alt. 1A would disturb **118** ac, require approximately **3,725,000** yd^3 of cut land and **610,000** yd^3 of fill land, and **affect** approximately **50** ac of prime farmland soils. • Rail alt. 1B **eliminated based on Draft EIS.** • **Rail alt. 3B would disturb 107 ac, require approximately 2,620,000 yd^3 of cut land and 620,000 yd^3 of fill land, and affect approximately 66 ac of prime farmland soils.** • **Access Roads 1 and 2 eliminated after Draft EIS (CR 7 realignment deferred by Itasca County).** • **Access Road 3 would disturb 20 ac, all of which are prime farmland soils.**	**Transportation Facilities:** Construction impacts from rail and road alignments. No long-term operational impacts. • Rail alt. 1 would disturb **53** ac and require approximately **2,390,000** yd^3 of cut land and less fill than at West Range. • Rail alt. 2 would disturb **58** ac and require approximately **2,180,000** yd^3 of cut land and less fill than at West Range. • Access road construction **(single segment)** would disturb **26** ac. Impacts on prime farmland could not be determined from data available, because the soil survey for St. Louis County has not been completed. **However, the Minnesota Prime Farmland Exclusion Rule does not apply to the alignment which is in or within 2 mi of a statutory city (Hoyt Lakes).**
	Water Sources and Discharges: Construction of process water supply pipelines would disturb **134** ac and occupy **55** ac of prime farmland soils. Cooling water effluent pipelines **avoided using enhanced ZLD system**. Potable/sanitary pipelines would disturb **9** ac and occupy **<1** ac of prime farmland. **Natural Gas Facilities:** Construction impacts of alignments. • Alternative 1 would disturb **135** ac. • Alternative 2 would disturb **84** ac. • Alternative 3 would disturb **99** ac.	**Water Sources and Discharges:** Construction of process water supply pipelines would disturb approximately 109 ac. No cooling water effluent pipelines required (due to the use of an enhanced ZLD system). Potable/sanitary pipelines would disturb 25 ac. Impacts on prime farmland could not be determined (soil survey for St. Louis County not complete). **Natural Gas Facilities:** Pipeline would be constructed within an existing gas pipeline ROW requiring disturbance of **259** ac.
	HVTL Corridors: Impacts of alignments. • **HVTL Alt 1 (WRA-1 or WRB-1)** would disturb 134 ac and occupy <1 ac of prime farmland soils. • **HVTL Alt 1A (WRA-1A or WRB-1A)** would disturb **136** ac and occupy <1 ac of prime farmland soils. • **HVTL Phase 2 Plan B** (WRB-2A) would disturb land on an existing HVTL ROW.	**HVTL Corridors:** HVTLs constructed on existing HVTL ROWs with new towers (<4 mi of new ROW); widening of one or the other corridor required. • **HVTL Alt 1 (widen 38L ROW)** would disturb **about** 457 ac. • **HVTL Alt 2 (widen 39L/37L ROW)** would disturb **about** 455 ac.

Table S-8. Summary Comparison of Impacts (Phases I & II)

No Action	West Range	East Range
Water Resources		
No changes to water resources in the project area. **At West Range Site, potential to aid the state in maintaining mine pits that are currently being pumped (HAMP) or may overflow (CMP) would not occur. No benefits to water quality of Swan River as a result of funded I/I studies and planned improvements at CBT WWTF. At East Range Site, potential to aid other industrial users (e.g., PolyMet) in the treatment of their wastewaters would not occur.**	**Power Plant Site:** Disturbance of land areas during plant construction, as summarized for Geology and Soils, would create potential for erosion and sedimentation. Impacts on surface waters would be minimized through the implementation of an erosion and sediment control (ESC) plan required for a National Pollutant Discharge Elimination System (NPDES) General Construction Permit. Potential impacts during operation would be minimized through the implementation of a stormwater pollution prevention plan (SWPPP) based on state requirements. **All stormwater discharges (within a 24-hour, 100-year storm event) would be eliminated, as stormwater would be treated and reused within the plant, primarily for cooling water**. No impacts on groundwater from the construction or operation of the plant are expected. **Transportation Facilities:** Disturbance of land areas during road and railway construction, as described for Geology and Soils. Impacts on surface waters would be minimized through the implementation of a SEC plan required for a NPDES General Construction Permit. No impacts on surface waters or groundwater from the operation of the road and railway expected. **Water Sources and Discharges: No direct discharge of any process wastewaters to surface waters would occur due to the enhanced ZLD system. During Phase I, annual process water demand** from CMP and interconnected mine pits would not adversely affect water sources. Lowering of water level in CMP would reduce potential for overflow impacts on Coleraine and Bovey. **At the end of the 30-year project life, concentration of phosphorous in the CMP would increase from 0.0037 mg/L to 0.0057 mg/L; however, this predicted concentration is below the state's standard of 1 mg/L and is expected to have minimal impact on biota in the CMP. During Phase II, water demand would lower water levels in HAMP Complex and may cause exposure of land bridges. Use of HAMP would require consultation with MNDNR to determine agency's operating priorities and to ensure minimal impacts to water resources. Elimination of LMP's discharge to the Prairie River represents 1.3 percent of river's average annual flow during normal operating conditions for Phase II. During dry seasons, Prairie**	**Power Plant Site:** Disturbance of land areas during plant construction, as summarized for Geology and Soils, would create potential for erosion and sedimentation. Impacts on surface waters would be minimized through the implementation of an ESC plan required for a NPDES General Construction Permit. Potential impacts during operation would be minimized through the implementation of a SWPPP based on state requirements. **All stormwater discharges (within a 24-hour, 100-year storm event) would be eliminated, as stormwater would be treated and reused within the plant, primarily for cooling water**. No impacts on groundwater from the construction or operation of the plant are expected. **Transportation Facilities:** Disturbance of land areas during road and railway construction, as described for Geology and Soils. Impacts on surface waters would be minimized through the implementation of a SEC plan required for a NPDES General Construction Permit. No impacts on surface waters or groundwater from the operation of the road and railway expected. **Water Sources and Discharges: No direct discharge of any process wastewaters to surface waters would occur due to the enhanced ZLD system. During Phase I, annual process water demand of 3,500 gpm (average) and 5,000 gpm (peak) from interconnected mine pits would not adversely affect water sources. During Phase II, water demand would cause fluctuations of water levels in Colby Lake, which is expected to result in minor impacts to fish populations, boat access and property values; greater fluctuation may occur in Whitewater Reservoir, which may cause similar impacts, but to a greater extent, depending on level of fluctuation. Excelsior would conduct further hydrologic modeling and investigations into limiting losses of water from Whitewater Reservoir as part of the water appropriation permit process. Any credit ultimately ascribed to recovering waters leaking from Whitewater Reservoir would be required to be supported by in-depth studies conducted in conjunction with input from the MNDNR. There are potential water quality benefits to the**

Table S-8. Summary Comparison of Impacts (Phases I & II)

No Action	West Range	East Range
	River's normal low flow could be reduced by approximately 18 percent. If necessary, to protect river flows during such events, Excelsior would curtail direct appropriations from the river and instead withdraw from stored capacity in other mine pits. **I/I studies and planned improvements at the CBT WWTF would improve water quality of Swan River watershed.** Potable water use of 7,500 gpd during operation would not adversely affect Taconite water system, however, the existing water system does not have sufficient capacity to provide the 45,000 gpd during construction. Planned improvements to the system would be necessary to handle this demand, or Excelsior would provide potable water via truck during construction. Domestic wastewater discharges would be within the effective treatment capacity of the regional facility. **Natural Gas Facilities:** Best management practices (BMPs) would be implemented to minimize impacts from erosion and sedimentation during construction. **HVTL Corridors:** BMPs would be implemented to minimize impacts from erosion and sedimentation during construction.	**Lake Superior Basin watershed from providing treatment to industrial users' wastewaters.** Potable water use of 45,000 gpd during construction and 7,500 gpd during operation would not adversely affect the Hoyt Lakes water system. Domestic wastewater discharges would be within the effective treatment capacity of the municipal facility. **Natural Gas Facilities:** BMPs would be implemented to minimize impacts from erosion and sedimentation during construction. **HVTL Corridors:** BMPs would be implemented to minimize impacts from erosion and sedimentation during construction.
	Floodplains	
No change in existing conditions; no impact on floodplains.	**Power Plant Site:** No impact. The site is approximately one mile from the nearest 100-year floodplain, along the Prairie River. **None of the candidate sites for Phase II staging and laydown activities is located within or would otherwise affect a 100-year floodplain.** **Transportation Facilities:** No impact. Proposed rail and access road alignments would be located outside of the 100-year floodplain. **Water Sources and Discharges:** No impact. Construction of pipelines would occur outside of the 100-year floodplain. **Natural Gas Facilities:** Temporary impacts may occur during construction of natural gas pipeline alt. 1, 2, or 3 as a result of trenching, stockpiling of soil, and storage of equipment where pipelines would cross the 100-year floodplain of Swan River or Prairie River However, impacts would be mitigated through the use of construction BMPs, and floodplain contours would be restored	**Power Plant Site:** No impact. The site is approximately one mile from the nearest 100-year floodplain, along the Partridge River. **None of the candidate sites for Phase II staging and laydown activities is located within or would otherwise affect a 100-year floodplain.** **Transportation Facilities:** No impact. Proposed rail and access road alignments would be located outside of the 100-year floodplain. **Water Sources and Discharges:** No impact. Construction of pipelines would occur outside of the 100-year floodplain. **Natural Gas Facilities:** Temporary impacts may occur during construction of the natural gas pipeline as a result of trenching, stockpiling of soil, and storage of equipment where the pipeline would cross the 100-year floodplain of the Partridge River. However, impacts would be mitigated through the use of construction BMPs, and floodplain contours would be restored

Table S-8. Summary Comparison of Impacts (Phases I & II)

No Action	West Range	East Range
	following construction. No permanent impacts on flood elevations would occur, because the pipelines would be located below the land surface. **HVTL Corridors:** No impact. Construction of HVTLs would occur outside of the 100-year floodplain.	following construction. No permanent impacts on flood elevations would occur, because the pipelines would be located below the land surface. **HVTL Corridors:** Temporary impacts may occur during widening of HVTL corridors (38L or 39L/37L) where the HVTLs would cross the 100-year floodplain of the Partridge, Embarrass, or East Two River. No permanent impact on flood elevations would occur, because permanent structures would be limited to HVTL towers that have small footprints.
Wetlands		
No change in existing conditions; wetlands would remain in their current status.	**Power Plant Site:** Wetland **fill for** the plant footprint (Phases I & II) would be approximately 31 ac **(13 ac for Phase I and 18 ac for Phase II)**. **No wetlands would be disturbed for use of offsite laydown areas to support Phase II construction.** **All utilities and transportation infrastructure would be developed for operation of Phase I (no difference in wetland impacts for Phase I-only outcome).** **Transportation Facilities:** Construction of rail and road access would result in **filling of wetlands and potential isolation of wetlands in rail loops:** • Rail alt. 1A would **fill 18 ac of wetlands and isolate 58 ac of additional wetlands in the rail loop**. • Rail alt. 1B **eliminated based on Draft EIS**. • **Rail alt. 3B would fill <6 ac of wetlands.** • **Access Roads 1 and 2 eliminated after Draft EIS (CR 7 realignment deferred by Itasca County).** • **Access Road 3 would fill <0.2 ac of wetlands.** **Water Sources and Discharges:** Construction of pipelines: • Process water supply pipelines would **permanently convert <5 ac and temporarily affect <3 ac of wetlands.** • Cooling water effluent pipelines **avoided using enhanced ZLD system**. • Potable/sanitary pipelines would **be installed in ROW developed for other plant infrastructure; no additional impacts**. **Natural Gas Facilities:** Construction of pipelines:	**Power Plant Site:** Wetland **fill for** the plant footprint (Phases I & II) would be approximately **17** ac **(13 ac for Phase I and <4 ac for Phase II)**. **No wetlands would be disturbed for use of offsite laydown areas to support Phase II construction.** **All utilities and transportation infrastructure would be developed for operation of Phase I (no difference in wetland impacts for Phase I-only outcome).** **Transportation Facilities:** Construction of rail and road access would result in **filling of wetlands and potential isolation of wetlands in rail loops:**: • Rail alt. 1 would **fill 13 ac of wetlands and isolate 51 ac of additional wetlands in the rail loop**. • Rail alt. 2 would **fill 18 ac of wetlands** (no center loop). • Access road construction **(single road segment)** would **fill <0.5 ac of wetlands**. **Water Sources and Discharges:** Construction of pipelines: • Process water supply pipelines would **permanently convert <2 ac and temporarily affect <1 ac of wetlands**. • No cooling water effluent pipelines required (due to the enhanced ZLD system). • No wetlands are located in the alignments for potable/sanitary pipelines **(would affect 1.1 ac segment of Colby Lake)**. **Natural Gas Facilities:** Construction of the natural gas pipeline would **permanently convert <0.5 ac and temporarily affect 24 ac of wetlands**.

Table S-8. Summary Comparison of Impacts (Phases I & II)

No Action	West Range	East Range
	• Alt. 1 would **permanently convert 16 ac and temporarily affect <5 ac of wetlands**. • Alt. 2 would **permanently convert 11 ac and temporarily affect <2 ac of wetlands**. • Alt. 3 would **permanently convert 4 ac and temporarily affect 8 ac of wetlands**. **HVTL Corridors:** Construction of HVTLs. • **HVTL Alt 1 (WRA-1 or WRB-1) would fill 0.01 ac, permanently convert 36 ac and temporarily affect 2 ac of wetlands**. • **HVTL Alt 1A (WRA-1A or WRB-1A) would fill 0.01 ac, permanently convert 25 ac and temporarily affect 4 ac of wetlands.** • **HVTL Phase 2 Plan B (WRB-2A) would fill 0.03 ac of wetland (construction in existing ROWs; no additional impacts).**	**HVTL Corridors:** HVTLs would be constructed on existing HVTL ROWs with new towers (<4 mi of new ROW); widening of one or the other corridor would be required. • **HVTL Alt 1 (widen 38L ROW) would fill 0.09 ac, permanently convert 62 ac and temporarily affect negligible ac of wetlands**. • **HVTL Alt 2 (widen 39L/37L ROW) would fill 0.09 ac, permanently convert 60 ac and temporarily affect 0.2 ac of wetlands**.
	Biological Resources	
No change in existing conditions; biological resources would remain in current status.	**Power Plant Site:** Approximately **202** ac of vegetation **and habitat** would be lost or destroyed from construction for **the plant footprint in both phases (111 ac** for Phase I and **92 ac** for Phase II). **DOE determined, based on a Biological Assessment (see Appendix E), that the project may affect, but would not likely adversely affect, the Canada lynx or gray wolf; the USFWS has concurred with DOE's determination for the West Range Site. USFWS has also concurred with DOE's determination that the project is not likely to adversely affect the bald eagle.** Eight state-listed plant species (17 occurrences) in general area of site, but no occurrences within the site boundary. Possible, but unlikely, that these species could be affected. **85 ac of land on 4 potential sites would be cleared for offsite laydown areas to support Phase II construction. All 4 sites have been disturbed during prior mining activities.** **All utilities and transportation infrastructure would be developed for operation of Phase I (no difference in impacts for Phase I-only outcome).**	**Power Plant Site:** Approximately **183** ac of vegetation **and habitat** would be lost or destroyed from construction for **the plant footprint in both phases (98 ac** for Phase I and **85 ac** for Phase II. **DOE determined, based on a Biological Assessment (see Appendix E), that the project may affect, but would not likely adversely affect, the Canada lynx or gray wolf at the East Range Site; however, the USFWS stated that agency policy precludes consultation on more than one site and that it would only concur on the DOE determination for one of the two sites. DOE agreed that in the event that the East Range Site would be selected by the MPUC in the site permitting process, DOE would re-initiate consultation for the East Range Site. USFWS has concurred with DOE's determination that the project is not likely to adversely affect the bald eagle.** No known occurrences of state-listed species within 1 mi of site. **85 ac of land on 2 potential sites would be cleared for offsite laydown areas to support Phase II construction. Both sites have been disturbed during prior mining activities.** **All utilities and transportation infrastructure would be developed for operation of Phase I (no difference in impacts for Phase I-only outcome).**

Table S-8. Summary Comparison of Impacts (Phases I & II)

No Action	West Range	East Range
	Transportation Facilities: Construction of rail and road access: • Rail alt. 1A: **92** ac of vegetation **and habitat would be** lost or destroyed **(80 ac additional habitat in rail loop may be affected without Excelsior's assurances to the contrary)**. No known occurrences of state-listed species within 1 mi. • Rail alt. 1B: **Eliminated based on Draft EIS**. • **Rail alt. 3B: 94 ac of vegetation and habitat would be lost (212 ac additional habitat in rail loop may be affected). No known occurrences of state-listed species within 1 mi.** • **Access Roads 1 and 2 eliminated after Draft EIS (CR 7 realignment deferred by Itasca County).** • **Access Road 3: 12 ac of vegetation and habitat would be lost; 8 ac would additionally be cleared for construction. No known occurrences of state-listed species within 1 mi.**	**Transportation Facilities:** Construction of rail and road access: • Rail alt. 1**: 53 ac of vegetation and habitat would be lost (105 ac additional habitat in rail loop may be affected without Excelsior's assurances to the contrary).** Two stream crossings could cause direct mortality to aquatic biota, habitat fragmentation/conversion, increased water temperature, and increased sedimentation (causing loss in macroinvertebrate communities). No known occurrences of state-listed species within 1 mi. • Rail alt. 2**: 58 ac of vegetation and habitat would be lost (no rail loop).** One stream crossing could cause direct mortality to aquatic biota, habitat fragmentation/conversion, increased water temperature, and increased sedimentation (causing loss in macroinvertebrate communities). No known occurrences of state-listed species within 1 mi. • Access road **(single road segment)** would result in the loss of **16** ac of **habitat; 10 ac would additionally be cleared for construction**. No known occurrences of state-listed species within 1 mi.
	Water Sources and Discharges: Construction of pipelines: • Process water supply pipelines would result in **conversion of 47 ac of wooded habitat to grassland habitat as well as clearing 46 ac of additional habitat during construction**. Five known occurrences of five state-listed plant species within 1 mi of proposed pipeline. Possible, but unlikely, that these species could be affected by construction (usually found in different habitat types). • Cooling water effluent pipelines **avoided using enhanced ZLD system.** • Potable/sanitary pipelines would cause the **conversion of 1 ac of wooded habitat to grassland habitat as well as clearing 6 ac of additional habitat during construction.**	**Water Sources and Discharges:** Construction of pipelines: • Process water supply pipelines would result in the **conversion of 21 ac of wooded habitat to grassland habitat as well as clearing 38 ac of additional habitat during construction**. No known occurrences of state-listed species within 1 mi. • No cooling water effluent pipelines (due to the use of an enhanced ZLD system). • Potable/sanitary pipelines would cause the **conversion of 2 ac of wooded habitat to grassland habitat as well as clearing 12 ac of additional habitat during construction**. No known occurrences of state-listed species within 1 mi of potable/sanitary pipelines.
	Natural Gas Facilities: • Alt 1 would cause the **conversion of 76 ac of wooded habitat to grassland habitat as well as clearing 32 ac of additional habitat during construction.** Nine known occurrences of seven state-listed plant species within 1 mi of proposed pipeline. Possible, but unlikely, that these species could be affected by construction (usually found in different habitat types).	**Natural Gas Facilities:** Proposed alignment would cause the **conversion of 24 ac of wooded habitat to grassland habitat as well as clearing <2 ac of additional habitat during construction**. Five occurrences of three state-listed plant species and seven occurrences of two state-listed animal species within 1 mi of proposed pipeline. Possible that construction could affect these species.

Table S-8. Summary Comparison of Impacts (Phases I & II)

No Action	West Range	East Range
	• Alt 2 would cause the **conversion of 36 ac of wooded habitat to grassland habitat as well as clearing 6 ac of additional habitat during construction.** Three known occurrences of one state-listed plant species within 1 mi of proposed pipeline. Possible, but unlikely, that these species could be affected by construction (usually found in different habitat types). • Alt. 3 would cause the **conversion of 30 ac of wooded habitat to grassland habitat as well as clearing 20 ac of additional habitat during construction**. No known occurrences of state-listed species within 1 mi.	
	HVTL Corridors: • **HVTL Alt 1 (WRA-1 or WRB-1)** would cause the **conversion of 70 ac of wooded habitat to field/meadow habitat as well as clearing 22 ac of additional habitat during construction**. Seven occurrences of five state-listed plant species within 1 mi of proposed HVTL, which could be affected during construction and operation. • **HVTL Alt 1A (WRA-1A or WRB-1A)** would cause the **conversion of 70 ac of wooded habitat to field/meadow habitat as well as clearing 29 ac of additional habitat during construction**. Seven occurrences of five state-listed plant species within 1 mi of proposed HVTL, which could be affected during construction and operation. • **HVTL Phase 2 Plan B (WRB-2A)** would not have a permanent impact on vegetation because it would be located within an existing HVTL corridor. Eleven occurrences of eight state-listed plant species and one occurrence of a state-listed animal species within 1 mi of proposed HVTL, which could be affected during construction and operation.	**HVTL Corridors: With the exception of two 2-mi segments, all HVTLs would be constructed on existing HVTL ROWs with new towers; widening of one or the other corridor would be required.** • **HVTL Alt 1 (widen 38L ROW)** would cause the **conversion of 219 ac of wooded habitat to field/meadow habitat; additional construction would be limited to existing ROW**. Eight occurrences of five state-listed plant species and eight occurrences of two state-listed animal species within 1 mi of proposed HVTL, which could be affected during construction and operation. • **HVTL Alt 2 (widen 39L/37L ROW)** would cause the **conversion of 219 ac of wooded habitat to field/meadow habitat; additional construction would be limited to existing ROW**. Two occurrences of two state-listed plant species and 16 occurrences of three state-listed animal species within 1 mi of proposed HVTL, which could be affected during construction and operation.

Table S-8. Summary Comparison of Impacts (Phases I & II)

No Action	West Range	East Range
Cultural Resources		
No new structures built, no archaeological or Native American sites disturbed.	**Power Plant Site:** Located within Western Mesabi Iron Range Early Mining Landscape District. MN State Historic Preservation Office (SHPO) has 11 historic properties recorded within the area of potential effect for the West Range Site and corridors. Coordination with SHPO required during construction to avoid or minimize potential impacts to the historic character of the District. No known archaeological resources or Native American cultural resources known to exist within 1 mi of site. The potential for the occurrence of archaeological resources is high within 55 ac (1%) and moderate on 108 ac (2%) of the site **(1,344 acres)**. Consistent with the recommendations of the SHPO, a Phase I archaeological survey of locations with high and medium potential was conducted in 2007. Although not yet final, the survey did not uncover any previously unknown resources within the site boundaries. **The Phase II footprint would be cleared to serve as a laydown area for Phase I construction. Therefore, the amount of disturbed land on site would not dramatically change between Phase I and Phase II construction. Offsite laydown areas for Phase II construction would be established on 85 ac of lands at 4 potential sites that have been disturbed from prior mining activities.** **All utilities and transportation infrastructure would be developed for operation of Phase I (no difference in impacts for Phase I-only outcome).** **Transportation Facilities, Water Sources and Discharges, Natural Gas Facilities, HVTL Corridors:** Located within Western Mesabi Iron Range Early Mining Landscape District. SHPO has 11 historic properties recorded within the area of potential effect for site and corridors. Coordination with SHPO required during construction to avoid or minimize potential impacts to the historic character of the District. No known archaeological resources or Native American cultural resources exist within the transportation or utility corridors. A total of 330 ac (5%) of high potential for archaeological resources and 580 ac (12%) of moderate potential for archaeological	**Power Plant Site:** No known archaeological sites or Native American cultural resources identified within 1 mi of the site. The study area (30,471 ac) included the site and associated transportation and utility corridors. A total of 4,862 ac (16%) of the study area has a high potential for archaeological resources and 457 ac (1.5%) has a moderate potential for archaeological resources. Phase I surveys are complete and the SHPO has agreed that no further study is needed, provided that there would be no terrain disturbance at the Longyear historic site. **The Phase II footprint would be cleared to serve as a laydown area for Phase I construction. Therefore, the amount of disturbed land on site would not dramatically change between Phase I and Phase II construction. Offsite laydown areas for Phase II construction would be established on 85 ac of lands at 2 potential sites that have been disturbed from prior mining activities.** **All utilities and transportation infrastructure would be developed for operation of Phase I (no difference in impacts for Phase I-only outcome).** **Transportation Facilities:** Included in the discussion for Power Plant Site above. **Water Sources and Discharges:** The water pipeline corridors would be located within previously disturbed areas; therefore, these corridors would not be expected to contain archaeological or historical resources. **Natural Gas Facilities:** The natural gas pipeline corridor would follow an existing ROW; therefore, no archaeological or historical resources are anticipated. **HVTL Corridors:** The proposed HVTLs would follow existing HVTL corridors, which would minimize potential for impacts.

Table S-8. Summary Comparison of Impacts (Phases I & II)

No Action	West Range	East Range
	resources exists along the HVTLs, rail line, and pipeline corridors (combined for all transportation and utility corridors - **4,988 acres**). Archaeological surveys would be conducted only in those corridors to be permitted by the PUC if the West Range Site were selected for permitting. Although surveys would necessarily be completed after the DOE Record of Decision, the Record of Decision would be conditional upon implementing the provisions of an agreement between DOE, SHPO, and appropriate parties for the identification and protection of resources. **DOE is developing a Programmatic Agreement with the SHPO, ACHP, and Native American tribes for the appropriate protection of cultural resources during construction for the Mesaba Energy Project.** **DOE is also negotiating a separate Memorandum of Agreement with regional Native American tribes for the appropriate consideration of interests not addressed by the PA.**	There are two known archaeological sites located within 0.25 mi of the 39L/37L corridors; however, they are outside of the construction ROW. One National Register of Historic Places (NRHP)-listed building and one potentially eligible building are within the town of Eveleth in the vicinity of the 39L/37L route. One eligible site within the HVTL visual area of potential effect would be crossed by the HVTL corridor south of the plant site. Archaeological surveys would be conducted only in those corridors to be permitted by the PUC if the East Range Site were selected for permitting. Although surveys would necessarily be completed after the DOE Record of Decision, the Record of Decision would be conditional upon implementing the provisions of an agreement between DOE, SHPO, and appropriate parties for the identification and protection of resources **DOE is developing a Programmatic Agreement with the SHPO, ACHP, and Native American tribes for the appropriate protection of cultural resources during construction for the Mesaba Energy Project.** **DOE is also negotiating a separate Memorandum of Agreement with regional Native American tribes for the appropriate consideration of interests not addressed by the PA.**
Land Use		
No change in land use; sites and corridors would remain in current status.	**Power Plant Site:** Generating station on **1,708**-ac site, currently undeveloped and zoned for industrial use. ~50 residential properties within 1 mi of footprint (closest, 0.71 mi); buffered by ~0.5 mi of dense woodlands. No conflict with local or regional zoning ordinances or land use plans. **The** use of eminent domain, **as allowed by MN Statutes 216B.1694**, **may be** needed to acquire **parcels of land within** the site footprint and its surrounding buffer land. The use of eminent domain also may be necessary to acquire some public and private lands or easements if agreements to purchase such lands or easements (for **HVTLs,** associated facilities, utilities, or transportation infrastructure; or to interconnect the project with such features and available water resources) cannot be negotiated with property owners. **All utilities and transportation infrastructure would be developed for operation of Phase I (no difference in impacts for Phase I-only outcome).**	**Power Plant Site:** Generating station on **1,322**-ac site, currently undeveloped and zoned for mining use. No residential properties within 1 mi of footprint (closest, 1.28 mi); buffered by ~0.5 mi of dense woodlands. No conflict with local or regional zoning ordinances or land use plans. No use of eminent domain is needed to acquire the site footprint and its surrounding buffer land. The use of eminent domain as allowed by MN Statutes 216B.1694 may be necessary to acquire some public and private lands or easements if agreements to purchase such lands or easements (for **HVTLs,** associated facilities, utilities, or transportation infrastructure; or to interconnect the project with such features and available water resources) cannot be negotiated with property owners. **All utilities and transportation infrastructure would be developed for operation of Phase I (no difference in impacts for Phase I only outcome).**

Table S-8. Summary Comparison of Impacts (Phases I & II)

No Action	West Range	East Range
	Transportation Facilities: Rail alignment alternatives: • Alt. 1A within 0.5 mi of 16 residences (closest **within 470** ft). • Alt. 1B **eliminated based on Draft EIS.** • **Alt 3B within 0.5 mi of 16 residences (closest within 470 ft).** **Access Roads:** • **Access Roads 1 and 2 eliminated after Draft EIS (CR 7 realignment deferred by Itasca County).** • **Access Road 3 within 1,250 ft of 2 residences.** **Water Sources and Discharges:** • Process water pipelines within 0.5 mi of 104 residences (4 within 500 ft). • Cooling water effluent pipelines **avoided using enhanced ZLD system**. • Potable/sanitary pipelines within 0.5 mi of 114 residences (4 within 500 ft). **Natural Gas Facilities:** Natural gas pipelines: • Alt. 1 within 0.5 mi of 153 residences (3 within 300 ft). • Alt. 2 within 0.5 mi of 339 residences (5 within 300 ft). • Alt. 3 within 0.5 mi of 935 residences (29 within 300 ft). **HVTL Corridors:** HVTL routes: • **HVTL Alt 1** within 0.5 mi of 66 residences (4 within 500 ft). • **HVTL Alt 1A** within 0.5 mi of 62 residences (7 within 500 ft). • **HVTL Phase 2 Plan B** within 0.5 mi of 214 residences (29 within 500 ft).	**Transportation Facilities:** Rail and road alignments: No residences within 0.5 mi of either rail alignment alternative (closest ~1 mi). No residences within 0.5 mi of site access road (closest >1 mi). **Water Sources and Discharges:** • No residences within 0.5 mi of process water pipeline segments (closest >0.75 mi). • No cooling water effluent pipeline (enhanced ZLD system). • No residences within 0.5 mi of potable/sanitary pipelines (closest >0.75 mi). **Natural Gas Facilities:** Natural gas pipeline on existing ROW within 0.5 mi of 856 residences (46 within 300 ft). **HVTL Corridors:** HVTL routes on existing ROWs (<4 mi of new ROW); widening of one or the other corridor would be required. • **HVTL Alt 1 (widen 38L ROW)** within 0.5 mi of 271 residences (22 within 500 ft). • **HVTL Alt 2 (widen 39L/37L ROW)** within 0.5 mi of 962 residences (49 within 500 ft).
Socioeconomics		
No change in existing socioeconomic conditions; no potential for economic stimulus from proposed project.	**General:** Project spending and creation of new construction and operation jobs would provide **total output economic** benefits to regional economy. **For both phases, the project would generate** $3.1 billion **in total output benefits** over 6 years during construction **($2 billion for Phase I and $1.1 billion for Phase II). The Project would generate total output economic benefits of** $1.1 billion/yr during operation of both phases **($535 million/yr for Phase I operation alone)**; the power plant would be expected to operate commercially for 20 years or more). **Power Plant Site:** No displacement of population, housing, businesses, or jobs. Ten or more residential properties closest to	**General:** Project spending and creation of new construction and operation jobs would provide **total output economic** benefits to regional economy. **For both phases, the project would generate** $3.1 billion **in total output benefits** over 6 years during construction **($2 billion for Phase I and $1.1 billion for Phase II). The Project would generate total output economic benefits of** $1.1 billion/yr during operation of both phases **($535 million/yr for Phase I operation alone)**; the power plant would be expected to operate commercially for 20 years or more). **Power Plant Site:** No displacement of population, housing, businesses, or jobs. No impact on property values anticipated

Table S-8. Summary Comparison of Impacts (Phases I & II)

No Action	West Range	East Range
	the plant footprint could experience impacts on property values based on proximity to facility and resulting aesthetic and noise impacts. Potential temporary adverse impacts on housing demand related to influx of workers during peak construction (>1,500/yr in **2011-13**); less than 3,000 housing units in Census Tract 9810, of which 513 were vacant (non-seasonal) or rental units in 2000. **Note: The Minnesota Steel[1] Final EIS concluded that there would be no significant cumulative socioeconomic impacts even with consideration of the Mesaba Energy Project.**	based on distances to nearest residences. Potential temporary adverse impacts on housing demand related to influx of workers during peak construction (>1,500/yr in **2011-13**); less than 1,000 housing units in Hoyt Lakes (Census Tract 140), of which 143 were vacant (non-seasonal) or rental units in 2000.
	Transportation Facilities: No displacement of population, housing, businesses, or jobs. Three residences within 1,000 ft of Rail Alignment Alternatives **3B and** 1A could experience impacts on property values due to proximity and resulting aesthetic and noise impacts. Realignment of CR 7 (connected action) **could** influence local housing development in vicinity**, but project was deferred by Itasca County after Mesaba Draft EIS publication**.	**Transportation Facilities:** No displacement of population, housing, businesses, or jobs. No impact on property values anticipated based on distances to nearest residences.
	Water Sources and Discharges: No displacement of population, housing, businesses, or jobs. No impact on property values anticipated. **Natural Gas Facilities:** No displacement of population, housing, businesses, or jobs. No impact on property values anticipated. **Excelsior proposes to negotiate with Nashwauk PUC for the purchase of natural gas from its permitted pipeline, which would follow the same alignment as Excelsior's preferred alternative.** **HVTL Corridors:** No displacement of population, housing, businesses, or jobs. **A small number of the closest residences may experience adverse effects on property values depending upon the visibility of HVTL structures**.	**Water Sources and Discharges:** No displacement of population, housing, businesses, or jobs. No impact on property values anticipated. **Natural Gas Facilities:** No displacement of population, housing, businesses, or jobs. No impact on property values anticipated. **HVTL Corridors:** No displacement of population, housing, businesses, or jobs. **Although HVTLs would be constructed in existing HVTL ROWs except for two 2-mi segments, the addition of 30 feet of ROW on one of the corridors would place HVTLs closer to more residences, which may adversely affect property values depending upon the visibility of the taller towers**.
Environmental Justice		
No change in existing conditions relative to minority and low-income populations; no potential for economic benefits from proposed project.	**Power Plant Site:** Minority and low-income populations in the region of influence for the power plant do not exceed 50% of the population and are not meaningfully greater than the percentages in the general population. Therefore, the plant site would not have a disproportionately high and adverse impact on minority or low-income populations. The closest concentrations of American-Indian populations are located approximately 20 mi from the site. Local tribes expressed concern regarding health risks associated with project pollutants	**Power Plant Site:** Minority and low-income populations in the region of influence for the power plant do not exceed 50% of the population and are not meaningfully greater than the percentages in the general population. Therefore, the plant site would not have a disproportionately high and adverse impact on minority or low-income populations. The closest concentrations of American-Indian populations are located approximately **20** mi from the site. Local tribes expressed concern regarding health risks associated with project pollutants

Table S-8. Summary Comparison of Impacts (Phases I & II)

No Action	West Range	East Range
	and their impact on traditional food sources. However, the increment of mercury (less than 0.5 percent increase) and other pollutants from the project would be very low and human health impacts from fish consumption would be negligible even within 2 mi from the power plant site. **Transportation Facilities, Water Sources and Discharges, Natural Gas Facilities, HVTL Corridors:** No disproportionately high and adverse impacts on minority or low-income populations are indicated.	and their impact on traditional food sources. However, the increment of mercury (less than 0.5 percent increase) and other pollutants from the project would be very low and human health impacts from fish consumption would be negligible even within 2 mi from the power plant site. **Transportation Facilities, Water Sources and Discharges, Natural Gas Facilities, HVTL Corridors:** No disproportionately high and adverse impacts on minority or low-income populations are indicated.
Community Services		
No change in existing conditions relative to community services.	**Power Plant Site:** Demands by the generating station may require staff at local fire and emergency response agencies to increase by 30 to 50%. Large numbers of construction workers (>1,500 during 3 years of peak construction) may affect capacities of local law enforcement agencies. Security requirements for the generating station may affect capacities of local law enforcement agencies. **OSHA Standard 1910.120 requires the Mesaba Generating Station to provide and train first responders and first aid specialists to respond until local emergency personnel arrive.** **Transportation Facilities:** Potential for delays to emergency response vehicles at 17 rail grade crossings between Grand Rapids and Taconite (8 in Grand Rapids). Approximately 2.5% daily probability of delay at a crossing caused by train serving Mesaba plant; 4% probability of delay from combined rail traffic. **Water Sources and Discharges:** Security requirements for process water intake facilities may **affect public access for recreation in the Canisteo Mine Pit depending upon MNDNR**. **Natural Gas Facilities:** No displacement of providers or change in demand on community services. **HVTL Corridors:** No displacement of providers or change in demand on community services.	**Power Plant Site:** Demands by the generating station may require staff at local fire and emergency response agencies to increase by 20% or less. Large numbers of construction workers (>1,500 during 3 years of peak construction) may affect capacities of local law enforcement agencies. Security requirements for the generating station may affect capacities of local law enforcement agencies. **OSHA Standard 1910.120 requires the Mesaba Generating Station to provide and train first responders and first aid specialists to respond until local emergency personnel arrive.** **Transportation Facilities:** Potential for delays to emergency response vehicles at 8 rail grade crossings between Clinton Township and Hoyt Lakes. Approximately 2.5% daily probability of delay at a crossing caused by train serving Mesaba plant; 5.5% probability of delay from combined rail traffic. **Water Sources and Discharges:** No displacement of providers or change in demand on community services. **Natural Gas Facilities:** No displacement of providers or change in demand on community services. **HVTL Corridors:** No displacement of providers or change in demand on community services.

Table S-8. Summary Comparison of Impacts (Phases I & II)

No Action	West Range	East Range
Utility Systems		
No change in existing conditions relating to utilities; the region would not benefit from the additional source of power from the Mesaba Energy Project.	**Power Plant Site:** The project would tie into the existing grid without service interruptions and would ensure necessary upgrades to substations and other infrastructure would be installed to prevent system failures. The project would provide another source of power for the region that could reduce outages and help meet future demand. **Transportation Facilities:** No expected impacts. **Proposed road and rail alignments would be the same for Phase I-only and combined Phases I and II.** **Water Sources and Discharges:** The Mesaba Energy Project would not adversely affect sanitary wastewater treatment capacity. The wastewater collection system in Taconite currently overflows during heavy rain and high water table events, which may be worsened by new flow from the West Range Site. This collection system would need to be redesigned or repaired regardless of the outcome of this project. During the construction phase of the project, potable water requirements would exceed the capacity of the existing Taconite water supply system; however, planned improvements and studies to the system would provide sufficient supplies **and improve water quality**. Otherwise, potable water supplies would be brought to the project site by truck**. Proposed sanitary wastewater and potable water pipelines would be the same for Phase I-only and combined Phases I and II. Proposed process water pipelines required for Phase I include pipelines to supply water from CMP and GMMP. Additional pipelines for Phase II would be required and include pipelines for LMP and Prairie River**. **Natural Gas Facilities:** No impacts on service providers or capacity expected**. Proposed natural gas pipeline route would be the same for Phase I-only and combined Phases I and II. Depending on status of Nashwauk Public Utilities Commission to construct the pipeline, Excelsior would operate a 16- or 24-inch diameter pipeline**. **HVTL Corridors:** The project's proposed utility lines would be constructed in accordance with all Federal and state regulations, and would pose no adverse impact on other resources**. No network upgrades required for Phase I. Specific network upgrades for Phase II unknown at this time; however, DOE considers the possible network upgrades that may be**	**Power Plant Site:** The project would tie into the existing grid without service interruptions and would ensure necessary upgrades to substations and other infrastructure would be installed to prevent system failures. The project would provide another source of power for the region that could reduce outages and help meet future demand. **Transportation Facilities:** No expected impacts**. Proposed road and rail alignments would be the same for Phase I-only and combined Phases I and II**. **Water Sources and Discharges:** The Mesaba Energy Project would not adversely impact existing potable and sanitary sewer systems, as both have capacity to serve the project**. Proposed sanitary wastewater and potable water pipelines would be the same for Phase I-only and combined Phases I and II. Proposed process water pipelines for Phase I include Mine Pit 2WX, Mine Pit 6, and Stephens Mine Pit (other mine pit sources may be used depending on other industrial users and consultation with MNDNR). Phase II would require additional process water pipelines from Colby Lake**. **Natural Gas Facilities:** No impacts on service providers or capacity expected**. Proposed natural gas pipeline route would be the same for Phase I-only and combined Phases I and II**. **HVTL Corridors:** The project's proposed utility lines would be constructed in accordance with all Federal and state regulations, and would pose no adverse impact on other resources**. No network upgrades required for Phase I. Specific network upgrades for Phase II unknown at this time; however, DOE considers the possible network upgrades that may be**

Table S-8. Summary Comparison of Impacts (Phases I & II)

No Action	West Range	East Range
	required for Mesaba Phase II to be unavailable information that is not essential for a reasoned choice among alternatives available to DOE (see 40 CFR 1502.22). Furthermore, if network upgrades or new HVTL's were to be required for Mesaba Phase II, the potential environmental impacts would be evaluated and disclosed to the public through the MDOC environmental review process. **Plan A: Same two 345-kV HVTLs would be utilized for both Phase I (operated at 230-kV) and combined Phases I and II (upgraded to operate at 345-kV).** **Plan B: Two 230-kV HVTLs would be utilized for Phase I. An additional 230-kV HVTL would be required for Phase II**.	**required for Mesaba Phase II to be unavailable information that is not essential for a reasoned choice among alternatives available to DOE (see 40 CFR 1502.22). Furthermore, if network upgrades or new HVTL's were to be required for Mesaba Phase II, the potential environmental impacts would be evaluated and disclosed to the public through the MDOC environmental review process. Same two HVTL corridors would be required for Phase I operation as well as Phase II. Installation of high voltage switchyard would occur at Phase I construction and no further development required for Phase II**.
Traffic and Transportation		
No change in existing vehicular traffic; Level of Service (LOS) conditions would remain the same.	**Power Plant Site:** During construction: temporary level of service (LOS) degradation of **CR 7 – from an LOS of A to B.** During operation: **For Mesaba Energy Project (Phase I) number of vehicle trips generated by personnel and from truck deliveries would be 165 and 30, respectively. LOS would remain the same and in stable operating conditions on nearby roadways. Up to one roundtrip train per day would be required. Combined Phases I and II would add 115 employee-generated vehicle trips and 30 truck trips. Except for CR 7 south of project site, no substantial differences in LOS for combined-phase plant compared to Phase I-only. CR 7 would degrade from an LOS of A to B. Up to two roundtrip trains per day would be required.** **Transportation Facilities:** Rail use during construction and operations is expected to have minimal adverse impacts to baseline rail traffic conditions. Access Roads: Access Roads 1 **and 2 eliminated after Draft EIS (CR 7 realignment deferred by Itasca County)**. • Access Road **3** would not impact LOS. **Water Sources and Discharges:** Temporary and localized traffic congestion during construction. **Natural Gas Facilities:** Temporary and localized traffic congestion during construction. **HVTL Corridors:** Temporary and localized traffic congestion during construction.	**Power Plant Site:** During construction: temporary LOS degradation of most of nearby roads; however, lowest LOS would be B. Reconstruction of Hampshire Drive expected to minimize potential congestion at intersection of CR 666 and CR 110. During operation: **For Mesaba Energy Project (Phase I) number of vehicle trips generated by personnel and from truck deliveries would be 165 and 30, respectively. Combined Phases I and II would add 115 employee-generated vehicle trips and 30 truck trips.** LOS would remain the same on nearby roadways, except for CR 666 (north of CR 110), which would degrade from A to B. **Up to one roundtrip train per day would be required for Phase I. Up to two roundtrip trains per day would be required for Phase II.** **Transportation Facilities:** Rail use during construction and operations is expected to have minimal adverse impacts to baseline rail traffic conditions. Access Roads: Access Road 1 **(single segment)** would provide access from CR 666 and would not affect LOS. **Water Sources and Discharges:** Temporary and localized traffic congestion during construction. **Natural Gas Facilities:** Temporary and localized traffic congestion during construction. **HVTL Corridors:** Temporary and localized traffic congestion during construction.

Table S-8. Summary Comparison of Impacts (Phases I & II)

No Action	West Range	East Range
Materials and Waste Management		
No change in existing conditions; no increase in the risk of a hazardous waste release.	**Power Plant Site:** Proper handling and storage of materials and wastes would be conducted to minimize potential for release of a hazardous waste or material to the environment. In-state or out-of-state solid waste collection services and landfills would have the capability and capacity to accept solid wastes generated. Additional market analysis would be required to secure a market and avoid disposal of slag (1000-1600 tons per day generated for both phases); however, sufficient capacity is available if disposal of the slag is necessary. Commercially available treatment, stabilization, or disposal for waste streams generated. The Mesaba Generating Station would be regulated as a large quantity generator of hazardous waste (sulfuric acid, spent activated carbon and potentially the ZLD filter cake, as well as smaller quantities of other hazardous wastes). No substantial increase in risk of a hazardous waste release to the environment. Proper handling and storage of wastes in accordance with Resource Conservation and Recovery Act (RCRA) would be adhered to. **The Mesaba Generating Station (Phases I and II) would use the same materials and generate the same wastes as a Phase I-only plant, although the quantities would be approximately double.** **Transportation Facilities:** Proper handling and storage of materials and wastes would be conducted to minimize potential for a release of a hazardous waste or material to the environment. **Water Sources and Discharges:** Proper handling and storage of materials and wastes would be conducted to minimize potential for a release of a hazardous waste or material to the environment. **Natural Gas Facilities:** Proper handling and storage of materials and wastes would be conducted to minimize potential for a release of a hazardous waste or material to the environment. **HVTL Corridors:** Proper handling and storage of materials and wastes would be conducted to minimize potential for a release of a hazardous waste or material to the environment.	**Power Plant Site:** Proper handling and storage of materials and wastes would be conducted to minimize potential for a release of a hazardous waste or material to the environment. In-state or out-of-state solid waste collection services and landfills would have the capability and capacity to accept solid wastes generated. Additional market analysis would be required to secure a market and avoid disposal of slag (1000-1600 tons per day generated for both phases); however, sufficient capacity is available if disposal of the slag is necessary. Commercially available treatment, stabilization, or disposal for waste streams generated. The Mesaba Generating Station would be regulated as a large quantity generator of hazardous waste (sulfuric acid, spent activated carbon and potentially the ZLD filter cake, as well as smaller quantities of other hazardous wastes). No substantial increase in risk of a hazardous waste release to the environment. Proper handling and storage of wastes in accordance with RCRA would be adhered to. **The Mesaba Generating Station (Phases I and II) would use the same materials and generate the same wastes as a Phase I-only plant, although the quantities would be approximately double.** **Transportation Facilities:** Proper handling and storage of materials and wastes would be conducted to minimize potential for a release of a hazardous waste or material to the environment. **Water Sources and Discharges:** Proper handling and storage of materials and wastes would be conducted to minimize potential for a release of a hazardous waste or material to the environment. **Natural Gas Facilities:** Proper handling and storage of materials and wastes would be conducted to minimize potential for a release of a hazardous waste or material to the environment. **HVTL Corridors:** Proper handling and storage of materials and wastes would be conducted to minimize potential for a release of a hazardous waste or material to the environment.

Table S-8. Summary Comparison of Impacts (Phases I & II)

No Action	West Range	East Range
Safety and Health		
No added health and safety risk, and no increase in the probability of construction or operational health and safety risks.	**Power Plant Site:** Construction workers would follow a safety plan and standard safety practices to reduce the potential for construction-related impacts. During the 5-year construction period, statistically less than 1 worker fatality (0.4) would occur. During the operation of the plant, statistically less than 1 operations-related worker fatality (0.01) would occur. **The potential for worker fatalities during Phase I construction and operation would be marginally lower than for both phases.** Based on air emission modeling results, cancer or morbidity hazards to workers or to the public would be small and would not exceed EPA standards. Specifically, the **highest cumulative** non-cancer **(morbidity)** hazard indices would be **0.081 and 0.082**, respectively **for adult and child,** compared to a threshold index of 1, and the **highest cumulative** projected cancer risks would be **$2.5x10^{-6}$ and $4.6x10^{-7}$, respectively for adult and child,** compared to a threshold of $1x10^{-5}$. **Risks from exposure to dioxins, furans, chromium, and $PM_{2.5}$ would be below established thresholds. These results, based on the emissions from both phases, indicate that the health risks associated with Phase I-only would also be below established thresholds.** Potential major operating accidents or intentional destructive acts, although not anticipated, could result in fires and localized airborne releases of substances **that are toxic in high concentrations**, such as CO, H_2S, and SO_2. In such cases, plant workers would be the most at-risk of injury or death, although the nearest residents, located 0.6 to 0.8 mi from the plant, would also be at-risk from a large release. **The probability of an accident or intentional destructive act occurring in Phase I-only or during the operation of both phases would be comparable and the potential for injury would be similar.** **All utilities and transportation infrastructure would be developed for operation of Phase I (no difference in impacts for Phase I-only outcome).** **Transportation Facilities:** During construction and operation, it is estimated, respectively, that approximately 1.2 and 0.53 fatalities could occur due to the movement of workers and material via trucks and personal vehicles. Because of the relatively low incremental	**Power Plant Site:** Construction workers would follow a safety plan and standard safety practices to reduce the potential for construction-related impacts. During the 5-year construction period, statistically less than 1 worker fatality (0.4) would occur. During the operation of the plant, statistically less than 1 operations-related worker fatality (0.01) would occur. **The potential for worker fatalities during Phase I construction and operation would be marginally lower than for both phases.** Based on air emission modeling results, cancer or morbidity hazards to workers or to the public would be small and would not exceed EPA standards. Specifically, the **highest cumulative** non-cancer **(morbidity)** hazard indices would be **0.081 and 0.082**, respectively **for adult and child**, compared to a threshold index of 1, and the **highest cumulative** projected cancer risks would be **$2.5x10^{-6}$ and $4.6x10^{-7}$, respectively for adult and child,** compared to a threshold of $1x10^{-5}$. **Risks from exposure to dioxins, furans, chromium, and $PM_{2.5}$ would be below established thresholds. These results, based on the emissions from both phases, indicate that the health risks associated with Phase I only would also be below established thresholds.** Potential major operating accidents or intentional destructive acts, although not anticipated, could result in fires and localized airborne releases of substances **that are toxic in high concentrations,** such as CO, H_2S, and SO_2. In such cases, plant workers would be the most at-risk of injury or death, although the nearest residents, located 1 mi from the plant, would also be at-risk from a large release. **The probability of an accident or intentional destructive act occurring in Phase I-only or during the operation of both phases would be comparable and the potential for injury would be similar.** **All utilities and transportation infrastructure would be developed for operation of Phase I (no difference in impacts for Phase I-only outcome).** **Transportation Facilities:** During construction and operation, it is estimated, respectively, that approximately 1.2 and 0.53 fatalities could occur due to the movement of workers and material via trucks and personal vehicles. Because of the relatively low incremental addition of project-related train trips (up to one and

Table S-8. Summary Comparison of Impacts (Phases I & II)

No Action	West Range	East Range
	addition of project-related train trips (up to one and two roundtrips per day during Phase I and II, respectively), it is expected that increases to safety hazards at at-grade crossings would be low because baseline vehicular traffic numbers within the region of influence are considered low. **Water Sources and Discharges:** No impacts would be expected. **Natural Gas Facilities:** No impacts would be expected. **HVTL Corridors:** Research regarding the potential for public health risks from the inhalation of pollutant particles charged by HVTLs (i.e., the Henshaw Effect) is currently inconclusive. Therefore, these risks are considered comparable to the risks imposed by tens of thousands of mi of HVTLs already in use throughout the U.S. EMF exposure from utility lines would fall **within the 8-kV/m MN standard inside the ROW; short segments of the 345-kV single-circuit delta configuration would be slightly above 2-kV/m at the edge of the ROW.** There would be no permanent residents located in areas exceeding 2-kV/m.	two roundtrips per day during Phase I and II, respectively), it is expected that increases to safety hazards at at-grade crossings would be low because baseline vehicular traffic numbers within the region of influence are considered low. **Water Sources and Discharges:** No impacts would be expected. **Natural Gas Facilities:** No impacts would be expected. **HVTL Corridors:** Research regarding the potential for public health risks from the inhalation of pollutant particles charged by HVTLs (i.e., the Henshaw Effect) is currently inconclusive. Therefore, these risks are considered comparable to the risks imposed by tens of thousands of mi of HVTLs already in use throughout the U.S. EMF exposure from utility lines would fall **within the 8-kV/m MN standard inside the ROW. One residence within 50-100 feet of the centerline of the 38L route and 2 residences within 50-100 feet of the centerline of the 39L/37L route could fall within areas where the electric fields exceed 2-kV/m.**
Noise		
No change in noise emissions. There would be no new violations or exceedances of noise standards.	**Power Plant Site:** <u>During construction</u>: Aggregate noise levels at receptors not expected to exceed MPCA thresholds **and would range from 27 to 56 dBA** (Table 4.18-7)**.** Steam blows would be an unavoidable adverse impact. A series of short steam blows, lasting two or three minutes each, would be performed several times daily over a period of two or three weeks during the final weeks of construction. Resultant levels at nearby receptors would range from **86 to 100** dBA (Table 4.18-8); however, steam piping would be equipped with silencers that would reduce noise levels by 20 dBA to 30 dBA at each receptor location. <u>During operation</u>: Daytime – MPCA noise thresholds would not be exceeded (Table 4.18-11). Nighttime (10:00 p.m. to 7:00 a.m.) – During Phase I-only (without mitigation), R3 and R4 would remain over state thresholds (note, existing noise levels at these receptors exceed state limits because of proximity to CR 7) (Table 4.18-11); however, no perceptible change in noise levels would occur at any of the receptors. During combined Phases I and II (without mitigation), the nighttime noise levels would exceed the L_{50} threshold at R3 and R4 by **3.5 and 3.4 dBA**, respectively; however, no perceptible noise increase would occur at any receptor.	**Power Plant Site:** <u>During construction</u>: Aggregate noise levels at receptors not expected to exceed MPCA thresholds and would range from **31 to 65 dBA** (Table 4.18-9). Steam blows would be an unavoidable adverse impact. A series of short steam blows, lasting two or three minutes each, would be performed several times daily over a period of two or three weeks during the final weeks of construction. Resultant sound levels at nearby receptors would range from 88 to **104** dBA (Table 4.18-10); however, steam piping would be equipped with silencers that would reduce noise levels by 20 dBA to 30 dBA at each receptor location. <u>During operation</u>: During Phase I-only and combined Phases I and II (and without mitigation), noise levels would not exceed daytime or nighttime MPCA noise thresholds (Table 4.18-11). During Phase I and combined Phases I and II (and without mitigation), predicted daytime and nighttime noise level increases would be greatest at R1 (**8.6-dBA** increase during combined Phase I and II); however, this is an isolated industrial area. No other perceptible changes in noise levels would occur at any of the receptor locations for each phase.

Table S-8. Summary Comparison of Impacts (Phases I & II)

No Action	West Range	East Range
	Transportation Facilities: Train operations: Freight train noise levels would range from **36 to 56** dBA (Table 4.18-13) at the modeled receptor locations during a train pass-by - noise from freight train operations could be noticeable to residences represented by receptors R2, R5, **and AAC-7** and may be considered an impact based on the FRA noise criteria, but would be short-term and relatively infrequent. Maximum noise levels generated by freight train operations would be below the ATPA guideline of 70 dBA at each receptor location and would not be considered significant. Train horns, as required under FRA regulations, would be adverse unavoidable impacts for receptors near at-grade crossings. Access Roads: **No perceptible noise increases would occur at any receptor during operation of proposed Access Road 3. MINNOISE modeling results indicate that noise levels at modeled receptors would range from 32.4 to 53.9 dBA during day-time hours and 32.6 to 55.1 dBA during nighttime hours (Table 4.18-15). Note that incremental noise levels related to transportation activities would be similar under the single and combined phases; however, Phase I-only would generally experience half the occurrences of noise increases that would occur under the combined phase (comparable to rail and vehicle traffic volumes analyzed).** **Water Sources and Discharges:** Temporary and localized increases in noise levels during construction of water pipelines. **Natural Gas Facilities:** Temporary and localized increases in noise levels during construction of natural gas pipelines. **HVTL Corridors:** Temporary and localized increases in noise levels during construction of HVTLs.	**Transportation Facilities:** Train operations: Freight train noise levels would range from **39 to 50** dBA (Table 4.18-14) at the modeled receptor locations during a train pass-by - noise from freight train operations could be noticeable to residences represented by receptor R1. Maximum noise levels generated by freight train operations would be below the ATPA guideline of 70 dBA at each receptor location and would not be considered significant. Train horns, as required under FRA regulations, would be adverse unavoidable impacts for receptors near at-grade crossings. Access Roads: There are no residences or sensitive noise receptors in proximity to the proposed access road intersecting CR 666. **Note that incremental noise levels related to transportation activities would be similar under the single and combined phases; however, Phase I-only would generally experience half the occurrences of noise increases that would occur under the combined phase (comparable to rail and vehicle traffic volumes analyzed).** **Water Sources and Discharges:** Temporary and localized increases in noise levels during construction of water pipelines. **Natural Gas Facilities:** Temporary and localized increases in noise levels during construction of natural gas pipelines. **HVTL Corridors:** Temporary and localized increases in noise levels during construction of HVTLs.

[1] **The Minnesota Steel project is now known as "Essar Steel Minnesota"; however it is identified throughout this EIS as "Minnesota Steel", Minnesota Steel Industries", or "MSI based on the name of the project in the Final EIS published for it.**

Acronyms: ac – acre(s); alt. – alternative; APTA – American Public Transportation Association; BMPs – best management practices; BWCAW – Boundary Waters Canoe Area Wilderness; CAMR – Clean Air Mercury Rule; CMP – Canisteo Mine Pit; CO – carbon monoxide; CO_2 – carbon dioxide; CR – County Road; DAT – deposition analysis threshold; dBA – A-weighted decibels; EMF – electromagnetic field; FRA – Federal Railroad Administration; ft – feet; gpd – gallons per day; gpm – gallons per minute; H_2S – hydrogen sulfide; HAP – hazardous air pollutant; HVTL – high voltage transmission line; IGCC – integrated gasification combined cycle; **IRNP – Isle Royale National Park;** kg – kilogram; kV – kilovolt; LOS – level of service; m – meter; M – million; MAAQS – Minnesota Ambient Air Quality Standards; mi – mile(s); MPCA – Minnesota Pollution Control Agency; N – nitrogen; NAAQS – National Ambient Air Quality Standards; NH_3 – ammonia; NO_x – nitrogen oxides; NPDES – National Pollutant Discharge Elimination System; NPS – National Park Service; NRHP – National Register of Historic Places; Pb – lead; PM_{10} – particulate matter (aerodynamic diameter <10 μm); PSD – prevention of significant deterioration; RCRA – Resource Conservation and Recovery Act; **RLW – Rainbow Lakes Wilderness Area;** ROW – right-of-way; S – sulfur; ESC – erosion and sediment control; SHPO – State Historic Preservation Office; SO_2 – sulfur dioxide; SWPPP – Stormwater Pollution Prevention Plan; tpy – tons per year; VNP – Voyageurs National Park; VOCs – volatile organic compounds; yd – yard; yr – year; ZLD – zero liquid discharge

CONCLUSIONS

The Proposed Action at either site would result in impacts to all resource areas as outlined in preceding Table S-8. For the Proposed Action at the East Range site, the impacts to the following resource areas would be greater relative to the West Range site:

- **Aesthetics, Land Use, and Socioeconomics – Longer HVTL corridors for the East Range Site would place a substantially greater number of residences within 500 feet of HVTLs than at the West Range Site, although many of these residences are already in the proximity of existing HVTL corridors. The height of the new HVTL double-circuited steel tower structures that would replace the existing wooden single-circuit 115 kV structures would be increased by about 40 to 60 feet, thereby increasing their visibility to residents and travelers; the number of the conductors on the towers would double, further increasing the visual impact.**

- **Air Quality – Predicted visibility impacts in Class I areas (Boundary Waters Canoe Area Wilderness and Voyageurs National Park) would be greater at the East Range Site compared to the West Range Site; more stringent controls and/or mitigation would be needed at the East Range site to reduce predicted visibility impacts to levels acceptable to the Federal Land Managers (FLMs). Similarly, predicted deposition of sulfur and nitrogen in Class I areas would be greater for the East Range Site. If mitigation of such impacts is recommended by the FLMs, DOE would consider such mitigation as a condition of the Record of Decision. Also, particulate matter emissions from cooling tower drift would be higher because of the greater solids content of source water at the East Range Site. Otherwise, air emissions would be generally equivalent at both sites.**

- **Water – Plans to reopen mine pits immediately northwest of the East Range Site, that were announced after Excelsior's June 2006 submission of the Joint Application, combined with PolyMet Mining's revised plans to use groundwater (from dewatering activities) and stormwater as their primary source of process water, introduced the likelihood that increased water appropriations from Colby Lake would be required to assure an adequate water supply for the power plant. Short term water level fluctuations in Whitewater Reservoir due to maximum appropriations from Colby Lake have been observed to swing 5 to 10 feet. Such fluctuations, without further mitigation, could affect fish populations, boat access, and property values for properties platted on the northeastern shoreline of the reservoir.**

- **Wetlands – The combined permanent and temporary direct impacts on wetland acreage from all of the proponent's preferred alignments for the plant footprint and infrastructure would be greater at the East Range Site than at the West Range Site without consideration of specific wetland functions.**

- **Biological Resources – Although DOE determined, based on a Biological Assessment, that the Proposed Action at either site may affect, but is not likely to adversely affect, the Canada lynx (a Federally listed endangered species), the East Range Site is closer to the range of the Canada lynx, while the West Range Site is located toward the southwest periphery of the lynx's range. The U.S. Fish and Wildlife Service (USFWS) concurred in the determination for the West Range Site. However, if the East Range Site were ultimately**

to be permitted by the Minnesota PUC, DOE would be required to re-initiate consultation with the USFWS for the East Range Site.

For the Proposed Action at the West Range Site, there would be greater impacts to the following resource areas relative to the East Range Site:

- **Aesthetics, Land Use, and Socioeconomics – The power plant footprint at the West Range Site is within 1 mile of approximately 50 residences; no residences are located within 1 mile of the footprint at the East Range Site. The proponent's preferred rail alignment would be closer to more residential properties (approximately 16 within 0.5 mile) at the West Range Site than the proponent's preferred rail alignment for the East Range Site (none within 0.5 mile). These conditions could potentially affect property values for the closest residences.**

- **Geology and Soils – Construction for the West Range Site would occupy more acreage of soils designated as prime farmland than at the East Range Site, although no active farming currently occurs on either site.**

- **Biological Resources – The West Range Site would cause greater loss of vegetation and habitat during clearing for the plant footprint and infrastructure corridors, including loss of more forested habitat than the East Range Site.**

- **Community Services (Recreation) – The proponent's need to protect the water intake structure on the Canisteo Mine Pit within a radius of the structure to be negotiated with MNDNR may affect recreational boating and fishing on the pit, which has developed a self-sustaining population of introduced lake trout after several years of stocking.**

- **Noise – The closer proximity of residences to the power plant footprint and rail alignment at the West Range Site would result in greater noise impacts from plant activities.**

For the No-Action Alternative, there would be no direct or indirect impacts to resources. However, there could be delays in commercialization of the E-Gas™ IGCC technology, and the potential benefits of deployment and widespread commercialization would likewise be delayed or jeopardized. These benefits include more cost-effective CCS options, progress in reducing greenhouse gas emissions in comparison to traditional coal-based electric power plants, and cost-effective reductions of emissions of criteria pollutants beyond levels required by regulatory caps in the utility sector. Also, potential direct and induced economic and employment benefits of the proposed project would not be experienced in the economically disadvantaged TTRA.

The Department of Energy acknowledges that there are areas of controversy regarding the Proposed Action; these areas were identified during the public involvement process and in consultation with Native American tribes and other Federal, state and local agencies. Many of these issues are not reconcilable, since they reflect differing points of view or uncertainties in predicting the future. The key areas of controversy are as follows:

- **The range of alternatives considered reasonable by DOE in meeting the agency's purpose and need. Members of the public would have preferred that renewable energy generation technologies or conservation measures be considered reasonable alternatives. However, as explained in Chapter 1, such alternatives do not meet the agency's purpose and need.**

- **The contribution from the Mesaba Energy Project to nationwide and global greenhouse gas emissions, mainly CO_2, and to global climate change. Members of the public would have preferred that the project implement carbon capture and storage for CO_2, emissions. However, DOE conducted an analysis of the feasibility of incorporating CCS and concluded that CCS is not considered feasible for the Mesaba Energy Project at this time. It is important to note that CCS was not a stated requirement under the CCPI funding opportunity announcement to which Excelsior responded.**

- **Impacts of air emissions from the power plant and associated activities, especially mercury and fine particulate matter, on public health, including ingestion of contaminated fish. With regard to mercury, the project would include state-of-the-art controls, and an analysis showed that incremental risk to human health would be below risk levels established by EPA and MPCA as described in Section 4.17.2.3. However, background mercury levels in nearby lakes are high from other sources, and there would still be an increase in mercury released to the environment by the Mesaba Energy Project that would be considered by MPCA in the permitting process. Likewise, for particulate matter emissions, the health risk analysis showed that the risks from the incremental increase in fine particulate matter emissions by the facility are expected to be negligible.**

- **Impacts of air emissions on visibility in Class I areas (especially Boundary Waters Canoe Area Wilderness and Voyageurs National Park). Since a final BACT determination has not been made by the MPCA, DOE analyzed the potential visibility impacts based on the emissions controls proposed by Excelsior in the air permit application. If the MPCA determines that more stringent controls are needed as a result of the permitting process, visibility impacts would be less than those predicted based on Excelsior's proposed controls. DOE understands that the Forest Service, a cooperating Federal agency and FLM, maintains that the modeled impacts from both Mesaba Phases I and II to visibility at either site, based on Excelsior's proposed controls, require mitigation. Therefore, DOE would consider appropriate mitigation as a condition of the Record of Decision, pending progress in negotiations between Excelsior and MPCA regarding the BACT determination.**

- **Concerns about the loss of recreational use of the Canisteo Mine Pit. Excelsior originlly requested that the CMP be closed to recreational access as a security measure to protect the cooling water intake structure at the West Range site. During the contested case proceedings overseen by the Minnesota Office of Energy Security, members of the public testified to their use of the CMP for boating and fishing. The MNDNR confirmed such use in their comments on the Draft EIS. It is not likely that MNDNR would agree to limit access to the entire pit. However, DOE has indicated in response to such concerns that Excelsior would be willing to consider other options that would allow public access to the CMP, while precluding access to areas of the pit near the intake structure.**

- **Effects of the Mesaba Energy Project and associated rail deliveries on traffic delays at crossings, on neighboring residences, especially aesthetic and noise impacts, as well as potential impacts on property values. These impacts are unavoidable.**

There are no issues that remain to be resolved for this Final EIS. However, the Record of Decision by DOE on whether or not to provide funding under CCPI or possibly a loan guarantee would be contingent on execution of an agreement among the State Historic Preservation Office, Advisory Council on Historic Preservation and DOE to satisfy Section 106 of the National Historic Preservation Act. In addition, if the East Range site were ultimately selected by the Minnesota PUC

for a joint site and routing permit, DOE would be required to re-initiate consultation with the USFWS under Section 7 of the Endangered Species Act.

Even if DOE were to provide funding under CCPI or possibly a loan guarantee, other issues must be resolved for the project to go forward. These issues include the negotiation of a power purchase agreement or off-take arrangement to sell the power generated by the Mesaba Energy Project, approval of the joint permit (for siting and routing) by the PUC, and approval of permits by other agencies (e.g. a Section 404 permit by the U.S. Army Corps of Engineers, an air permit by the MPCA, etc.). DOE is not involved in the negotiation of a power purchase agreement for the project, nor is DOE a participant in the decisions by other Federal and state agencies for these required permits.

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1. PURPOSE AND NEED

This chapter introduces the purpose, need, and scope of the EIS for the Mesaba Energy Project. The chapter also summarizes the background **for the proposed project** and other aspects, including the **project proponent's preferred and alternate sites** and description **of surrounding areas**, the project components and objectives, a description of technologies associated with the Proposed Action, an explanation of the NEPA process, an explanation of relevant Minnesota environmental review and permitting processes, an overview of Federal and state public scoping comments, and a description of associated actions.

1.1 INTRODUCTION

DOE has prepared this EIS in cooperation with the MDOC to evaluate the potential environmental impacts of the Mesaba Energy Project, which **would be** a two-phased**,** nominal **600** $MWe_{(net)}$ per phase (**1,200** $MWe_{(net)}$ total) IGCC power plant (NETL, 2006a) proposed to be located in northeastern Minnesota (Figure 1.1-1). In IGCC, coal **would be** gasified **in a controlled thermal process converting it into** synthesis gas (syngas), which **would then be conditioned and** fed to **one or more** CTGs to generate electricity. **Heat from the CTG would be used to produce steam, which would be combined with steam produced from syngas cooling and fed to one or more STG to generate additional** electricity.

The project proponent, Excelsior Energy, Inc. (hereafter referred to as Excelsior), is an independent energy development company based in Minnetonka, Minnesota. **Excelsior is proposing the project through and on behalf of its wholly owned project company, MEP-I, LLC.**

The EIS has been prepared in compliance with the NEPA of 1969 as amended (42 USC 4321 et seq.) and with the Minnesota Power Plant Siting Act (Minnesota Statutes Chapter 216E). The lead Federal agency for the EIS is DOE. The lead state agency for the EIS is the MDOC, which has purview over the state permitting process. Under the Minnesota Power Plant Siting Act, a site permit is required from the Minnesota PUC to build a LEPGP, defined as a power plant and associated facilities capable of operating at a capacity of 50 MWe or more. The PUC normally has up to one year from the time the application is accepted to hold a contested case hearing and complete the process and make a decision on the permits. Since the state**-equivalent** EIS requirements under the Minnesota Power Plant Siting Act are comparable to those for NEPA, DOE has prepared this EIS in cooperation with the MDOC to fulfill the requirements of both laws.

A Federal, state, tribal, or local agency having special expertise with respect to an environmental issue or jurisdiction by law may be a cooperating agency in the NEPA process. USACE (St. Paul District, Brainerd Office) and the USDA Forest Service (Superior National Forest, Laurentian District) have participated as cooperating agencies for the EIS. A cooperating agency has the responsibility to assist the lead agency by participating in the NEPA process at the earliest possible time, by participating in the scoping process, by developing information and preparing environmental analyses including portions of the EIS for which the cooperating agency has special expertise, and by making staff support available at the lead agency's request to enhance the lead agency's interdisciplinary capabilities. USACE agreed to be a cooperating agency because the placement of dredged or fill material in waters of the U.S., including wetlands, associated with the **proposed project** would require its authorization pursuant to Section 404 of the CWA. In its role as a cooperating agency, USACE staff has provided input regarding potential aquatic resource impacts and related regulatory requirements. **The USDA Forest Service agreed to be a cooperating agency because, as a Federal Land Manager, the Forest Service has a responsibility to protect air quality-related values of wilderness areas. In its role as a cooperating agency, Forest Service staff has provided technical expertise in the review of air quality impacts.**

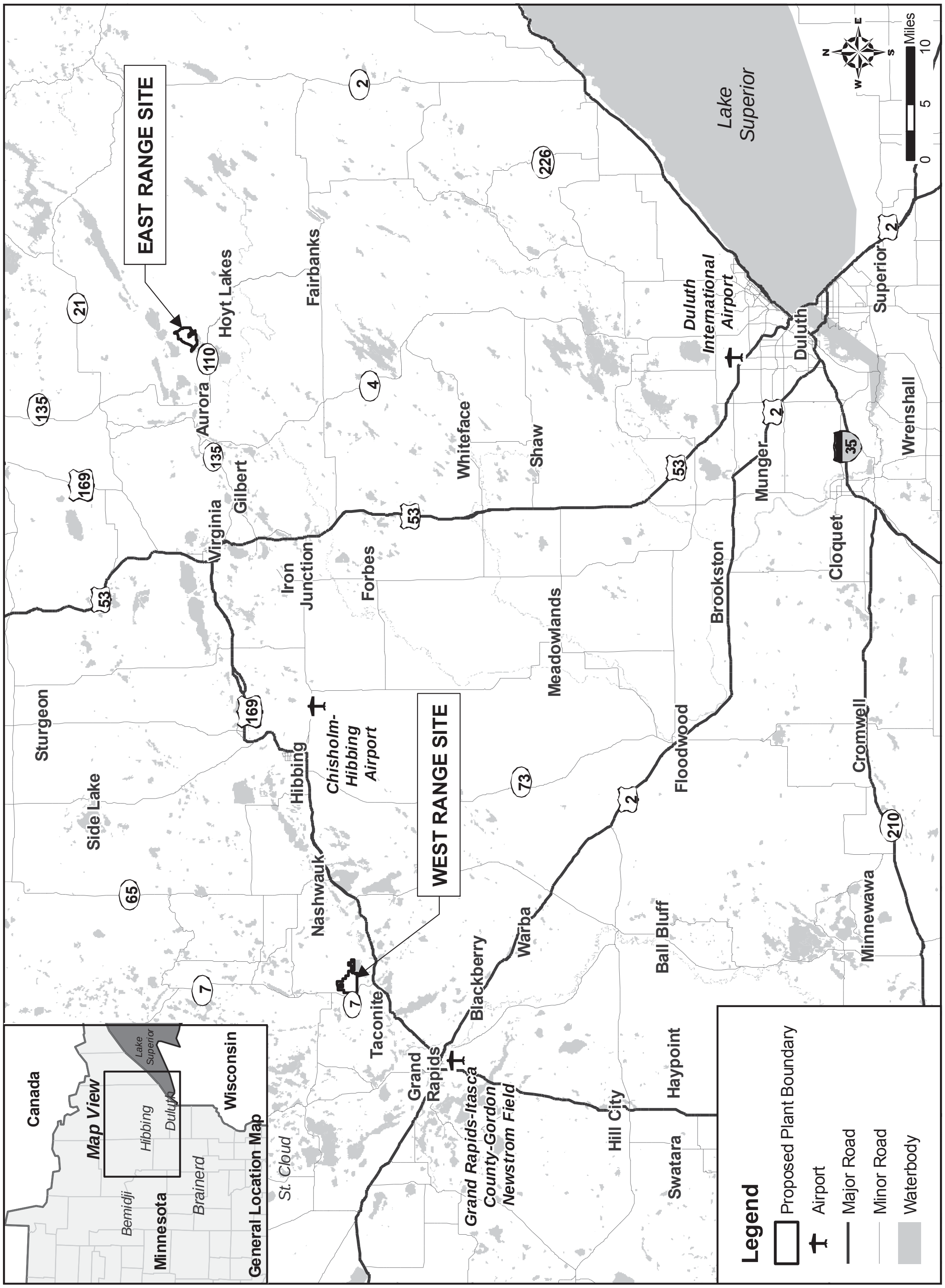

Figure 1.1-1 General Location Map

1.2 FEDERAL AND STATE CONTEXTS

1.2.1 Clean Coal Power Initiative

> At current consumption levels, it is estimated the U.S. has about 240 years of recoverable coal reserves.

Coal**, an abundant and indigenous energy resource,** accounts for over 94 percent of the proven fossil energy reserves in the U.S. and supplies over 50 percent of **its electric power. Vital** to the nation's economy and global competitiveness**, demand for electricity is projected to increase by over 30 percent by 2030. Based on thorough analyses conducted by the Energy Information Agency, it is projected that this power increase can only be achieved if coal use is also increased (EIA, 2007). Furthermore, nearly** half of the nation's electric power generating infrastructure is over 30 years old**, with a significant portion in-service for twice as long**. These aging facilities are or will soon be in need of substantial refurbishment or replacement. Additional capacity must also be put in-service to keep pace with the nation's ever-growing demand for electricity. **Therefore, nearly half of the nation's electricity needs will continue to be served by coal for at least the next several decades.** Given heightened awareness of environmental stewardship, while at the same time meeting the demand for a reliable and cost-effective electric power supply, it is clearly in the public interest for the nation's energy infrastructure to be upgraded with the latest and most advanced commercially viable technologies to achieve greater efficiencies, environmental performance, and cost-competitiveness. **However, to realize** acceptance and replication **of these advanced technologies into the electric power generation sector, the technologies need to be "demonstrated," i.e., designed and constructed to industrial standards and operated at significant scale under industrial conditions**.

Public Law 107-63, enacted in November 2001, first provided funding for the CCPI**. The CCPI** is **the current** multi-year **Federal** program to accelerate the commercial readiness of advanced multi-pollutant emissions control, combustion, gasification, and efficiency improvement technologies to retrofit or re-power existing coal-based power plants and for deployment in new coal-based generating facilities. **The CCPI encompasses a broad spectrum of commercial-scale demonstrations that target today's most pressing environmental challenges, including reducing mercury emissions and reducing greenhouse gases by boosting the efficiency at which coal is converted to electricity or other energy forms. The CCPI is closely linked with research and development activities driving toward ultra-clean, fossil fuel-based energy complexes in the 21st century. When integrated with other DOE initiatives, the CCPI will help the nation successfully commercialize advanced power systems that will produce electricity at greater efficiencies, attain near-zero emissions, produce clean fuels, and have carbon dioxide-management capabilities. Improving power plant efficiency is a potentially significant way to reduce carbon dioxide emissions in the near- and mid-term. In the longer term, CCPI technologies offering carbon dioxide capture and storage, or beneficial reuse, will remove fossil-fueled power as a potential threat to global climate change (DOE, 2008).**

Accelerating commercialization of clean coal technologies also positions the U.S. to supply advanced coal-based power generation and pollution control technologies to a rapidly expanding world market.

Congress provided for competitively awarded **Federal cost-shared funding for** CCPI **demonstrations**. **In contrast to other Federally funded activities, CCPI demonstrations** are not Federal projects seeking private investment; **instead,** they are private projects seeking Federal financial **assistance**. Under the CCPI **funding opportunity announcements**, **industry** propose**s** projects that meet **its** needs and those of **its** customers and further national goals and objectives embodied in the CCPI. **Demonstrations** accepted into the CCPI portfolio become private-public cost-**shared** partnerships that satisfy a wide set of industry and government needs. Industry satisfies its short-term need to retrofit or re-power a facility or develop new power generating capacity for the benefit of its customers. By providing financial incentive**s to the energy sector that reduce project risks associated with project financing and technical challenges** for emerging clean coal technologies, the government**: (a)** supports the verification of commercial readiness leading toward the long-term objective of transitioning the nation's existing fleet of electric power generating plants to the next generation of more efficient, environmentally sound, and cost-competitive facilities (NETL, 2006b)**; and, (b) facilitates the adoption of technologies that meet and enable more stringent environmental regulation through more efficient electric power generation, advanced environmental controls, and production of environmentally-attractive energy carriers and by-product utilization.**

Applications **for demonstrations under the CCPI** are evaluated against **specific** programmatic criteria**,** which include the following:

- Technical Merit – Scientific and engineering approach, data and other evidence to support technology claims, readiness of the technology, and potential benefits such as improved system performance, reliability, environmental performance, and costs;
- Feasibility – Appropriateness of proposed site**(s)**, including availability and access to water, power transmission, coal transportation, facilities and equipment infrastructure, and permits; the ability of the proposed project team to successfully implement the project; and the soundness and completeness of the statement of work, schedule, test plan, milestones, and decision points;
- Commercialization Potential – Commercial viability relative to the scale of the project, potential for broad market impact and widespread deployment, and soundness of the commercialization plan, including experience of the project team;
- Adequacy of the Financial and Business Plan – Financial condition and capability of proposed funding sources, priority placed by management on financing the project, and adequacy of the applicant's financial management system; and
- Adequacy of the Repayment Plan – Ability to repay the government co-funding.

Consistent with the CEQ NEPA regulations (40 Code of Federal Regulations [CFR] Parts 1500-1508) and DOE regulations (10 CFR Part 1021), DOE reviews preliminary environmental, health, safety, and socioeconomic information during the **evaluation and** selection process, particularly with respect to technical merit and feasibility. This is the first of two principal elements within the overall strategy under the CCPI for satisfying NEPA requirements. Program policy factors are also considered to ensure that the portfolio of **demonstrations** selected represents the most appropriate mix to achieve program objectives. These factors include program budget constraints, technological diversity, diversity of U.S. coals, and representation from a broad geographical cross-section of the country. No two **applications to the CCPI** are alike and therefore cannot be evaluated on an "apples-to-apples" basis.

As the second element of the overall CCPI NEPA compliance strategy, once an application has been selected for negotiation, the applicant must prepare detailed technology- and site-specific environmental information. This environmental information serves as the source material for analyses and preparation of NEPA documentation. As industry-led projects, the industry participants are responsible for project definition as well as design, construction, and operation of the facilities. DOE is responsible for (1) ensuring that the industry participants execute projects pursuant to the terms and conditions established in the cooperative agreements; (2) monitoring project activities; (3) reviewing project performance and documentation; (4) providing technical advice to ensure that critical programmatic issues are addressed; and (5) ensuring that project costs are allocable and allowable. The government also participates in decision-making at major project junctures.

DOE conducts its CCPI funding in a series of "rounds," or **funding opportunity announcements**, **to which industry can prepare and submit applications requesting Federal cost-sharing** for proposed **demonstrations**. DOE issued the first CCPI funding opportunity announcement (Round 1) in March 2002. A second funding opportunity announcement (Round 2) was issued in February 2004. These **announcements** emphasized advanced coal-based power generation, including gasification, efficiency improvements, optimization through neural networking, environmental/economic improvements, and mercury control. **A third funding opportunity announcement (Round 3) was issued in August 2008 and emphasized advanced coal-based technologies that capture and sequester, or put to beneficial reuse, carbon dioxide emissions.**

IGCC technology meets the goals of the Clean Coal Power Initiative by utilizing an estimated 240-year domestic supply of reliable, low-cost coal in an environmentally acceptable manner.

Thirteen applications **for Federal cost-shared demonstrations** were received in response to **CCPI** Round 2. Two **of the thirteen** applicants proposed archetypal IGCC **demonstrations**. Four **of the 13** applications were selected, including both archetypal IGCC **demonstrations**, one of which was the Mesaba Energy Project (NETL, 2006a). The selections were based on individual merit. The selected **demonstrations** were believed to represent the mix of technologies with the best potential to progress toward DOE objectives for CCPI Round 2. These objectives as stated in the Financial Assistance Announcement DE-PS26-04NT42061 were as follows:

(1) Demonstrate advanced coal-based technologies that have progressed beyond the research and development stage to a point of readiness for operation at a scale that can be readily replicated into commercial practice within the electric power industry; and

(2) Accelerate the likelihood of deploying the demonstrated technologies for widespread commercial use within the electric power sector.

Two technology priorities for **CCPI** Round 2 were gasification-based power generation systems and mercury control technology. The two IGCC **applications** that were selected involve the demonstration of different gasifier types, which is important in achieving a diversity of technology approaches and methods in the CCPI Program. They also involve different coals, operating environments, and environmental considerations, all of which enhance the potential for widespread commercialization of IGCC technology in the marketplace. The unique technological features of the Mesaba Energy Project include the following: integration of the air separation unit and the combustion turbine to improve efficiency; demonstration of full slurry quench for added efficiency improvements; the potential for demonstration of high availability and reliability needed for commercial acceptance of the technology; and the application of lessons learned through optimization studies conducted at a previous clean coal demonstration project.

Project applications selected for the CCPI Program may also be eligible to apply for Federal loan guarantees. The Energy Policy Act of 2005 (EPAct05) established a Federal loan guarantee program for eligible energy projects that employ innovative technologies. Title XVII of the EPAct05 authorizes the Secretary of Energy to make loan guarantees for a variety of types of projects, including projects that "avoid, reduce, or sequester air pollutants or anthropogenic emissions of greenhouse gases; and employ new or significantly improved technologies as compared to commercial technologies in service in the United States at the time the guarantee is issued." (Section 1703(a)(1), 42 U.S.C. 16513). Excelsior has submitted a formal application to DOE for a loan guarantee.

1.2.2 State Legislative Incentives

The Minnesota Legislature adopted legislation in 2003 that provided incentives for an "innovative energy project" to be located on as many as three sites in the TTRA of northeastern Minnesota (see Section 2.1.1). Minnesota Statutes § 216B.1694 define an innovative energy project as a proposed energy-generation facility or group of facilities that:

- Makes use of an innovative generation technology utilizing coal as a primary fuel in a highly efficient combined-cycle configuration with significantly reduced sulfur dioxide, nitrogen oxide, particulate, and mercury emissions from those of traditional technologies;
- Is capable of offering a long-term supply contract at a hedged, predictable cost; and
- Is designated by the commissioner of the Iron Range Resources and Rehabilitation Board as located in the TTRA on a site that has substantial real property with adequate infrastructure to support new or expanded development and that has received prior financial and other support from the board.

The specific incentives for an innovative energy project provided in the statutes include:

- Exemption from the requirements for a Certificate of Need (under section 216B.243) for the generation facilities and associated transmission infrastructure;
- Eligibility, once permitted and constructed, to increase the capacity of the associated transmission facilities without additional state review;
- Power of eminent domain limited to the sites and routes approved by the PUC for the project facilities;
- Qualification as a "clean energy technology" as defined in section 216B.1693;
- Consideration of the project as a supply option prior to the approval by the PUC of any arrangement to build or expand a fossil fuel-fired generation facility, or to enter into an agreement to purchase capacity or energy from such a facility for a term exceeding five years;
- Entitlement to enter into a contract with a public utility that owns a nuclear generation facility in the state to provide 450 megawatts of baseload capacity and energy under a long-term contract subject to approval by the PUC; and
- Eligibility for a grant from the renewable development account.

The statute also requires the innovative energy project to make a good faith effort to secure funding from DOE and USDA to conduct a demonstration project at the facility for either geologic or terrestrial carbon sequestration projects to achieve reductions in facility emissions or carbon dioxide. Other related state legislation provided a personal property tax exemption and other benefits to the project and its investors. These incentives created by the Minnesota Legislature were a principal determinant in Excelsior's decision to locate the Mesaba Energy Project in the TTRA of northeastern Minnesota.

The PUC has the responsibility for siting power plants having the capacity to operate at 50 MWe or greater (i.e., LEPGPs) and transmission lines designed for or capable of operation at a voltage of 100 kilovolts (kV) (i.e., high voltage transmission lines [HVTLs]). The Minnesota legislature directed the PUC to designate sites that minimize adverse human and environmental impacts while ensuring electric power system reliability and integrity and ensuring that electric energy needs are met and fulfilled in an orderly and timely fashion. Minnesota Rules Chapter 7849 establishes the requirements for submitting and processing a permit application. In the application, the applicant must identify the preferred site for the power plant and one alternative site. As part

of the permitting process, the MDOC prepares an EIS on the project and holds a contested case hearing. See further discussion of the state regulatory framework in Section 1.5.2.

The Mesaba Energy Project has been assigned PUC Docket Number E6472/GS-06-668. Documents submitted by Excelsior in conjunction with the state permitting process, including the Joint Application (Excelsior, 2006a) and the Environmental Supplement (Excelsior, 2006b), as well as other documents relating to the state review process, can be accessed at the PUC website (http://energyfacilities.puc.state.mn.us/Docket.html?Id=16573; "Mesaba Energy Project"). Although the project is exempt as an "innovative energy project" under Minnesota Statutes § 216B.1694 from Certificate of Need proceedings for all generation and transmission infrastructure, it otherwise remains subject to all applicable environmental review and permitting procedures.

1.3 PROPOSED ACTION

[Text in the Draft EIS summarizing the project proponent's proposed action has been removed from this chapter. Section 2.1.2 describes the project proponent's proposed project and alternatives.]

1.3.1 DOE Proposed Action

The DOE Proposed Action is to provide a total of $36 million in co-funding, through a cooperative agreement with Excelsior **(MEP-I, LLC)**, for the **definition and preliminary** design and one-year operational demonstration testing period for Phase I of the proposed two-phased Mesaba Energy Project. **In addition, DOE may provide a loan guarantee to Excelsior pursuant to EPAct05 Section 1703 for Phase I of the proposed project.** This first phase would be a nominal **600** $MWe_{(net)}$ IGCC power plant with an estimated cost of $2.16 billion **as documented in the cooperative agreement**. Phase II, which would be an identical, co-located **600** MWe plant, would be privately financed and not involve co-funding **or a loan guarantee from** DOE. **See further discussion of the DOE Proposed Action in Section 2.1.1.**

For the Mesaba Energy Project, DOE has determined that its Proposed Action to provide co-funding for the definition and preliminary design and the one-year operational demonstration period constitutes a major Federal action. Approval of the loan guarantee is also considered a major Federal action subject to NEPA review. Therefore, DOE has prepared this EIS as a record of its analysis of the potential impacts of the Proposed Action and reasonable alternatives available to the Department. DOE has considered information prepared by Excelsior and its team, as well as additional sources available from government agencies and other entities. The EIS has been prepared in accordance with Section 102(2)(C) of NEPA, as implemented under regulations promulgated by the CEQ (40 CFR Parts 1500-1508), and as provided in DOE regulations for compliance with NEPA (10 CFR Part 1021).

[Text repetitive to text in Section 2.1.1.1 has been removed.]

This EIS considers the impacts of both phases of the Mesaba Energy Project as connected actions, consistent with NEPA policy **(see Sections 1.5.1 and 1.6.4)**, even though only Phase I would be co-funded under the CCPI Program. **However, at the request of USACE, the Final EIS has been revised as appropriate to describe the potential impacts of Phase I separately from the impacts of the combined two-phased project.**

1.3.2 State Proposed Action

The Proposed Action for the State of Minnesota is to approve, through the PUC as supported by the MDOC, the pre-construction joint permit application submitted by Excelsior for the construction of the Mesaba Energy Project as an "innovative energy project" within the TTRA.

1.4 PURPOSE AND NEED FOR ACTION

[Text in the Draft EIS describing the DOE purpose and need separately has been revised to combine the purpose and need in one section to eliminate confusion. Text describing the project proponent's purpose has been eliminated.]

1.4.1 DOE Purpose and Need

The DOE purpose in the context of the CCPI Program is to demonstrate the commercial-readiness of the ConocoPhillips E-Gas™ gasification technology in a fully integrated and quintessential IGCC utility-scale application. The technical, environmental, and financial data generated from the design, construction, and operation of the facility would result in a commercial reference plant for the technology.

The purpose of the DOE action with regard to the proposed issuance of a Federal loan guarantee is to encourage early commercial use in the United States of a new or significantly improved energy technology and to avoid or reduce emissions of greenhouse gases and other air pollutants pursuant to Title XVII of EPAct05.

The specific technology that would be deployed in the Mesaba Energy Project represents a significant advancement on the base design of the smaller-scale 262 $MWe_{(net)}$ Wabash River Plant in Terre Haute, Indiana, which was a project completed under the DOE Clean Coal Technology Program, a predecessor to the CCPI. The advancements would include enhanced environmental performance, greater capacity, increased efficiency and availability, as well as fuel flexibility and enhanced integration of IGCC plant systems.

The principal need addressed by DOE, pursuant to Public Law 107-63 and subsequent legislative appropriations, is to accelerate the commercialization of clean coal technologies that achieve greater efficiencies, environmental performance, and cost-competitiveness (see Section 1.2). The proposed project was selected under the CCPI Program as one of a portfolio of projects that would represent the most appropriate mix to achieve programmatic objectives and meet legislative requirements.

With regard to the proposed issuance of a Federal loan guarantee, this action is needed to fulfill the DOE mandate under EPAct05 to issue loan guarantees to eligible projects that "avoid, reduce, or sequester air pollutants or anthropogenic emissions of greenhouse gases" and "employ new or significantly improved technologies as compared to technologies in service in the United States at the time the guarantee is issued."

1.4.2 State Purpose and Need

A purpose of the Minnesota Legislature, as intended in Minnesota Statutes § 216B.1694, is to provide incentives for the development of an "innovative energy project" on as many as three sites within the TTRA of northern Minnesota.

The mission of the PUC (supported by the MDOC) is to create and maintain a regulatory environment that ensures safe, reliable, and efficient utility services at fair and reasonable rates (PUC, 2006). The commission conducts its mission by:

- Emphasizing the production and consumption of energy resources that will minimize damage to the environment;
- Encouraging conservation;
- Implementing the state's energy policies, which include the provision of incentives for the construction of "innovative energy projects" within the TTRA;
- Establishing rules related to safety and quality of service; and
- Encouraging the development and appropriate implementation of new technologies and services for the public.

1.4.3 Project Proponent Purpose

At the request of, and in consultation with, USACE regulatory staff, Excelsior has developed a purpose statement to satisfy USACE NEPA and CWA Section 404 requirements. The project purpose provided in Appendix F1 will be carried into the CWA Section 404 permit evaluation, and will be the basis for the alternatives analysis required by USACE regulations.

1.5 REGULATORY FRAMEWORK

The following sections summarize the principal Federal and state regulations affecting the permitting process and required environmental documentation for the Mesaba Energy Project. The project would be subject to additional Federal, state, and local regulations and permit conditions in Chapter 6.

1.5.1 National Environmental Policy Act

NEPA requires Federal agencies to integrate environmental values into their decision-making processes by considering the environmental impacts of, and reasonable alternatives to, their proposed actions. For major Federal actions that have the potential to cause significant adverse impacts on the environment, NEPA requires sponsoring agencies to prepare an EIS. DOE determined that providing financial assistance for the design and operational demonstration of the proposed Mesaba Energy Project constitutes a major Federal action that may significantly affect the quality of the natural and human environment. Therefore, DOE prepared this EIS for use by decision-makers in determining whether to provide assistance.

NEPA also requires Federal agencies to ensure that the scope of an EIS considers connected actions. A connected action is one that is closely related to the Proposed Action. As defined in 40 CFR 1508.25, actions are connected if they:

"(i) Automatically trigger other actions which may require environmental impact statements.

(ii) Cannot or will not proceed unless other actions are taken previously or simultaneously.

(iii) Are interdependent parts of a larger action and depend on the larger action for their justification."

Accordingly, this EIS considers the impacts of both phases of the Mesaba Energy Project as connected actions (see further discussion in Section 1.6.4), even though only Phase I would be co-funded under the CCPI Program.

CWA Section 404 authorization is required for the proposed project, because its construction would require discharges of dredged and/or fill material into waters of the U.S. As a cooperating agency in the preparation of the EIS, and the agency responsible for determining whether to issue a permit for wetland impacts associated with the proposed project, it is the USACE's intention to adopt the EIS as part of its permit evaluation. Also, the USDA Forest Service has an affirmative responsibility to protect air quality-related values of wilderness areas as a Federal Land Manager and is providing technical expertise in the review of air quality impacts as a cooperating agency. This EIS assesses the potential impacts on the natural and human environment of the Proposed Action and reasonable alternatives within the scope of the CCPI Program. The NEPA process and opportunities for public input are illustrated in Figure 1.5-1. The scope of this EIS is discussed in Section 1.6.

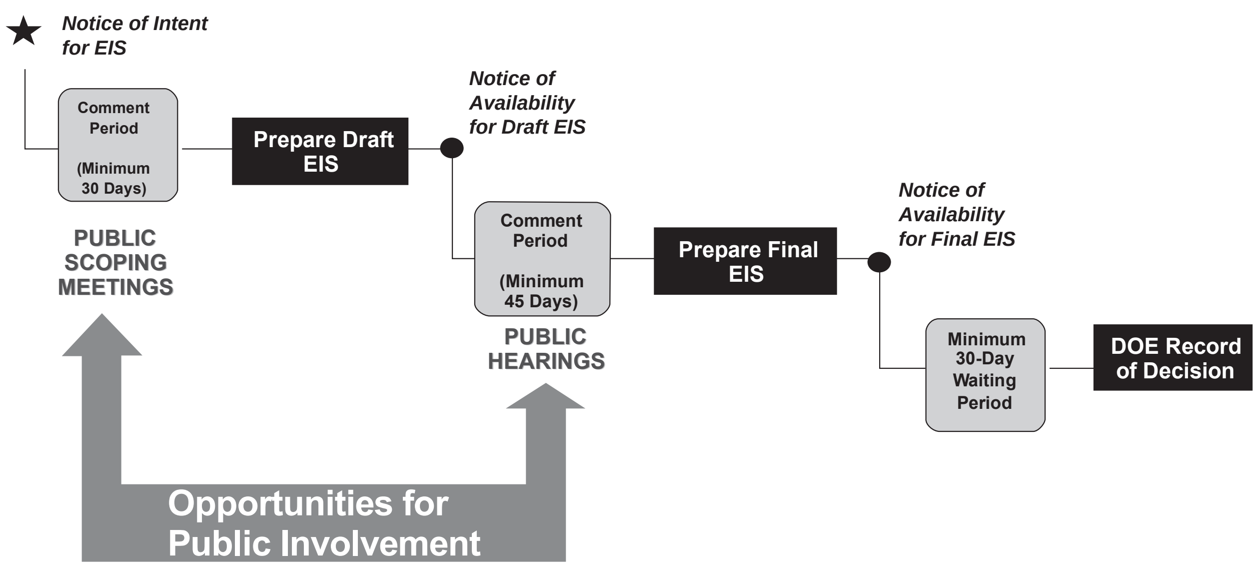

Figure 1.5-1. The NEPA Process

1.5.2 State Requirements

1.5.2.1 Minnesota Power Plant Siting Act

The Mesaba Energy Project is considered a Large Electric Power Generating Plant subject to the Minnesota Power Plant Siting Act, which requires the preparation of a state-equivalent EIS.

Because the proposed Mesaba Energy Project is considered a LEPGP and also includes a HVTL, it is subject to the Minnesota Power Plant Siting Act (Minnesota Statutes Chapter 216E), which requires the preparation of a state-equivalent EIS. Figure 1.5-2 illustrates the process to be undertaken by the state in producing the EIS. Section 1.5.2.2

discusses the requirements for compliance with the Minnesota Power Plant Siting Act in accordance with Minnesota Rules Chapter **7849**. Section 1.5.2.4 provides further information about the Minnesota Environmental Review Program.

1.5.2.2 Minnesota Rules Chapter 7849

Minnesota Rules Chapter **7849** implements and regulates the Power Plant Siting Act. The intent of the Act and Chapter **7849** is to ensure that LEPGPs are sited and HVTLs are routed in an orderly manner compatible with environmental preservation and the efficient use of resources. In accordance with this policy, the PUC must choose locations that minimize adverse human and environmental impacts while ensuring continuing electric power system reliability and integrity and ensuring that electric energy needs are met and fulfilled in an orderly and timely fashion. The PUC is also required to provide for broad-spectrum citizen participation in conjunction with these rules.

LEPGP Site Permit

In accordance with Minnesota Rules **7849.5220** Subpart 1, an application for a site permit for a LEPGP must contain the following information:

- A statement of proposed ownership of the facility as of the day of filing and after commercial operation;
- The precise name of any person or organization to be initially named as permittee or permittees and the name of any other person to whom the permit may be transferred if transfer of the permit is contemplated;
- At least two proposed sites for the proposed LEPGP and identification of the applicant’s preferred site and the reasons for preferring the site;
- A description of the proposed LEPGP and all associated facilities, including the size and type of facility;
- Environmental information (see subsection below);
- The names of the owners of the property for each proposed site;
- The engineering and operational design for the LEPGP at each of the proposed sites;
- A cost analysis of the LEPGP at each proposed site, including the costs of constructing and operating the facility that are dependent on design and site;
- An engineering analysis of each of the proposed sites, including how each site could accommodate expansion of generating capacity in the future;
- Identification of transportation, pipeline, and electrical transmission systems that will be required to construct, maintain, and operate the facility;
- A listing and brief description of Federal, state, and local permits that may be required for the project at each proposed site; and
- A copy of the Certificate of Need for the project from the PUC or documentation that an application for a Certificate of Need has been submitted or is not required.

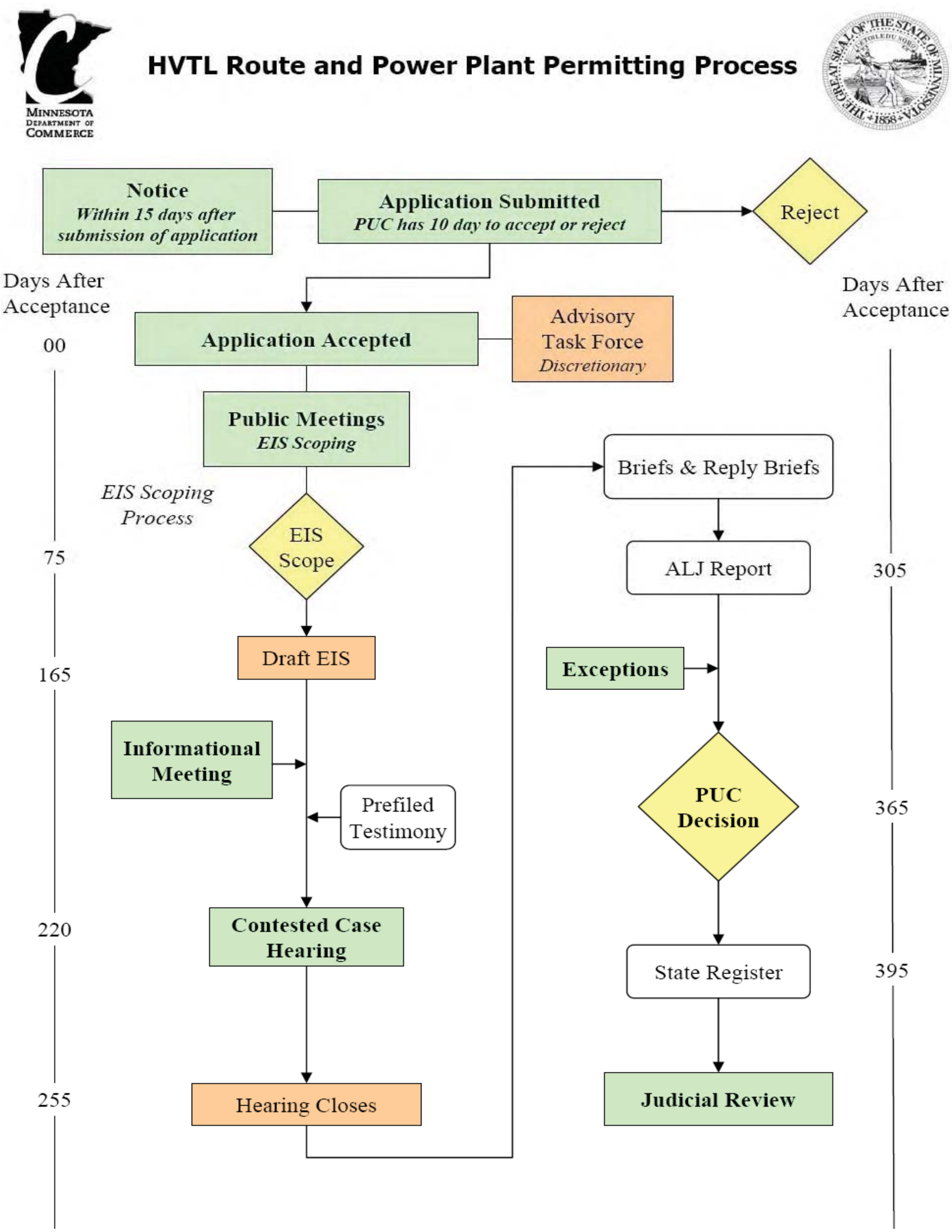

Figure 1.5-2. Minnesota Power Plant Siting Process

HVTL Route Permit

In accordance with Minnesota Rules **7849.5220** Subpart 2, an application for a route permit for a HVTL must contain the following information:

- A statement of proposed ownership of the facility at the time of filing the application and after commercial operation;
- The precise name of any person or organization to be initially named as permittee or permittees and the name of any other person to whom the permit may be transferred if transfer of the permit is contemplated;
- At least two proposed routes for the proposed HVTL and identification of the applicant's preferred route and the reasons for the preference;
- A description of the proposed HVTL and all associated facilities including the size and type of HVTL;
- Environmental information (see subsection below);
- Identification of land uses and environmental conditions along the proposed routes;
- The names of each owner whose property is within any of the proposed routes for the HVTL;
- U.S. Geological Survey (USGS) topographical maps or other maps acceptable to the state authority showing the entire length of the HVTL on all proposed routes;
- Identification of existing utility and public rights-of-way (ROWs) along or parallel to the proposed routes that have the potential to share the ROW with the proposed line;
- The engineering and operational design concepts for the proposed HVTL, including information on the electric and magnetic fields of the transmission line;
- The cost analysis of each route, including the costs of constructing, operating, and maintaining the HVTL that are dependent on design and route;
- A description of possible design options to accommodate expansion of the HVTL in the future;
- The procedures and practices proposed for the acquisition and restoration of the ROW, construction, and maintenance of the HVTL;
- A listing and brief description of Federal, state, and local permits that may be required for the proposed HVTL; and
- A copy of the Certificate of Need or the certified HVTL list containing the proposed HVTL or documentation that an application for a Certificate of Need has been submitted or is not required.

Environmental Information

A site permit or route permit application shall include the following environmental information for each proposed site or route to aid in the preparation of an EIS:

- Environmental setting for each site or route;
- Effects of construction and operation of the facility on human settlement, including, but not limited to, public health and safety, displacement, noise, aesthetics, socioeconomic impacts, cultural values, recreation, and public services;
- Effects of the facility on land-based economies, including, but not limited to, agriculture, forestry, tourism, and mining;
- Effects of the facility on archaeological and historic resources;
- Effects of the facility on the natural environment, including effects on air and water quality resources and flora and fauna;
- Effects of the facility on rare and unique natural resources;

- Identification of human and natural environmental effects that cannot be avoided if the facility is approved at a specific site or route; and
- Measures that might be implemented to mitigate the potential human and environmental impacts and the estimated costs of such mitigative measures.

Factors to be Considered

In determining whether to issue a permit for a LEPGP or HVTL, the state authority shall consider the following factors:

- Effects on human settlement, including, but not limited to, displacement, noise, aesthetics, cultural values, recreation, and public services;
- Effects on public health and safety;
- Effects on land-based economies, including, but not limited to, agriculture, forestry, tourism, and mining;
- Effects on archaeological and historic resources;
- Effects on the natural environment, including air and water quality resources and flora and fauna;
- Effects on rare and unique natural resources;
- Application of design options that maximize energy efficiencies, mitigate adverse environmental effects, and could accommodate expansion of transmission or generating capacity;
- Use or paralleling of existing ROWs, survey lines, natural division lines, and agricultural field boundaries;
- Use of existing LEPGP sites;
- Use of existing transportation, pipeline, and electrical transmission systems or ROWs;
- Electrical system reliability;
- Costs of constructing, operating, and maintaining the facility that are dependent on design and route;
- Adverse human and natural environmental effects which cannot be avoided; and
- Irreversible and irretrievable commitments of resources.

Joint Application Process

Per Minnesota Rules **7849.5070**, the proponent of a LEPGP that will require a HVTL may elect to apply for both a site permit for the plant and a route permit for the transmission line in one application process. The PUC also may elect to combine two pending applications if it is appropriate to consider both projects as part of one proceeding. Furthermore, an applicant may combine an application for a pipeline routing permit with a site permit if a natural gas or petroleum pipeline to a new LEPGP will be required.

> Under Minnesota Rules, the applicant for a LEPGP can apply for the permits for the plant, transmission lines, and pipelines under one application.

1.5.2.3 Minnesota Pipeline Routing Rules

A pipeline routing permit from the PUC is required for the construction of certain pipelines (Minnesota Statutes § 216G.02). The PUC has jurisdiction over pipelines with a diameter of 6 inches or more that are designed to transport hazardous liquids like crude petroleum and those that are designed to carry natural gas and be operated at a pressure of more than 275 pounds per square inch. However, the PUC's authority does not apply to interstate natural gas pipelines regulated under the Federal Natural Gas Act or to a pipeline owner or operator who is defined as a natural gas public utility under Minnesota Statutes § 216B.02. The procedures are explained in detail in the Pipeline Routing Rules (Minnesota Rules Chapter **7852**).

For the Mesaba Energy Project, a natural gas pipeline would be required and would be subject to the Pipeline Routing Rules. The pipeline routing permit would supersede and preempt all zoning, building, or land use rules, regulations, or ordinances adopted by regional, county, local, or special purpose governments, as provided in Minnesota Statutes § 216G.02 Subdivision 4. As an "innovative energy project," the Mesaba Energy Project would have the power of eminent domain limited to routes approved by the PUC.

1.5.2.4 Minnesota Environmental Policy Act

The Minnesota Environmental Review Program is based on the Federal NEPA law. The Minnesota Environmental Policy Act (MEPA) was enacted in 1973 (Minnesota Statutes § 116D) to (1) declare a state policy that will encourage productive and enjoyable harmony between human beings and their environment; (2) promote efforts that will prevent or eliminate damage to the environment and biosphere and stimulate the health and welfare of human beings; and (3) enrich the understanding of the ecological systems and natural resources important to the state and to the nation.

MEPA established a formal process for reviewing the environmental impacts of major developmental projects. The purpose of the review is to provide information to units of government on the environmental impacts of a project before approvals or necessary permits are issued. After projects are completed, unanticipated environmental consequences can be very costly to undo, and environmentally sensitive areas can be impossible to restore. Environmental review creates the opportunity to anticipate and correct these problems before projects are built.

MEPA is regulated by Minnesota Rules Chapter 4410. However, as stated in Minnesota Rules **7849.5300** Subpart 12, the requirements of Chapter 4410 do not apply to the preparation or consideration of an EIS for a LEPGP or HVTL. Instead, the requirements for preparation of an EIS under the Minnesota Power Plant Siting Act are specified in Minnesota Rules **7849.5300**, which embodies and implements the general intent of MEPA.

1.5.2.5 Taconite Tax Relief Area

The TTRA is a geographic area in northeastern Minnesota that encompasses approximately 13,000 square miles and stretches from Crosby, Minnesota across the state's Cuyuna, Mesabi, and Vermilion iron ore ranges to the north shore of Lake Superior. This area was the site of some of the largest iron mines in the world, but is now economically depressed. Pursuant to the "Innovative Energy Project" Statute, Excelsior's project siting efforts centered on sites within the TTRA. Excelsior focused particularly on potential sites within the Mesabi Iron Range due to the existing infrastructure system developed in response to earlier industrial mining activities. The location of the TTRA is discussed in Section **2.1.1.2.**

1.6 SCOPE OF THIS EIS

Because the EIS for the Mesaba Energy Project has been prepared as a joint Federal and state document to satisfy the requirements of NEPA and the Minnesota Power Plant Siting Act, the scoping requirements of both Federal and state legislation were applicable. The Federal public scoping process – including two public scoping meetings – was conducted early in the process as required by NEPA regulations. However, as required under state regulations, MDOC could not conduct public scoping meetings until after receipt of a joint application. Therefore, separate DOE and MDOC scoping meetings and scoping periods were held. However, representatives from DOE and MDOC attended all scoping meetings, and the EIS considered scoping comments received during both scoping periods.

1.6.1 Federal NEPA Scoping Process

1.6.1.1 The Notice of Intent

DOE published the NOI to prepare this EIS in the *Federal Register* on October 5, 2005 (70 *FR* 58207) and sent copies to Federal and state agencies (DOE, 2005). Publication of the NOI initiated the EIS process with a public scoping period (40 CFR 1501.7) for soliciting public input to ensure that (1) significant issues would be identified early and properly studied; (2) issues of minimal significance would not consume excessive time and effort; (3) the EIS would be thorough and balanced; and (4) potential delays that could result from an incomplete or inadequate EIS would be avoided. The Federal EIS scoping period extended through November 14, 2005.

The scope of issues to be addressed in this EIS, and the significant issues related to the action, were determined through several means including:

- The preliminary identification of issues by DOE as a part of the early project planning and internal scoping;
- Additional issues identified by DOE as a result of state and Federal agency consultation and coordination with representatives of Native American tribes;
- The identification of issues and concerns expressed in comments received from the public and interested parties during the NEPA scoping process; and
- Additional issues and concerns expressed in comments received from the public and interested parties during the Minnesota Power Plant Siting Act scoping process.

DOE initially identified the environmental issues listed in Table 1.6-1 in the NOI for analysis in the EIS. The list, which was developed based on reviews of the proposed project location and technology as well as the scope of the proposed project and similar projects, was presented to facilitate public comment on the planned scope of the EIS. It was not intended to be all-inclusive; nor was it meant as a pre-determined set of potential impacts. Also, the order in which issues were listed was not intended to imply any priority or level of significance.

Table 1.6-1. Issues Identified in the NOI for Consideration in the EIS

- Atmospheric resources: Potential air quality impacts resulting from emissions during construction and operation of the project, including potential impacts on Class I areas in the vicinity (Voyageurs National Park [VNP] and Boundary Waters Canoe Area Wilderness [BWCAW]) and local odor impacts.
- Water resources: Potential impacts on surface and groundwater resources and water quality, including effects of water usage, wastewater management, storm water management, and soil erosion and sedimentation in the Mississippi River and Great Lakes Basins.
- Cultural resources: Potential effects on historic and archaeological resources and Native American tribal resources.
- Ecological resources: Potential onsite and offsite impacts to vegetation, wildlife, protected species, and ecologically sensitive habitats.
- Floodplains and wetlands: Potential impacts on wetlands located within the East Range and West Range Sites and their associated transportation/utility corridors, and potential impacts on floodplains within the transportation/utility corridors for both sites. In accordance with DOE regulations (10 CFR Part 1022), the final EIS will include a floodplain and/or wetlands assessment and a statement of findings.
- Terrestrial resources: Land requirements and compatibility of plant facilities and operations, access roads, rail alignments, and potential new corridors for HVTL and natural gas lines with adjacent and surrounding land uses.
- Utility and transportation infrastructure requirements for delivery of feedstocks and process chemicals to the facility.
- Health and safety impacts: Construction-related safety and process-related safety associated with handling and management of process chemicals.
- Noise: Potential impacts resulting from construction and operation of the proposed plant and from transportation of feedstocks, process materials, and plant by-products.
- Community resources: Potential impacts on local traffic patterns, socioeconomic impacts of plant construction and operation, including effects on public services and infrastructure resulting from the influx of construction personnel and plant operating staff, and environmental justice issues.
- Aesthetic and scenic resources: Potential visual effects associated with plant structures and operations.
- Cumulative effects that result from the incremental impacts of the proposed plant when added to the other past, present, and reasonably foreseeable future activities in the Iron Range area.
- Connected actions: Effects of construction and operation of the second phase of the Mesaba Generating Station resulting in a combined, nominal, **1,200** $MWe_{(net)}$ power generating facility on the selected site.

1.6.1.2 Coordination with Federal and State Agencies

DOE contacted the following agencies by letter to initiate consultation with respect to particular environmental resources and/or to invite them to become cooperating agencies under NEPA. The agency contacts have also been included in the distribution list for the EIS.

- Regional Environmental Officer, U. S. Department of the Interior
- Regional Director, National Park Service
- Regional Director, Bureau of Indian Affairs
- Director, Water Division, U. S. Environmental Protection Agency, Region 5
- Director, Federal Energy Regulatory Commission, Division of Gas – Environment & Engineering
- U.S. Army Corps of Engineers, St. Paul District Office (District Engineer, NEPA Coordinator, Regulatory Branch Chief, and Archaeologist)
- U.S. Forest Service (Superior National Forest Supervisor and Laurentian District Ranger)
- Field Supervisor, U.S. Fish and Wildlife Service, Twin Cities Ecological Services Field Office
- U.S. Department of Transportation, Federal Highway Administration

- State Historic Preservation Office, Minnesota Historical Society
- Minnesota Department of Natural Resources, Natural Heritage and Nongame Research Program

In response to the coordination letters, the USACE (St. Paul District, Brainerd Office) and the USDA Forest Service (Superior National Forest, Laurentian District) agreed to participate as cooperating agencies for the EIS.

1.6.1.3 Outreach to Native American Tribes

During scoping, it was and remains DOE's goal that all Federally recognized tribes with historic or current affiliation to Minnesota and the project area would be invited to participate in the consultation process. DOE contacted **the Minnesota Indian Affairs Council to inform the council of the project and elicit any support that it might provide in facilitating consultation with tribal organizations. In September 2005, DOE contacted the following** representatives of **local** Native American tribes and reservations **by letter** to inform them **of** the project and initiate formal consultation.

- Leech Lake Reservation
- Mille Lacs Band of Ojibwe
- White Earth Reservation
- Minnesota Chippewa Tribe
- Grand Portage Reservation
- Bois Forte Reservation
- Fond du Lac Reservation
- Red Lake Band of Chippewa
- Lower Sioux Community
- Upper Sioux Community
- Prairie Island Indian Community
- Shakopee Mdewakanton Dakota Community
- Bad River Band of Lake Superior Chippewa
- Keweenaw Bay Indian Community
- Lac Courte Oreilles Band of Lake Superior Chippewa Indians of Wisconsin
- Lac Vieux Desert Band of Lake Superior Chippewa Indians
- Lac du Flambeau Band of Lake Superior Chippewa Indians of Wisconsin
- Red Cliff Band of Lake Superior Chippewa Indians
- Sisseton-Wahpeton Oyate of the Lake Traverse Reservation
- Sokaogon Chippewa (Mole Lake) Community of Wisconsin
- Spirit Lake Tribal Council
- St. Croix Chippewa Indians of Wisconsin
- Turtle Mountain Band of Chippewa
- Flandreau Santee Sioux
- Santee Sioux Nation
- Iron Range Area Council, White Earth Band

DOE received responses from the Tribal Historic Preservation Offices (THPOs) of the Keweenaw Bay Indian Community, Flandreau Santee Sioux Tribe, the Lac Vieux Desert Band of Lake Superior Chippewa Indians, the Mille Lacs Band of the Ojibwe Indians, and the Leech Lake Band of Ojibwe Indians. Because not all tribes responded to the initial consultation letters sent in

September 2005, follow-up consultation letters were sent to the tribes listed above in May 2006 inviting them again to submit any concerns they might have that had not as yet been submitted. Copies of the responses from the tribes to both letters are included in Appendix E and entered into the Administrative Record for the project. Also included in Appendix E are copies of responses from the 1854 Authority, an intra-tribal natural resource management organization, and correspondence from James Merhar, representing the Iron Range Council for Native Americans.

Section 1.8, Continuing Outreach to Native American Tribes, provides a summary of DOE's efforts beyond scoping, with respect to tribal consultation.

1.6.1.4 NEPA Public Scoping Meeting

The NOI invited public participation in the NEPA process and announced two scoping meetings, one held on October 25, 2005, at the Taconite Community Center in Taconite, Minnesota and one held on October 26, 2005, at the Hoyt Lakes Arena, in Hoyt Lakes, Minnesota. These locations were selected for their close proximity to Excelsior's respective preferred and alternative sites for the Mesaba Energy Project. DOE announced the public scoping meetings in local newspapers, including the *Eastern Itascan* on October 20; *Duluth News Tribune*, *Hibbing Daily Tribune*, *Mesabi Daily News*, and *Grand Rapids Herald-Review* on October 23; and *East Range Shopper* and *Grand Rapids Manney's Shopper* on October 24.

DOE also notified Federal, state, and local agencies, public officials, Native American tribes, and non-governmental organizations about the meetings. The public was encouraged to provide oral comments at the meeting and to submit comments to DOE by the close of the EIS scoping period. The NOI and announcements provided appropriate addresses and phone numbers where comments could be communicated to DOE by U.S. Mail, e-mail, toll-free telephone, or facsimile.

DOE led the presentations and presided over both formal meetings. Both meetings began at 7:00 pm Central Daylight Time (CDT) on the respective nights. The Taconite meeting adjourned at 8:57 pm, and the Hoyt Lakes meeting adjourned at 8:00 pm. Each scoping meeting was preceded by an open house from 4:00 pm to 7:00 pm, during which DOE and Mesaba Energy Project personnel were available to answer questions. Information packages were available to attendees that included background information about the project, the CCPI Program, and the NEPA process. Also, Excelsior exhibited approximately 15 mounted graphic displays illustrating various features of the proposed project. A court recorder was present at each meeting to ensure that all oral comments were recorded and legally transcribed.

Collectively, 157 individuals attended the public scoping meetings, (111 signed the Taconite attendance list and 46 signed the Hoyt Lakes attendance list) including several who attended both meetings. All attendees were invited to provide comments, either written or oral, on the proposed project. Those attendees wishing to speak were given an opportunity to sign up. Comment sheets were made available for all attendees wishing to provide written comments. Twenty-nine individuals presented oral comments and six comment sheets were submitted at the meetings. In all, 18 comments were submitted by e-mail, five letters were received by mail, four comments were received by facsimile, and two comments were received by telephone. Comments were posted on the PUC website for the project (http://energyfacilities.puc.state.mn.us/Docket.html?Id=16573) and all submissions are maintained as part of the DOE Administrative Record.

1.6.1.5 Comments Received During the Federal Public Scoping Period

As discussed in the following sections, comments received by DOE during the public scoping period generally aligned according to major groupings, including:

- General comments about the project, the EIS, and the scoping process;
- Purpose and Need (including comments about the DOE decision);
- Proposed Action (including comments about project components and features);
- Alternatives (including comments on alternative sites and other alternatives); and
- Resource-specific concerns (comments related to specific environmental resources).

General Comments

Among the general comments received, respondents raised concerns about the absence of direct notification to all adjacent landowners about the meeting, the limited amount of material available about the project before the meetings, the desire for more written information to be available about the project that could be taken home from the meetings, and questions about how the process would proceed after the meetings. Other comments emphasized that the project should meet all regulatory requirements, expressed concerns regarding the project's emission of greenhouse gases, and raised concerns about the protection of Native American tribal interests.

Comments on the Purpose and Need

Respondents expressed concerns about the need for the proposed facility, both from the perspective of electricity demand (e.g., exemption from the Certificate of Need) and from the perspective of whether coal use is the best choice to meet that demand. Others conveyed concerns about the long-term operation and viability of the demonstration plant. Respondents questioned whether the envisioned economic benefits of the proposed facility are valid, and whether economics should outweigh the potentially adverse environmental and human effects.

Comments on the Proposed Action (Project Features)

Respondents recommended project information and details to be included in the EIS, including process information, information about the expected efficiency and reliability of the plant, feedstocks, utility, and resource requirements, emissions, and controls. Other comments addressed the size of the plant and the expected "footprint," rail alignments, transmission corridors, and various other features.

Comments on the Alternatives

Respondents expressed concerns about the range of alternatives to be considered in the EIS. Specific comments were made regarding **the** DOE "No Fund" Alternative, as well as alternative site and technology selection (e.g., greenfield versus brownfield sites and the applicability of carbon sequestration technologies). Other respondents indicated that the project should include alternatives for renewable energy sources, such as wind and solar power that would reduce air pollutants, greenhouse gas emissions, and impacts on global climate change, or that the alternative of avoiding plant construction through increased energy efficiency and conservation should be considered.

Comments Related to Specific Environmental Resources

Numerous comments were received with respect to specific natural and human environmental resources. The majority of the comments were related to the use of natural resources (e.g., coal, land, and water), the discharge of pollutants to the natural environment (e.g., air, water, and national parks), and the socioeconomic impacts of the project (e.g., jobs, taxes, and property values). Comments were also received relating to eminent domain, wetlands destruction, increased vehicular and rail traffic, the potential for adverse health effects, and demands on local community services (e.g., emergency responders, local water and sewer systems, and tourism/recreation). Native American tribal issues that were raised related to the following areas: surveys to identify cultural resources; protection of treaty rights to hunt, fish, and gather (i.e., potential impacts to wild game species, fisheries, and wild rice); avoidance or minimization of negative impacts to natural resources such as air quality, water quality, and wetlands; and cumulative effects. Concerns were also expressed by the general public about connected actions and the cumulative effects of current industrial activities and future projects planned within the vicinity of the Mesaba Energy Project.

1.6.2 Minnesota EIS Scoping Process

1.6.2.1 MDOC Scoping Meetings

Upon acceptance of an application for a site or route permit, the PUC must provide the public with an opportunity to participate in developing the scope of the EIS by holding a public meeting and by soliciting public comments. Excelsior filed a Joint Permit Application for a LEPGP site permit, a HVTL routing permit, and a pipeline (partial exemption) routing permit on June 16, 2006. In an Order dated July 28, 2006, the PUC accepted the Joint Permit Application submitted by Excelsior for the Mesaba Energy Project. The MDOC held two public scoping meetings for the Mesaba Energy Project on consecutive nights in the vicinities of the West and East Range Sites in northeastern Minnesota. The first meeting was held on August 22, 2006, at the Taconite Community Center in Taconite. The second was held on August 23, 2006, at the Hoyt Lakes Arena in Hoyt Lakes.

In satisfying the notification requirements within Minnesota Rules **7849.5240**, the public informational and EIS scoping meetings were announced in the EQB Monitor on July 31, 2006, and notices were published in local newspapers, including the *Scenic Range News* on July 6; *Duluth News Tribune*, *Hibbing Daily Tribune*, and *Mesabi Daily News* on July 5; *Grand Rapids Herald-Review* on July 7; and *East Range Shopper* on July 3. Additionally, notice was sent to those persons whose names are on the EQB general notification list, regional and local governments, and each person whose property is adjacent to any of the proposed sites or routes.

Both meetings began at 7:00 pm CDT on the respective nights. The Taconite meeting adjourned at approximately 10:45 pm, and the Hoyt Lakes meeting adjourned at approximately 9:30 pm. Each scoping meeting was preceded by an open house from 4:00 pm to 7:00 pm, during which MDOC, DOE-National Energy Technology Laboratory (NETL), and Excelsior personnel were available to answer questions.

Information packages were available to attendees that included a fact sheet on the state siting and routing process, and the Draft EIS Scoping Document. Also, Excelsior exhibited approximately 25 mounted graphic displays illustrating various features of the proposed project.

Collectively, approximately 300 individuals attended the public scoping meetings, (159 signed the Taconite attendance list and 123 signed the Hoyt Lakes attendance list) including several who attended both meetings. All attendees were invited to provide comments, either written or oral, on the proposed project. Those attendees wishing to speak were given an opportunity to do so. Comment sheets were made available for all attendees wishing to provide written comments.

The MDOC Energy Facility Permitting staff led the presentations and presided over both formal meetings. A court recorder was present at each meeting to ensure that all oral comments were recorded and legally transcribed. Oral comments from 50 individuals were presented at the meetings.

In addition, the MDOC-Energy Facility Permitting staff provided an e-mail address for members of the public who preferred to submit their comments electronically, a postal address for those who preferred to mail their comments, a telephone fax number for those who preferred to fax their comments, and a toll-free telephone number for those who preferred to speak their comments. In all, 49 comments were submitted via e-mail, U.S. Mail, or facsimile. All of the various comment submissions were reviewed to characterize specific issues, concerns, and questions to ensure the consideration of all substantive concerns. The Commissioner of MDOC issued the EIS Scoping Decision on September 13, 2006 (see Appendix G). Comments received during the public scoping period are intended to help direct and focus the analysis and contents of the EIS.

Comments on Operational Information and Design

Several respondents recommended that project operational information and design details be included in the EIS, including process information, information about the expected efficiency and reliability of the plant, feedstocks, utilities and resource requirements, emissions, and controls. Other comments addressed the physical size of the plant and the expected "footprint," rail alignments, transmission corridors, and various other features. This information has been incorporated into the project/process description sections of the EIS.

Opinions

A number of comments contained statements of opinion and rhetorical questions, such as the desirability of a particular site. Such comments have not been assimilated into the Scoping Decision in all cases; however, the EIS has attempted to address the subjects raised to the extent appropriate.

Comments on Need

Many respondents expressed concerns about the need for the proposed facility, both from the perspective of electricity demand (e.g., exemption from Certificate of Need) and from the perspective of whether coal use is the best choice to meet that demand. Because Minnesota Statutes § 216B.1694, Subdivision 2, item 1 has exempted this facility from demonstrating need and that this facility qualifies as an "innovative energy project," issues related to the need, size, or type of the facility are excluded from consideration by the MDOC-Energy Facility Permitting staff. Such issues are not within the scope of the EIS. The MDOC will not, as part of this environmental review, consider whether a different size or different type of plant should be built instead, nor will the MDOC consider the "No Build" option.

Comments on Viability

Additionally, some of the comments conveyed concern over the long-term operation and viability of the project. Respondents questioned whether the envisioned economic benefits of the proposed facility are valid, and whether economics should outweigh the potentially adverse environmental and human effects of construction and operation of the facility. There is currently a docket before the PUC pertaining to Excelsior's proposed power purchase agreement (Docket E6472/M-05-1993) that will evaluate many of these concerns.

Comments on Overall Environmental Impacts

Numerous comments were received with respect to specific natural resources, environmental welfare, and human health issues. The majority of the comments were related to the use of natural resources (e.g., coal, land, water, and national parks), the discharge of pollutants to the natural environment (e.g., air, water, wetlands, and CO_2 emissions) and adverse health effects, and the socioeconomic impacts of the project (e.g., jobs, taxes, and property values). Comments were also received relating to eminent domain, increased vehicular and rail traffic, and demands on local community services (e.g., emergency responders, local water and sewer systems, and tourism/recreation). Concerns were also expressed about connected actions and the cumulative effects of current industrial activities and future projects planned within the vicinity of the Mesaba Energy Project.

These issues, along with the typical LEPGP, HVTL, and pipeline routing and siting impacts, were incorporated into the proposed Order on the EIS Scoping Decision.

1.6.2.2 Citizens Advisory Task Force

A Citizens Advisory Task Force was established by the PUC to provide input to the scope of the EIS for the Mesaba Energy Project. The Task Force was charged with the following three tasks:

- Determine whether local site or route specific information as presented within the Joint Permit Application is inaccurate or has missing information;
- Recommend which site- or route-specific impacts and issues of local concern should be assessed in the EIS; and
- Express a preference for either the preferred or alternative site contained within the Joint Permit Application if a consensus can be reached.

Task Force members were selected by the MDOC based on the responses to a solicitation letter, and the Task Force met three times during August 2006 at locations near the West and East Range Sites. The final comments and recommendations of the Task Force were posted on the PUC website (see Section 1.6.1.4). Due to the time constraints, there was not an opportunity for the Task Force to discuss individual comments and reach a consensus as to whether or not the comment represented the view of all members. Consequently, some of the comments provided may present views that are not necessarily shared by all Task Force members.

In an attempt to facilitate the discussion of which site should be indicated as the preferred site, a number of evaluation criteria were considered to provide a quantitative evaluation of the two sites. During the second meeting, the evaluation criteria and weightings were selected by the task force members, and a consensus was reached on both the evaluation criteria and the weighting of each of those criteria. These criteria included many of the environmental issues addressed in this EIS (such as noise, aesthetics, air, and water quality) and impacts from construction on residences, rail traffic, and tourism/recreation. The evaluation matrices were then provided to each member to fill out the rankings of each evaluation criterion for each site prior to the third meeting.

Thirteen members submitted completed evaluations matrices. Seven members scored the East Range Site as having a lower impact, while five members scored the West Range Site as having a lower impact. One member determined that the impact between the two sites was essentially equal. From both the scores and comments received from individual members, it was clear that the Task Force would not be able to reach a consensus on a preferred site.

During the final meeting of the Task Force, several members expressed an interest in developing statements related to the project that could be supported by all members. A unanimous consensus was not reached on any of the proposed statements, but a majority of the members voted affirmatively on the following statements (note that the recommendations of the Task Force on limitations to the scope are not binding on DOE):

- *This Task Force recommends that a site or sites be permitted and built on the Iron Range, assuming that all environmental concerns are considered and adequately addressed in the Environmental Impact Statement.*
- *This Task Force recommends that any analysis of cumulative impacts only be conducted on projects that have the necessary permits in place to proceed with the construction of the facility.*

1.6.3 Special CCPI Program Considerations under NEPA

DOE does not possess permitting and regulatory authority for the proposed project. Furthermore, by providing financial assistance to private sector investments in energy systems, DOE has a more limited role than if the Federal government were the owner and operator of the energy systems. In the latter case, DOE would be responsible for a comprehensive review of reasonable alternatives for power generation, as well as for the siting of proposed facilities. However, when dealing with applicants under the CCPI Program, the alternatives available to DOE are necessarily more restrictive. Once DOE selects a prospective applicant and project, the department's decision is bounded by the reasonable alternatives available to the applicant within the constraints of the application and the applicant's needs for the project. **The same is true of DOE's role with respect to applications under the loan guarantee program.**

> It is important to note that in the absence of DOE co-funding **or loan guarantee**, Excelsior may still elect to construct and operate the IGCC power plant.

This relationship creates an important distinction between alternatives that might be available to Excelsior as a project proponent, alternatives available to the PUC as a state regulatory agency, and alternatives that are available to DOE as the Federal sponsor of an energy program initiative. The reasonable alternatives available to DOE in this case are either to enter into a cooperative agreement to provide co-shared funding **and possibly a loan guarantee** for the applicant's project or to decline to participate in the project. However, alternatives considered by Excelsior and incorporated into the Federal Proposed Action are described in Section 2.1 of this EIS. At the request of USACE staff, Excelsior has prepared an analysis of alternatives intended to satisfy USACE NEPA and CWA Section 404 requirements. This supplemental alternatives analysis is provided in Appendix F1.

The evaluations of potential impacts included in this EIS are intended to enable the Federal decision-makers to choose the appropriate alternative. If DOE elects to provide financial assistance for the Mesaba Energy Project under a cooperative agreement (beyond those activities that are appropriate and necessary to complete the NEPA evaluation and documentation), the agency may also specify measures to mitigate potential significant impacts as identified in the EIS. See Section 5.3 for discussion of the mitigation measures that Excelsior would implement for the proposed project. All mitigation measures imposed by DOE would be announced in the ROD.

If DOE declines to provide financial assistance for the Mesaba Energy Project beyond those activities that are appropriate and necessary to complete the NEPA evaluation and documentation, the co-funding withdrawn may be made available for other current or future CCPI projects. In the absence of DOE co-funding **or a loan guarantee** (the Federal No Action Alternative), Excelsior may still elect to construct and operate the proposed IGCC power plant provided it can obtain all required state and Federal permits.

1.6.4 Connected Actions

Although DOE's CCPI Program co-funding will apply only to Phase I of the Mesaba Energy Project, Phase II, which is a duplicate of the Phase I facility, is considered a connected action. MDOC's state EIS must address the project as submitted in the joint permit application, which includes both phases of the Mesaba Energy Project. Because Phase II is inextricably linked to the successful performance of Phase I, the impacts of both phases are assessed as a whole in this EIS. **However, at the request of USACE, the Final EIS has been revised as appropriate to describe the potential impacts of Phase I separately from the impacts of the combined two-phased project.**

In association with the proposed Mesaba Energy Project at Excelsior's preferred site near Taconite, the Itasca County Engineer indicated that the county has an interest in rerouting County Road (CR) 7 near its intersection with U.S. Highway (US) 169. Therefore, although this action would be undertaken independently of the proposed Mesaba Energy Project as a road improvement project by Itasca County, it has been addressed in this EIS as a connected action, because the construction of the Mesaba Generating Station would provide substantial impetus for the road realignment. **Since publication of the Mesaba Draft EIS, Itasca County has deferred action on the realignment and improvement of CR 7. Therefore, although the potential impacts of that project are addressed in this Final EIS, appropriate sections have been revised to describe the anticipated impacts of providing road access to the Mesaba power plant in the absence of the CR 7 realignment.**

Also, following publication of the Mesaba Draft EIS, the PUC issued a Pipeline Route Permit dated April 16, 2008 for Nashwauk Public Utilities Commission to construct approximately 23 miles of 24-inch natural gas pipeline along a route from Blackberry Township to Nashwauk (Docket No. PL,E-280/GP-06-1481; http://energyfacilities.puc.state.mn.us/Docket.html?Id=19035). The Nashwauk PUC intends to supply natural gas to the proposed Minnesota Steel project (renamed Essar Steel Minnesota) and other potential customers. Excelsior intends to enter into negotiations with Nashwauk PUC to purchase natural gas from the pipeline in the event that the pipeline can be constructed in sufficient time to be available for use by Mesaba. The Mesaba Draft EIS described the potential impacts of alternative natural gas pipeline alignments to supply the power plant during start-up and back-up conditions, and Nashwauk's approved pipeline route would follow an alignment consistent with one of the alignments proposed by Excelsior. Although the discussion of these impacts has been retained in the Final EIS, the impacts of construction of a natural gas pipeline would not be attributable directly to the Mesaba project if Excelsior were to purchase natural gas from the Nashwauk PUC instead of building its own pipeline.

1.7 COMMENTS ON THE DRAFT EIS

The Draft EIS for the Mesaba Energy Project was published in November 2007. DOE and MDOC distributed copies of the Draft EIS to officials, agencies, Native American tribes, organizations, libraries and members of the public identified in the distribution list (Chapter 8). MDOC announced the availability of the Draft EIS in the *EQB Monitor* on November 5, 2007 (Volume 31, Number 23, Page 9); DOE announced the Notice of Availability of the Draft EIS in the *Federal Register* on November 8, 2007 (72 *FR* 63169); and EPA published the Notice of Availability in the *Federal Register* on November 9, 2007 (72 *FR* 63579).

DOE and MDOC jointly held two public hearings for the Draft EIS at the same locations as the scoping meetings. The hearings were held in Taconite, Minnesota on November 27, 2007 and in Hoyt Lakes, Minnesota on November 28, 2007. DOE and MDOC advertised the hearings in the *Hibbing Daily Tribune*, *Grand Rapids Herald-Review*, and *Mesabi Daily News* on November 14 and 18, 2007, and in the *Duluth News Tribune* on November 18, 2007. Informal information sessions were held at the same locations prior to both hearings from 4:00 to 7:00 pm, during which time attendees were given information about the project and were able to view project-related informational displays.

Based on sign-in sheets, 107 individuals attended the Taconite hearing, and 34 individuals attended the Hoyt Lakes hearing. MDOC and DOE led the presentations and presided over the public hearings. The public was encouraged to provide oral comments at the hearings and to submit written comments to DOE or MDOC by January 11, 2008. A court reporter was present at each hearing to ensure that all oral comments were recorded and legally transcribed.

Volume 3 of this EIS describes the process DOE and MDOC followed for cataloging and responding to comments. Oral comments were given by 28 individuals at the Taconite hearing and by six individuals at the Hoyt Lakes hearing. In addition, DOE and MDOC received 88 written comments, including five from Federal agencies, four from state agencies, five from Native American tribal organizations, and several from national and regional non-governmental organizations and other affiliations. Volume 3 includes scanned images of the comment documents, beginning with the transcripts from both public hearings, and provides responses to all comments. DOE and MDOC considered all comments to the extent practicable in preparing the Final EIS.

1.8 CONTINUING OUTREACH TO NATIVE AMERICAN TRIBES

Following scoping and before issuing the Draft EIS, DOE had discussions with representatives of the following tribes and organization by telephone in May and June of 2007.

- **Grand Portage Reservation**
- **Red Lake Band of Chippewa**
- **Fond du Lac Reservation**
- **Lower Sioux Community**
- **Bois Forte Reservation**
- **Leech Lake Band of Ojibwe**
- **Mille Lacs Band of Ojibwe**
- **White Earth Reservation**
- **Fort Peck Tribes**
- **Wahpekute Band**
- **Spirit Lake Tribe**
- **Standing Rock Tribe**
- **1854 Treaty Authority**

DOE offered to personally meet with the tribes for consultation. DOE also invited these tribes to consider participation in a possible Programmatic Agreement (PA) between DOE and the Minnesota State Historic Preservation Office that would be necessary to satisfy DOE's responsibilities under Section 106 of the National Historic Preservation Act [see Sections 4.9.3.1 and 4.9.4.1]). At that time, the following tribes requested that they be included as signatories to any

such agreement: Bois Forte Band of Chippewa; Grand Portage Band of Chippewa; and Leech Lake Band of Ojibwe.

The initial meeting with Native American tribes was held on February 27-28, 2008, at the Fond du Lac Reservation in Carlton, MN. Representatives of the following tribes and organizations attended.

- **Grand Portage Reservation**
- **Red Lake Band of Chippewa**
- **Fond du Lac Reservation**
- **Lower Sioux Community**
- **Bois Forte Reservation**
- **Leech Lake Band of Ojibwe**
- **Fort Peck Tribes**
- **Wahpekute Band**
- **Spirit Lake Tribe**
- **Standing Rock Tribe**
- **1854 Treaty Authority**

After presentations by DOE, Excelsior, and Excelsior's cultural resources consultant on the status of the project, DOE provided a draft PA for consideration by the tribes. The response of the tribes was twofold. First, the tribes stated that not all tribes with potential interest in the project had been identified and contacted by DOE. Second, the tribes sought a separate Memorandum of Agreement among DOE, Excelsior and the tribes to address certain issues. The tribes provided suggestions on resources to consult (e.g., Tribal Leaders Directory, June 2007, Bureau of Indian Affairs, U.S. Department of the Interior) in identifying additional tribes to contact, as well as a draft MOA for DOE consideration. DOE staff agreed to make a more thorough effort to identify potentially interested tribes, to consider the draft MOA, and to arrange for a subsequent consultation meeting.

In preparation for the next meeting, DOE identified and contacted the following additional tribes.

- **Flandreau Santee Sioux Tribe**
- **Three Affiliated Tribes**
- **Sisseton Wahpeton Oyate**
- **Northern Cheyenne Tribe**
- **Turtle Mountain Band of Chippewa**
- **Santee Sioux Nation; Lower Brule Sioux Tribe**
- **Upper Sioux Community**
- **Cheyenne River Sioux Tribe**
- **Winnebago Tribe**
- **Shakopee Mdewakanton Sioux Community**
- **Yankton Sioux Tribe**
- **Crow Creek Sioux Tribe**
- **Northern Arapaho Tribe**
- **Northern Cheyenne Tribe**
- **Oglala Sioux Tribe**

DOE also considered the draft MOA provided at the first meeting but decided to propose that relevant portions of the MOA be incorporated into the PA. This revised PA was then sent to the

tribes prior to the second meeting which was held at the White Earth Reservation in Mahnomen, MN, on June 23-24, 2008. Attending this meeting were representatives of Excelsior, DOE, the Army Corps of Engineers, the Minnesota Deputy SHPO, and the following tribes.

- **Grand Portage Reservation**
- **Red Lake Band of Chippewa**
- **Fond du Lac Reservation**
- **Lower Sioux Community**
- **Bois Forte Reservation**
- **Leech Lake Band of Ojibwe**
- **Fort Peck Tribes**
- **Wahpekute Band**
- **Spirit Lake Tribe**
- **Standing Rock Tribe**
- **Mille Lacs Band of Ojibwe**
- **White Earth Reservation**
- **Sisseton Wahpeton Oyate**
- **Turtle Mountain Band of Chippewa**
- **Shakopee Mdewakanton Sioux Community**

The tribes insisted on an MOA as a prerequisite to a PA. They also requested that in conjunction with the next meeting that DOE and Excelsior arrange for a site visit for interested Tribal representatives and that DOE, Army Corps, and Excelsior staff participate in a cultural sensitivity training session.

A series of events was scheduled for October 7-9, 2008. On October 7, 2008, a representative of the Lac du Flambeau, Fort Peck Assiniboine, and Sioux Tribes conducted sensitivity training at the Fond du Lac Reservation for DOE, Army Corps, and Excelsior staff. On October 8, 2008, Excelsior conducted a site tour of both sites, during which aerial videos of the utility corridors were shown to interested tribal representatives. The third consultation meeting was held on October 9, 2008, at the Fond du Lac Reservation. Attending this meeting were representatives of Excelsior, DOE, and the following tribes and tribal organization.

- **Grand Portage Reservation**
- **Red Lake Band of Chippewa**
- **Fond du Lac Reservation**
- **Bois Forte Reservation**
- **Fort Peck Tribes**
- **Mille Lacs Band of Ojibwe**
- **White Earth Reservation**
- **Shakopee Mdewakanton Sioux Community**
- **Northern Cheyenne Tribe**
- **Yankton Sioux Tribe**
- **1854 Treaty Authority**

Most of the meeting was spent discussing modifications to the MOA. Based on the discussions, the tribes agreed to prepare a revised MOA for consideration.

The fourth meeting was held at the White Earth Reservation on November 13-14, 2008. Attendees at the meeting included staff from DOE, Excelsior, and the Army Corps and representatives from the following tribes.

- **Grand Portage Reservation**
- **Red Lake Band of Chippewa**
- **Lower Sioux Community, Bois Forte Reservation**
- **Fort Peck Tribes**
- **Mille Lacs Band of Ojibwe**
- **White Earth Reservation**
- **Yankton Sioux Tribe**
- **Leech Lake Band of Ojibwe**
- **Wahpekute Band**
- **Sisseton Wahpeton Oyate**

Before the meeting began, the tribes provided a copy of the revised MOA. The meeting entailed a group discussion of each element of the MOA to identify any remaining issues, and editing the MOA.

In parallel with the process described above, DOE also had separate meetings with the Upper Sioux Community, as they had requested. These meetings were held at the Upper Sioux Community, in Granite Falls, MN, on September 9, 2008 and October 28, 2008. At the first meeting the Upper Sioux stated that it was important to recognize the cultural value of properties and not just the archaeological aspects. There was also discussion on various elements in a glossary of terms/acronyms to a PA that should be more clearly defined. At the follow-up meeting the tribe stated that it was important that a tribal cultural resource specialist be included in cultural resource surveys and that the specialist be appointed or designated in accordance with Tribal law and, hence, be an official representative of an Indian tribe. Other topics discussed were the environmental effects of the new transmission routes, monitoring and mitigation of potential biota transfer between surface water bodies, and a management plan to ensure that the current recreational status of the Canisteo Mine Pit is retained.

A conference call was held on February 3, 2009, to discuss the results of the legal reviews of the MOA by the tribes. Participating in the call were staff of Excelsior, DOE, and representatives of the Bois Forte Reservation, the Upper Sioux Community, the Red Lake Band of Chippewa, and White Earth Reservation tribes. On March 13, 2009, DOE sent the revised version of the MOA to the tribes with a request that this version be submitted for Tribal Council review.

The fifth meeting was held on May 12-14, 2009 at the Fond du Lac Reservation in Carlton, MN. Attending this meeting were representatives of Excelsior, DOE, the Army Corps of Engineers, the Minnesota SHPO's office and the following tribes and tribal organization:

- **Yankton Sioux Tribe**
- **Wahpekute Band**
- **Lower Sioux Community**
- **Sisseton Wahpeton Oyate**
- **White Earth Reservation**
- **Red Lake Nation**
- **Bois Forte Reservation**

- **Northern Cheyenne Tribe**
- **Fort Peck Tribes**
- **Mille Lacs Band of Ojibwe**
- **Fond du Lac Reservation**
- **1854 Treaty Authority**

The consulting parties discussed a signing ceremony for the MOA. Efforts continued on the development of a PA. The tribes requested that representatives from the Fish and Wildlife Service and Army Corps of Engineers be available for the next meeting.

The sixth meeting was held on June 23-25, 2009 at the Bois Forte Reservation in Tower, MN. Participating in this meeting were representatives of Excelsior, DOE, the Army Corps of Engineers, the Fish and Wildlife Service and the following tribes:

- **Yankton Sioux Tribe**
- **White Earth Reservation**
- **Bois Forte Reservation**
- **Northern Cheyenne Tribe**
- **Fort Peck Tribes**
- **Mille Lacs Band of Ojibwe**
- **Leech Lake Band of Ojibwe**
- **Grand Portage Reservation**

The tribal members asked questions of the representatives from the Army Corps of Engineers and the Fish and Wildlife Service regarding participation in the Section 106 process and impacts of the Mesaba Energy Project. Efforts continued on the development of the PA with the majority of sections being developed. The tribal members stated that it would be best to complete development of the PA before signing the MOA.

The seventh meeting was held on July 21-23, 2009 at the Bois Forte Reservation in Tower, MN. Attending this meeting were representatives of Excelsior, DOE, and the following tribes:

- **Yankton Sioux Tribe**
- **Bois Forte Reservation**
- **Northern Cheyenne Tribe**
- **Fort Peck Tribes**
- **Mille Lacs Band of Ojibwe**
- **Grand Portage Reservation**
- **Sisseton Wahpeton Oyate**
- **Wahpekute Band**
- **Lower Sioux Community**

Efforts at this meeting continued on the development of the PA. Considerable time was spent on sections of the agreement addressing the area of potential effects, inadvertent discoveries, and the discovery of human remains. The tribes requested that a plan of action be developed that would address inadvertent discovery of human remains and other inadvertent discoveries. DOE, Excelsior and the tribes made progress on the development of this plan, which would be incorporated as an attachment to the PA. Other potential plans (such as an identification plan, historic property treatment plan, historic property survey plan, and a safety plan for tribal monitors) were also discussed.

On September 16, 2009, DOE and Excelsior representatives met with members of the Tribal Council for the Upper Sioux Community. All members of the Tribal Council and the project coordinator for the Board of Trustees were present. DOE and Excelsior presented an overview of the Project's integrated historic properties management plan, the decision making process to be followed in identifying historic properties, and the plans to be used within that process. A draft of the PA was then discussed in detail. Final comments from the Upper Sioux are pending.

DOE, Excelsior and the tribes met on October 6-8, 2009 in Carlton, Minnesota on the Fond du Lac Indian Reservation to conduct the eighth consultation among the parties. Prior to the meeting, DOE distributed a complete draft of the PA with changes requested by the ACHP. The draft PA contained exhibits detailing the historic property survey plan, historic property treatment plan and inadvertent discovery plan. Also attached to the draft PA, for reference purposes rather than as an integral part of the PA, was a Cultural Resource Preservation Plan to deal with cultural resources not eligible for listing on the NRHP and therefore outside of the Section 106 process.

Much of the discussion at the meeting focused on preservation of cultural resources. The ACHP participated in a portion of the discussion by telephone. Preservation of cultural resources, including resources not eligible for the NRHP, is a significant concern for the tribes. Although not required by Section 106, Excelsior had previously expressed a good faith intention to identify and preserve such resources. Hence, DOE and Excelsior proposed the Cultural Resource Preservation Plan, which together with the PA, would constitute a comprehensive, approach to the preservation of all cultural resources important to the tribes.

The status of the tribal consultation as of October 15, 2009, is such that consultation with the tribes regarding the PA will continue beyond the distribution of this Final EIS. The DOE Record of Decision will be contingent upon satisfactory completion of the PA signed – at a minimum – by DOE, Excelsior, the ACHP, and the Minnesota SHPO to satisfy DOE's requirements under Section 106 of the National Historic Preservation Act. Although signing of the agreement by the tribes is not specifically required under Section 106, DOE expects that the efforts made in the consultation process described in this section will result in execution of the agreement by tribes involved in the process.

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2. PROPOSED ACTION AND ALTERNATIVES

2.1 INTRODUCTION

This chapter describes the Proposed Action and alternatives for the Mesaba Energy Project from the perspectives of DOE, the project proponent (Excelsior), and the Minnesota PUC. These perspectives and respective decisions are discussed in the balance of Section 2.1. Section 2.2 describes the technology and principal features of Excelsior's proposed IGCC power plant, including the process equipment; plant utility systems, resource requirements (inputs); discharges, wastes and products (outputs); construction plans; and operational plans, which would be common features of the project irrespective of siting. Finally, Section 2.3 describes the siting and routing alternatives considered by Excelsior for the components of the proposed project, as well as site-specific considerations relating to the respective inputs and outputs at alternative sites.

2.1.1 Agency Action and Alternatives Considered by DOE

2.1.1.1 DOE Proposed Action

As described in Section 1.2.1, DOE identified the Mesaba Energy Project in Round 2 of CCPI funding opportunity announcements as one of four applications selected. The project is one of two applications that proposed archetypal IGCC technologies, both of which were selected in Round 2. Accordingly, the DOE Proposed Action is to provide a total of $36 million in co-funding, through a cooperative agreement with Excelsior, for the **definition and preliminary** design and one-year operational demonstration-testing period for Phase I of the proposed two-phased Mesaba Energy Project. **In addition, DOE may provide a loan guarantee to Excelsior pursuant to EPAct05 Section 1703 for Phase I of the proposed project.** This first phase would be a nominal **600** $MWe_{(net)}$ IGCC power plant with an estimated cost **in the cooperative agreement** of $2.16 billion (NETL, 2006a). Phase II, which would be an identical, co-located **600** MWe plant, would be privately financed and not involve co-funding **or a loan guarantee from** DOE.

A portion ($22,245,505) of the total funding has been made available for cost sharing in the first budget period under the cooperative agreement, prior to completion of the NEPA process. The activities eligible for cost sharing during the first period allow for the development of information (such as project definition, preliminary design, and environmental studies and permitting) that provide the basis for this EIS. This is typical both in the amount of funding and the types of allowable activities for a CCPI project of this scope. Making these funds available does not prejudice DOE's ultimate decision on the proposed action and is consistent with DOE and CEQ regulations (10 CFR 1021.211 and 40 CFR 1506.1, respectively), which restrict DOE from taking action that would have an adverse environmental impact or limit the choice of reasonable alternatives until the ROD has been issued.

This EIS considers the impacts of both phases of the Mesaba Energy Project as connected actions, consistent with NEPA policy **(see Section 1.5.1)**, even though only Phase I would be co-funded under the CCPI Program. **However, at the request of USACE, the Final EIS has been revised as appropriate to describe the potential impacts of Phase I separately from the impacts of the combined two-phased project.**

2.1.1.2 Alternatives Determined to be Reasonable by DOE

Section 102 of NEPA requires that agencies discuss the reasonable alternatives to the proposed action in an EIS. The term "reasonable alternatives" is not self-defining, but rather must be determined in the context of the statutory purpose expressed by the underlying legislation.

Congress established the CCPI Program with a specific goal—to accelerate commercial deployment of advanced coal-based technologies that can generate clean, reliable, and affordable electricity in the United States. The CCPI legislation (Pubic Law No. 107-63) has a narrow focus in directing DOE to demonstrate **the commercial viability of** technology advancements related to coal-based power generation designed to reduce the barriers to continued and expanded use of coal. Technologies capable of producing any combination of heat, fuels, chemicals, or other use byproducts in conjunction with power generation were considered; however, coal is required to provide at least 75 percent of the fuel for power generation. The DOE purpose in considering the **agency action** (to provide cost-shared funding) is to meet the goal of the program by demonstrating the commercial readiness of the Conoco-Phillips E-Gas™ gasification technology in a fully integrated and quintessential IGCC utility-scale application. Other technologies that cannot serve to carry out the goal of the CCPI Program (e.g., natural gas, wind power, conservation) are not relevant to the DOE decision whether to provide cost-shared funding support for the Mesaba Energy Project, and therefore, are not reasonable alternatives.

CCPI only allows for Federal co-funding of proposed industry projects for which an application has been prepared, submitted, and selected in response to a formal funding opportunity announcement issued by the Department. In 2004, DOE issued the CCPI Round 2 funding opportunity announcement. This announcement was open to any interested potential applicant nationwide and solicited applicants for co-funding that were consistent with one or more of the DOE priority need areas of interest established in the announcement. Two technology priorities for the announcement were gasification-based power generation systems and mercury control technologies. Further, applications submitted for co-funding must have been integrated within existing or planned new power plant facilities that use coal for at least 75 percent of the energy input and that produced at least 50 percent of the energy-equivalent output in the form of electric power. Applications for co-funding must also have identified a site or sites.

Thirteen applications for co-funding of proposed industry project demonstrations from across the nation were received and evaluated in response to the CCPI Round 2 announcement. These applications represented diverse technologies and utilized a variety of coals consistent with the requirements embodied in the announcement. Two of the 13 applications were for co-funding of proposed archetypal IGCC projects. Pursuant to Federal regulations, the choices available to DOE were limited to those applications submitted in response to the funding opportunity announcement. In all, four of the 13 applications were selected, including both of the proposed archetypal IGCC projects, one of which was the Mesaba Energy Project (NETL, 2006a). The two IGCC projects that were selected for co-funding involved the demonstration of different gasifier types, which is important in achieving a diversity of technology approaches and methods in the CCPI program. They also involve different coals, operating environments, and environmental considerations, all of which enhance the potential for widespread commercialization of IGCC technology in a competitive marketplace. The Mesaba Energy Project was selected because of the opportunity to demonstrate the specific technology proposed—the Conoco-Phillips E-Gas™ gasification technology—in a fully integrated and quintessential large commercial utility-scale IGCC setting. No other applicants proposed this specific IGCC technology. Other projects that proposed to demonstrate other technologies are not alternatives to the proposed project for NEPA purposes.

Congress not only prescribed a narrow goal for the CCPI Program, but also directed DOE to use a process to accomplish that goal that would involve a more limited role for the Federal government. Instead of requiring government ownership of **CCPI** demonstration**s**, Congress provided for cost-sharing in a project sponsored by the private parties **as a means to provide incentive for accelerated deployment**, with the provision for repayment of the public funds invested. Therefore, rather than being responsible for the siting, construction and operation of the projects, DOE is in the more limited role of evaluating CCPI project applications to determine if they meet the CCPI Program's goal. **The same is true of the DOE role with regard to applications under the Federal loan guarantee program.** It is well established that an agency should take into account the needs and goals of the applicant in determining the scope of the EIS for the applicant's project. When an applicant's needs and goals are factored into the deliberations, a narrower scope of alternatives may emerge than would be the case if the agency is the proprietor responsible for all project-related decisions.

DOE's preferred alternative is to provide financial assistance in the form of co-funding under the CCPI cooperative agreement and possibly a loan guarantee under Title XVII of the EPAct 05 to the Mesaba Energy Project, assuming that one of the two sites proposed by Excelsior (see below) would be found acceptable and granted a site permit by the Minnesota PUC. DOE tentatively finds both sites to be acceptable. DOE does not have a preference among the alternatives considered for utility and transportation infrastructure necessary to support the project. These routing decisions are also under the jurisdiction of the PUC in its permitting process. If DOE ultimately selects the preferred alternative, DOE would then determine for each site whether mitigation of specified potential impacts would be required. DOE is also free, however, to ultimately determine in the ROD that only one of the two sites is acceptable, or to select no action.

No Action Alternative

Under the No-Action Alternative, DOE would not provide cost-shared funding **or a loan guarantee** to **the Mesaba Energy Project to** demonstrate the commercial readiness of the Conoco-Phillips E-Gas™ gasification technology in a fully integrated and quintessential IGCC utility-scale application (beyond funding required to complete the NEPA process). In this case, the remaining funding withheld from the Mesaba Energy Project may be made available for other current or future CCPI projects. In the absence of DOE funding **or loan guarantee**, Excelsior could still elect to construct and operate the proposed power plant provided that it could replace the Federal financing component and obtain required permits from state and Federal agencies. Therefore, the DOE No-Action Alternative could result in one of two potential scenarios:

(1) The Mesaba Energy Project would not be built.
(2) The Mesaba Energy Project would be built by Excelsior **without benefit of CCPI co-funding or a loan guarantee**.

DOE assumes that if Excelsior were to proceed with development in the absence of DOE funding, the project would include all of the features, attributes, and impacts as described for the Proposed Action. However, without DOE participation, it is possible that the proposed project would be canceled. Therefore, for the purposes of analysis in this EIS, the DOE No Action Alternative is assumed equivalent to a "No Build" Alternative, meaning that environmental conditions would remain in the status quo (no new construction, resource utilization, emissions, discharges, or wastes generated).

If the project were canceled, the proposed technology may not be demonstrated elsewhere. Consequently, eventual commercialization of the integrated technologies would probably not occur because utilities and industries tend to use known and demonstrated technologies rather than unproven technologies. This scenario would not contribute to the CCPI Program goal of accelerating commercial deployment of advanced coal-based technologies that can generate clean, reliable, and affordable electricity in the United States. **Similarly, the No Action Alternative would not contribute to the Federal loan guarantee program goals to make loan guarantees for energy projects that "avoid, reduce, or sequester air pollutants or anthropogenic emissions of greenhouse gases; and employ new or significantly improved technologies."**

Alternative Sites

The DOE Proposed Action to co-fund the Mesaba Energy Project as an application selected under CCPI Round 2 constitutes a decision only to select a specific technology for demonstration. DOE has not participated in the identification or selection of alternative sites or alignments for the Mesaba Energy Project. Excelsior Energy was founded in the State of Minnesota because of the experience of the firm's leadership team with the electric power industry in Minnesota, as well as the support of the Minnesota Legislature and administration. Therefore, the initial consideration of potential sites by the project proponent (Excelsior) was limited to the State of Minnesota.

As described in Section 1.2.2, Excelsior decided to locate the Mesaba Energy Project within the TTRA—in advance of submitting an application to DOE for co-funding in response to the CCPI Round 2 funding opportunity announcement—because the funding provided by the Iron Range Resources Rehabilitation Board required that the project be located within the TTRA and because the incentives created by the Minnesota Legislature in the Innovative Energy Project statute are necessary for project viability. Excelsior has stated that it has no intention to locate the Mesaba Energy Project elsewhere in the State of Minnesota or anywhere other than the TTRA, because without those incentives the project would not be viable; the financial value of the incentives far outweighs any potential mitigation costs associated with sites in the TTRA. Excelsior has further stated that it would not have submitted an application in response to the CCPI Round 2 announcement if it did not intend to locate the Mesaba Energy Project in the TTRA. Therefore, if the project would not be located in the TTRA, the project would not exist, since no other applicants to CCPI Round 2 proposed the same technology in any other location. From the DOE perspective, any consideration of an alternative location outside of the TTRA would be the equivalent of the No Action Alternative for this EIS.

As described in Section 1.5, Excelsior is required by state regulations to consider at least two potential sites for the proposed plant and two potential alignments for HVTLs. Excelsior's preferred and alternative sites and alignments are described in Section 2.3. **At the specific request of USACE in its role as a cooperating agency under NEPA and as the Federal agency responsible for compliance with Section 404 of the CWA,** Excelsior **provided an** analysis of **the range of** alternative sites **it considered** within the TTRA (see Appendix F1). **Excelsior concluded from the analysis** that the West Range and East Range sites are the only practicable alternative sites **available to Excelsior**. DOE has reviewed Excelsior's siting analysis and found it to be adequate for purposes of determining reasonable site alternatives for this EIS. Accordingly, DOE has evaluated the West and East Range sites in detail as reasonable alternatives **in this EIS**. Figure 2.1-1 shows the boundary of the TTRA and the two alternative locations (West Range Site and East Range Site) for the proposed project.

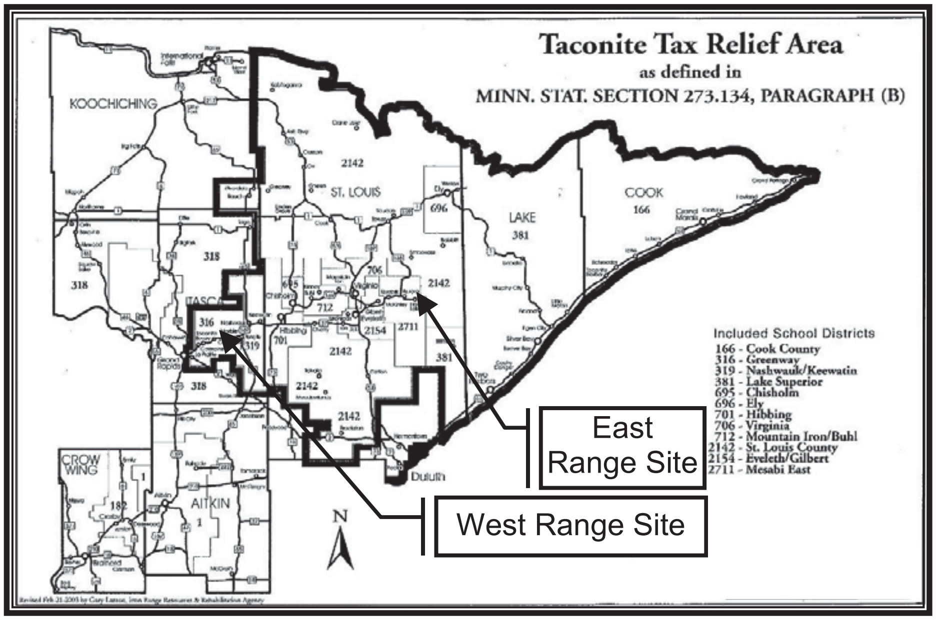

Figure 2.1-1. West and East Range Sites in Taconite Tax Relief Area

Alternatives Eliminated from Further Consideration

DOE considered the following alternatives in addition to the Proposed Action and No Action Alternative.

Alternative Sizes

The proposed project could be demonstrated using a smaller-sized plant; however, **no other applicant proposed** a smaller-sized plant **using this specific technology. Further, a smaller plant** would not be sufficiently large to demonstrate the large utility-scale commercial viability of the IGCC technology advancements, which is the central purpose of this CCPI project. The smaller-sized, single process system IGCC plant was successfully demonstrated as part of the predecessor Clean Coal Technology (CCT) program at the Wabash River Plant located in Terre Haute, Indiana. Following the Wabash River Plant demonstration, a Value Improving Practices (VIP) process – a formal industry process applying nine separate practices – was applied to examine lessons learned, identify options to improve cost and performance, and optimize the design for application to large utility-scale commercial plant configurations. An availability target above 85 percent would be needed to successfully compete against older technology base load facilities in the power generation industry. Multiple process systems would be required to meet this availability requirement, including a more cost-effective redundancy within the plant, low-cost back-up systems of conventional technologies, and the integration of these features throughout the plant. The proposed project would demonstrate the large utility-scale commercial design configuration resultant from the Wabash River Plant VIP process and subsequent research and development consistent with the DOE IGCC Roadmap.

Alternative Technologies

DOE could demonstrate other coal gasification technologies instead of the Proposed Action; however, such alternatives would not demonstrate the commercial readiness of the Conoco-Phillips E-Gas™ gasification technology, which is DOE's purpose for this demonstration project. **As already stated, DOE**

selected both applications proposing IGCC technology under the CCPI Round 2 funding opportunity announcement, but only the Mesaba Energy Project proposed the E-Gas™ technology.

Other Alternatives

CCPI legislation specifically directs DOE to demonstrate technology advancements related to coal-based power generation. Other technologies that cannot serve to carry out the goal of the CCPI Program (e.g., natural gas, wind power, solar energy, and conservation) are not reasonable alternatives in this EIS. However, DOE conducts various other programs that support those technologies.

The alternative of incorporating technologies to reduce the "carbon footprint" of the Mesaba Energy Project was also considered. DOE recognizes that fossil fuel burning is **a** primary contributor to increasing carbon dioxide (CO_2) concentrations in the atmosphere (IPCC, **2007**). CO_2 is a significant greenhouse gas, and increasing concentrations of greenhouse gases show correlation with global warming. DOE recognizes that there are concerns about the effects of fossil fuel use on global climate change. Therefore, DOE oversees other research programs aimed at reducing the cost of electricity associated with power production and proving the viability of technologies for carbon capture and **storage** (CCS)**, or beneficial reuse,** to reduce CO_2 emissions from fossil fuel use. DOE expects that the combined efforts of these programs will enable large-scale plants to come on-line by 2020 that offer 90 percent carbon capture with 99 percent storage permanence at less than a 10 percent increase in the cost of energy services (NETL, 2007). The planned in-service date for the Mesaba Energy Project is well in advance of the timeline for achieving the DOE CCS goal.

Based on an analysis of the current feasibility of carbon capture and **storage (geologic** sequestration**)** provided in Appendix A2, CCS is not considered a reasonable alternative to **the** DOE Proposed Action. However, because CCS could become feasible during the commercial lifetime (at least 20 years) of the facility, DOE has evaluated the impacts of implementing CCS during commercial operation of the project in Section 5.1.2.1 of this EIS based on the most current and representative information about available technologies.

2.1.2 Proposed Project and Alternatives Considered by Excelsior

Excelsior proposes to construct and operate the **1,200-**MWe $_{(net)}$ Mesaba Generating Station at one of two sites in **the TTRA of** northeastern Minnesota, along with its associated support structures and utility lines. The Mesaba Generating Station would consist of the Mesaba Energy Project (Phase I) and an identical facility (Phase II) on the same site. Phases I and II combined are referred to as the Mesaba Generating Station. Each phase would be rated nominally at peak to deliver **600** MWe $_{(net)}$ to the **point of interconnection with the regional electric grid**. Section 2.2 describes the technology and principal features, resource requirements, emissions, effluents, and wastes of the proposed generating station as summarized in Table 2.1-1 **(which has been updated for the Final EIS)**.

In accordance with the Proposed Action, Excelsior has entered into a cooperative agreement with DOE under the CCPI Program to demonstrate features and technologies in the Mesaba Energy Project (Phase I) to improve and advance IGCC processes toward commercial acceptance as described in Section 1.4.

Table 2.1-1. Expected Operating Characteristics – Mesaba Energy Project (Values for West and East Range Sites are equal except where noted)

Operating Characteristics	Phase I	Phase I & II
Generating capacity **(net)** - megawatts electricity (MWe)[1]		
West Range (WR)	605	1,210
East Range (ER)	604	1,208
Load output		
Capacity Factor - percent	92	92
Coal consumption[2] - tons per day (tpd)		
Sub-bituminous (SB)	8,550	17,100
Bituminous (B)	6,120	12,240
Sub-bituminous/petroleum coke (50:50 blend)	6,450	12,900
Water requirements - gallons per minute (gpm)		
Average water use	3,500	7,000
Peak water use	5,000	10,000
Air emissions - tons per year (except CO_2)		
Sulfur dioxide (SO_2)	695	1,390
Oxides of nitrogen (NO_x)	1,436	2,872
Particulate matter $\leq$10 microns (PM_{10}) – WR[3]	266	532
Particulate matter $\leq$10 microns (PM_{10}) – ER[3]	355	709
Carbon monoxide (CO)	1,270	2,539
Mercury (Hg)	0.014	0.027
Lead (Pb)	0.015	0.030
Volatile organic compounds (VOCs)	99	197
Carbon dioxide[4] (CO_2) - million tons per year	5.3(SB)/4.7(B)	10.6(SB)/9.4(B)
Effluent discharges		
Sanitary wastewater[5] in gallons per day	3,750	7,500
Cooling tower blowdown discharge (gpm)	0	0
Solid wastes[6] - tons per year		
Mercury removal carbon (hazardous [H])	7	14
Sour water sludge (H)	15	30
Sour water carbon (H)	24	48
Syngas treatment carbon (H)	30	60
Waste char and ash (non-hazardous)	80	160
Zero Liquid Discharge (ZLD) filter cake – WR[7]	~2,200(GI)[H]/<2,500(PB)	~4,400(GI)[H]/<5,000(PB)
Zero Liquid Discharge (ZLD) filter cake (H) – ER[7]	~2,200(GI)[H]/<12,250(PB)	~4,400(GI)[H]/<24,500(PB)
Marketable byproducts – tons per day		
Slag	500 – 800	1,000 – 1,600
Sulfur	30 – 165	60 – 330

[1] The generating capacity at the East Range Site is expected to be approximately 1 MWe less than the West Range Site per phase because the lower source water quality at the East Range Site increases the load from the enhanced zero liquid discharge system.
[2] Peak use of alternative feedstocks in partial slurry quench mode. Fuel flexibility allows the IGCC power plant to operate on sub-bituminous coal, bituminous coal, or a coal/petroleum coke blend.
[3] Because of the lower quality of water used for cooling at the East Range Site, PM_{10} emissions from cooling towers would be greater than for the West Range Site.
[4] CO_2 emissions are a function of the feedstock consumed and of the Mesaba Generating Station's net heat rate. SB - Sub-bituminous coal, such as Power River Basin Coal; B - Bituminous coal, such as Illinois Basin Coal
[5] Discharged to publicly owned treatment works; the discharge rate shown is conservatively assumed to equal the expected use of water for domestic purposes
[6] Fuel dependent; highest values listed.
[7] Because of the lower quality of water used for cooling at the East Range Site, solid waste production of ZLD filter cake from the power block would be greater than for the West Range Site; GI - Gasification Island; PB - Power Block.

2.1.2.1 West Range Site and Corridors

Excelsior's preferred site for the Mesaba Generating Station is an approximately 1,**708-**acre property just north of the downtown area of Taconite in Itasca County. The project's generating facilities would connect to the power grid via new and existing HVTL corridors to a substation near the unincorporated community of Blackberry. Excelsior **plans to enter into negotiations with Nashwauk PUC to purchase natural gas from a proposed pipeline that would provide start-up and backup fuel for the station (see Section 2.3.1.4). In the event that natural gas would not be available from that pipeline in accordance with the schedule for the Mesaba Energy Project, Excelsior** would construct, own, and operate a new natural gas pipeline connecting to an existing 36-inch pipeline owned by Great Lakes Gas Transmission Company (GLG). Section 2.3 provides a discussion of the site layout and alternative alignments considered for HVTL and gas pipeline corridors, as well as features for water supply, rail and road access. Key features of the West Range Site and corridors are illustrated in Figure 2.1-2.

Excelsior **stated the company's preference for** the West Range Site for the location of the Mesaba Generating Station because of its abundant supply of water, greater distance from Class I areas, immediate proximity to two competing rail service providers, reduced electrical losses (shorter power transmission distances than the East Range Site), closer proximity to an abundant supply of natural gas, shorter distance via rail to the base case fuel source, and location outside the Lake Superior Basin watershed. In addition, Excelsior holds an option agreement for the West Range Site from a land owner having significant real estate holdings abutting the site and across which easements for the station's associated facilities would be required. The agreement allows for purchase of mineral rights extending beyond the station footprint and acquisition of easements for the associated facilities under commercially reasonable terms. Excelsior believes that the combination of the above considerations would translate to reduced environmental impacts and project costs.

2.1.2.2 East Range Site and Corridors

Excelsior's alternative East Range Site for the proposed Mesaba Generating Station is an approximately **1,322-**acre site in Hoyt Lakes, St. Louis County, approximately 1 mile north of the downtown area. The project's generating facilities would connect to the grid via existing HVTL corridors that lead to a substation near the unincorporated community of Forbes. Northern Natural Gas (NNG) would construct, own, and operate a gas pipeline as an extension of the company's interstate pipeline system to provide start-up and backup fuel for the station. Section 2.3 provides a discussion of the site layout and alternative alignments considered for HVTL and gas pipeline corridors, as well as features for water supply, rail and road access. Key features are shown in Figure 2.1-3.

2.1.2.3 Site Selection Process and Other Alternatives Considered by Excelsior

The site selection process required several years of study that included a three-tiered siting process to identify the most favorable location for the Mesaba Generating Station. The first tier was guided by Minnesota Statutes § 216B.1694, Subdivision 1(3), which provides incentives for up to three "innovative energy projects" to be located in the TTRA. Excelsior then determined which regions throughout the TTRA have the necessary minimum infrastructure (i.e., HVTL, water, gas, etc.), rail access, road access, and other necessary components to support the project. Once the initial candidate areas of the TTRA were identified, a second tier of evaluation was performed that included review of engineering feasibility, environmental compatibility, community support and acceptance, **constructability, size,** and other criteria. The third tier of evaluation consisted of a detailed analysis of the candidate project sites in Excelsior's Joint Permit Application.

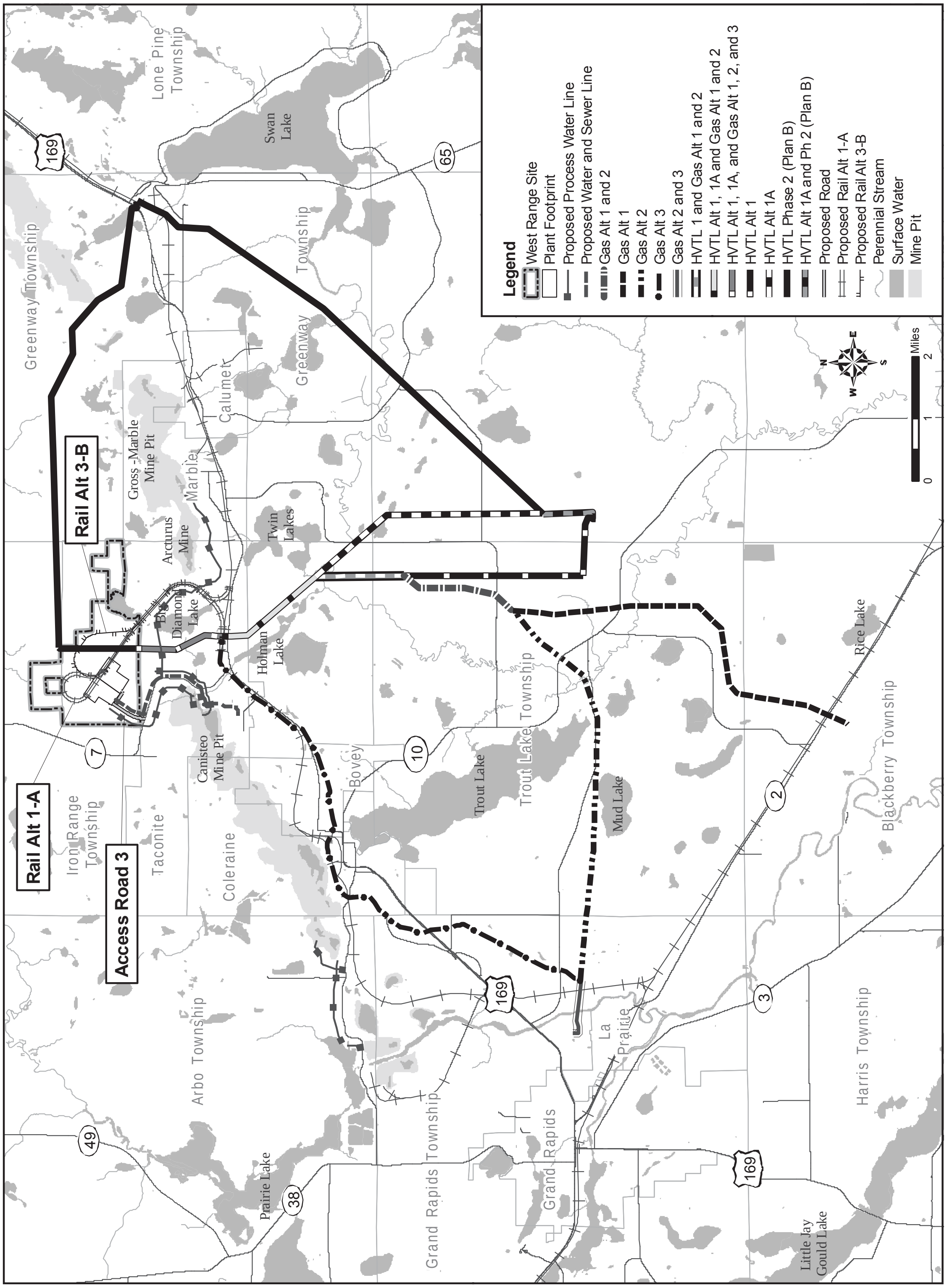

Figure 2.1-2. West Range Site and Corridors

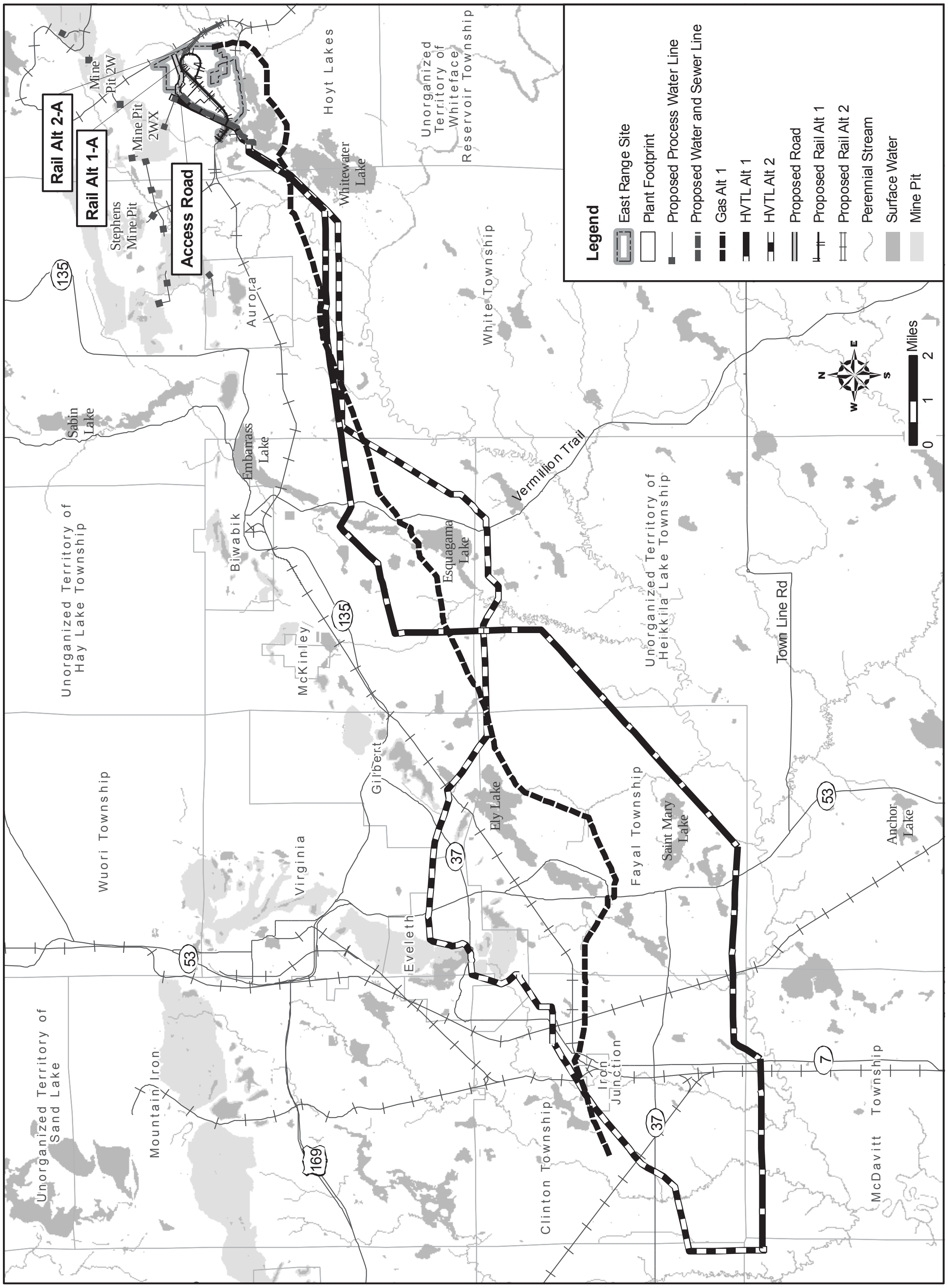

Figure 2.1-3. East Range Site and Corridors

Excelsior documented the site screening and selection process (see revised Appendix F1) in support of its application to USACE for a CWA Section 404 wetlands permit. Based on incentives described in Section 1.2.2, Excelsior focused its search on areas within the TTRA that provide access to transmission lines, availability of fuel; and availability of water. Excelsior used a four-step process in its site selection effort that included: (1) developing site selection criteria; (2) identifying potential sites; (3) establishing a short list of sites having the greatest likelihood of licensing success; and (4) specifying at least two licensable sites for consideration under rules implementing the Minnesota Power Plant Siting Act. In selecting candidate sites, Excelsior took into consideration: permitting criteria, which focused on issues related to the relative feasibility of obtaining preconstruction permits necessary to construct and operate the IGCC Power Station; technical criteria that focused on the feasibility of constructing and operating the station; and site control criteria, which considered the likelihood of obtaining site ownership and control in a timely manner with landowner cooperation.

Using the selection process, Excelsior identified 17 candidate sites within the TTRA. As explained in Appendix F1, Excelsior eliminated 14 sites from further consideration based on issues relating to water availability, constructability, rail access, nearby residences, wetland acreage, and property size and availability. Of the three remaining sites, one was subsequently eliminated by Excelsior, because it was deemed unavailable due to conflicting development plans for the property. Excelsior thus identified its preferred (West Range) and alternative (East Range) sites from the two remaining properties.

2.1.3 Alternatives Available to the Minnesota Public Utilities Commission

As described in Section **1.2.2**, the Mesaba Energy Project is subject to the siting and permitting process of the Minnesota PUC. Section 1.5.2 outlines the state regulations and requirements applicable to this process. In accordance with these requirements, and after considering the potential impacts of the Mesaba Project, the PUC has the responsibility for taking one of the following actions:

(1) PUC may approve and issue permits for Excelsior's preferred West Range Site and corridors.
(2) PUC may approve and issue permits for Excelsior's alternative East Range Site and corridors.
(3) PUC may disapprove the joint permit application submitted by Excelsior.

2.2 DESCRIPTION OF THE PROPOSED PROJECT

DOE would provide a total of $36 million in cost-shared funding (see Section **1.3.1**) to Excelsior for the demonstration of advanced IGCC technologies to produce electricity at commercial scale **(specifically, project definition and preliminary design, and 1-year operational demonstration)**. The proposed IGCC demonstration plant would be designed for long-term commercial operation following the completion of an anticipated 12-month minimum demonstration period under a cooperative agreement between DOE and Excelsior. The project would represent Phase I of the proposed two-phased Mesaba Generating Station. As planned by Excelsior, Phase I would begin service in **2014** and Phase II would begin service in **2016**. This EIS considers the impacts of both phases as connected actions, even though only Phase I would be co-funded under DOE's CCPI Program. **However, at the request of USACE, the Final EIS has been revised as appropriate to describe the potential impacts of Phase I separately from the impacts of the combined two-phased project.**

The balance of this section describes the project as proposed by Excelsior. Information contained in this chapter of the EIS has been obtained from documents prepared by Excelsior and its contractors, including the "Mesaba Energy Project, Joint Application to the Minnesota Public Utilities Commission for the Following Pre-Construction Permits: Large Electric Generating Plant Site Permit, High Voltage Transmission Line Route Permit And Natural Gas Pipeline Routing Permit" (Excelsior, 2006a) and "Mesaba Energy Project, Environmental Supplement" (Excelsior, 2006b).

The subsections of Section 2.2 provide the following information:

- Section 2.2.1 describes the technology selected for the Mesaba Energy Project and the various processes included in the technology.
- Section 2.2.2 describes resource requirements and inputs to the facility.
- Section 2.2.3 describes discharges, wastes, and products from the facility.
- Section 2.2.4 describes plans for facility construction.
- Section 2.2.5 describes plans for facility operation.

2.2.1 Technology Selection and Process Description

The Mesaba Energy Project would demonstrate advanced IGCC technologies to produce electricity, including advanced gasification and air separation systems, feedstock flexibility, improved environmental performance characteristics, and improved thermal efficiency as described in Section 1.4.1. The technologies would be more efficient, economical, reliable, and environmentally favorable than conventional coal-fueled steam electric generating plants.

2.2.1.1 Technology Selection

Excelsior evaluated proposals from three companies to provide gasification technology licenses for the project before selecting the ConocoPhillips E-Gas™ technology in the spring of 2004. Based upon optimization analyses, Excelsior determined that the project should be designed as a "fuel-flexible" facility capable of utilizing petroleum coke, bituminous coal, sub-bituminous coal, and certain combinations of these feedstocks. With such capability, Excelsior determined that the design would minimize energy costs and provide significant long-term benefits to consumers.

The gasification process for the project is based upon ConocoPhillips E-Gas™ technology for gasification of solid feedstocks. The starting point for the design is the 262 $MWe_{(net)}$ Wabash River Plant in Terre Haute, Indiana. The Wabash River Plant was built with Federal co-funding under the DOE Clean Coal Technology Program (predecessor to the CCPI) and has been in commercial operation since 1995. Following construction of the Wabash River Plant, the DOE funded studies of potential performance and technological upgrades, which resulted in numerous recommendations for design and operational improvements. Based in part on the DOE studies and the lessons learned from the Wabash River Plant, the Mesaba Energy Project would incorporate several features and technologies for an advanced IGCC process. The substantial advancements being incorporated within the E-Gas™ technology and other plant systems to be integrated and demonstrated in the Mesaba Energy Project would constitute a third generation IGCC facility.

2.2.1.2 Integrated Gasification Combined-Cycle Technology

The project would employ integrated gasification combined-cycle technology. Gasification is the process of converting coal, petroleum coke, or blends of these resources to a gaseous fuel called synthesis gas (syngas). A combined-cycle electric power plant is one that uses both a steam turbine generator and a combustion turbine generator at one location to produce electricity. Combining (integrating) the gasification process with the combined-cycle power plant is known as IGCC, which is an inherently lower-polluting technology to produce electricity from solid feedstocks.

Electric power for each phase of the Mesaba Energy Project would be produced in two CTGs (about 220 MWe $_{(gross)}$ each) and in one STG (up to 300 MWe $_{(gross)}$). The combined power generation for Phases I and II would be up to 1480 MWe $_{(gross)}$. The power generated would be interconnected to the regional electrical grid by a HVTL system. Natural gas would be used to start up the IGCC power plant and as a backup fuel.

In the E-Gas™ process, coal, petroleum coke, or blends of coal and petroleum coke would be crushed, slurried with water, and pumped into a pressurized vessel (the gasifier) along with purified oxygen. In the gasifier, controlled reactions take place, thermally converting feedstock materials into syngas. The syngas is cooled, cleaned of contaminants, and then combusted in a combustion turbine, which is directly connected to an electric generator. The assembly of the combustion turbine and generator is known as a CTG. The expansion of hot combustion gases inside the combustion turbine creates rotational energy that spins the generator and produces electricity. The hot exhaust gases exiting the CTG would pass through a heat recovery steam generator (HRSG), which is a type of boiler, where steam is produced. The resulting steam is piped to a steam turbine that is connected to an electric generator. The expansion of steam inside the steam turbine spins the generator to produce an additional source of electricity.

2.2.1.3 Process Components and Major Equipment

The principal buildings associated with Phase I of the project are listed in Table 2.2-1. The major process equipment is listed in Table 2.2-2. Figure 2.2-1 **(updated for the Final EIS)** provides a block diagram showing processes and emission sources for Phase I (Phase II essentially would be the same). Figure 2.2-2 illustrates the principal features of the E-Gas™ process, which are described in the balance of this section.

Table 2.2-1. Principal Buildings Associated with Phase I of the Mesaba Generating Station

Structure	Size
Combustion Turbine Generator Building	230 ft. x 180 ft. x 75 ft. high
Steam Turbine Generator Building	170 ft. x 140 ft. x 90 ft. high
Air Separation Unit Building	375 ft. x 140 ft. x 70 ft. high
Heat Recovery Steam Generator	110 ft. x 55 ft. x 90 ft. high
Rod Mill Feed Bins	155 ft. x 25 ft. x 150 ft. high
Gasification Structure (Open Frame)	**100 ft. x 50 ft. x 200 ft. high**

Table 2.2-2. Major Process Equipment

Equipment	Component Capacity	Ancillary Facilities/Processes
Air Separation Unit (ASU) (2 units at 50% capacity each)	• 2,507 tons per day per train, based on Powder River Basin No. 1 (PRB1) coal operation.	• Nitrogen Booster Compressor for Combustion Turbine Generator (CTG) Injection • Liquid Oxygen and Liquid Nitrogen storage
Feedstock Handling and Storage (Coal/Petroleum Coke) (1 unit at 100% capacity)	• Active storage - 20 days based on PRB1 coal • Conveying/Reclaiming based on 8,550 tons per day, as received • Feedstock inactive storage – 45 days based on PRB1 coal • Flux storage (silos)/conveying/reclaiming (250 tons per day based on 50:50 blend of PRB2:PRB3 coals)	• Rotary Railcar Unloading Facilities and Thaw Shed (Feedstock) • Dust collectors for enclosed feedstock storage areas • Truck unloading facilities (Flux)
Gasification Island (3 units at 50% capacity each)	• Coal Grinding and Slurry Preparation (2 units at 60% capacity each) • Gasification (4,275 tons per day design coal, as received, per gasifier, based on PRB1 coal) • Slag Storage and Loading System (1 at 100% capacity) (800 tons per day (wet basis), based on 50:50 blend of PRB2:PRB3 coals)	• High Temperature Heat Recovery • Dry Char Removal • Slag Grinding (1 at 100% capacity) • Slag Dewatering (1 at 100% capacity)
Syngas Treating (2 units at 50% capacity each)		• Syngas Scrubbing • Low Temperature Syngas Cooling • Carbonyl Sulfide (COS) Hydrolysis • Recycle Gas Compression • Acid Gas Removal • Acid Gas Enrichment (1 at 100% capacity) • Mercury Removal • Syngas Moisturization • Sour Water System (1 at 100% capacity)

Table 2.2-2. Major Process Equipment (continued)

Equipment	Component Capacity	Ancillary Facilities/Processes
Sulfur Recovery and Tail Gas Recycle (2 units at 50% capacity each)	• Claus Plant Sulfur Recovery (Oxygen-Blown), (Up to 83 tons per day per train, based on high sulfur Illinois No. 6 coal operation)	• Molten Sulfur Storage • Molten Sulfur Truck/Rail Loading Facilities (1 at 100% capacity) • Tail Gas Recycle (1 at 100% capacity) • Tank Vent Gas Incineration (1 x 100%)
Power Block	• CTG (2 units at 50% capacity each) (220 MWe nominal each, based on Siemens-Westinghouse SGT6-5000F combustion turbine assumed for environmental permitting) • Heat Recovery Steam Generator (HRSG) & Exhaust Stack (2 units at 50% capacity each) • Steam Turbine Generator (STG) (1 at 100% capacity) (Up to 300 MWe nominal)	• Surface Condenser (1 at 100% capacity) • Vacuum, Condensate and Boiler Feedwater Systems (1 at 100% capacity) • Power Block Circulating Water System • Raw Water/Demineralizer Water Tankage/Pumps • Demineralizer System • Filtered Raw Water, Firewater/Tankage/Pumps • Wastewater Collection/Wastewater Separation • Plant & Instrument Air • Step-up Transformers
General Facilities (1 at 100% capacity)		• Gasification/ASU Cooling Water/Tower System • Zero Liquid Discharge (ZLD) System for Gasification Island Process Waters • ZLD System for Process Condensate Blowdown • Process Condensate Blowdown Holding Tank • Gasification Unit Flare • Emergency Diesel Generators • Natural Gas Distribution • Drains and Blowdowns • Nitrogen Distribution • Potable & Utility Water • Sanitary Sewage System • Stormwater Collection and Treatment

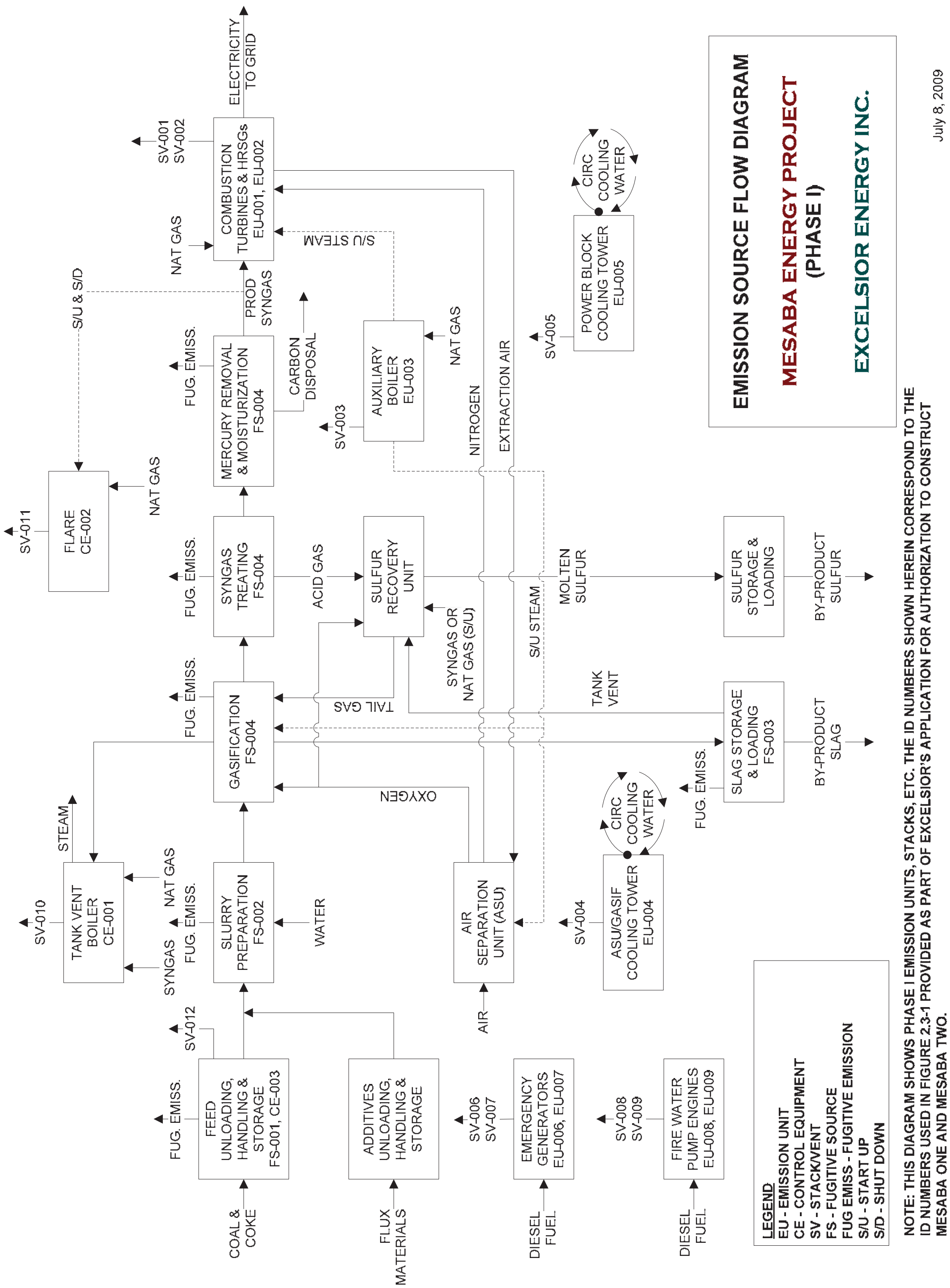

Figure 2.2-1. Process Block Diagram, Mesaba Energy Project

Figure 2.2-2. E-Gas™ Process for IGCC Power Generation

Other buildings associated with Phase I include the control room, administration building, warehouse/maintenance shop, combustion turbine and steam turbine buildings, weather enclosures for the air separation unit (ASU) compressors, slurry preparation, water treatment/laboratory, railcar thaw shed, switchyard control room, several power distribution centers, and a visitor's center. Phase II would consist of a duplicate facility and would require the same structures as described for Phase I.

Feedstock Slurry Preparation

To produce slurry feedstock for the gasifier, the solid fuel would be mixed and ground with treated recycled water and slag fines that are recycled from other areas of the plant producing slurry with a paste-like consistency. The process is illustrated in Figure 2.2-3.

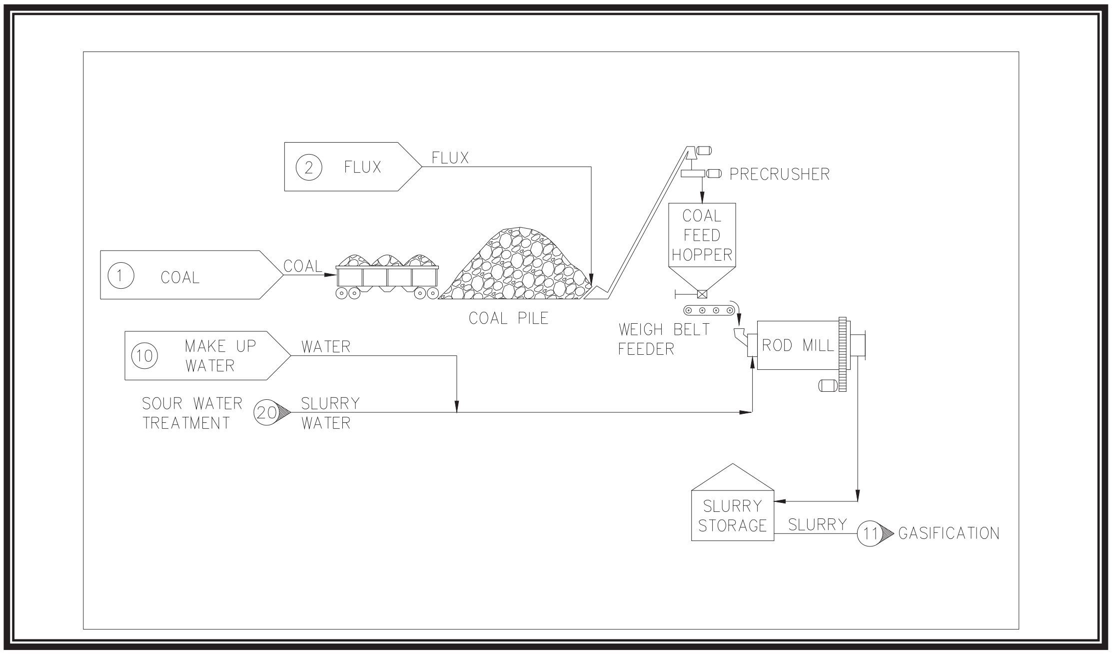

Figure 2.2-3. Feedstock Grinding and Slurry Preparation

Tanks, drums, and other areas of potential atmospheric exposure of the slurry or recycle water would be covered and vented into the tank vent collection system for vapor emission control. The entire feedstock grinding and slurry preparation facility would be paved and curbed to contain spills, leaks, wash down, and stormwater runoff. A trench system would carry this water to a sump where it would be pumped into the recycle water storage tank.

Gasification and Slag Handling

The gasifier consists of two stages: a slagging first stage, and an entrained flow, non-slagging second stage. Unlike traditional pulverized coal power plants, where fuel is actually combusted, in an IGCC power plant, slurry is fed to the gasifier along with sub-stoichiometric oxygen (O_2) at an elevated temperature and pressure. The feedstock would be almost totally gasified in this environment to form syngas consisting principally of H_2, carbon monoxide (CO), carbon dioxide (CO_2), and water (H_2O). Figure 2.2-4 illustrates the process. Each phase of the Mesaba Energy Project would include three gasification systems.

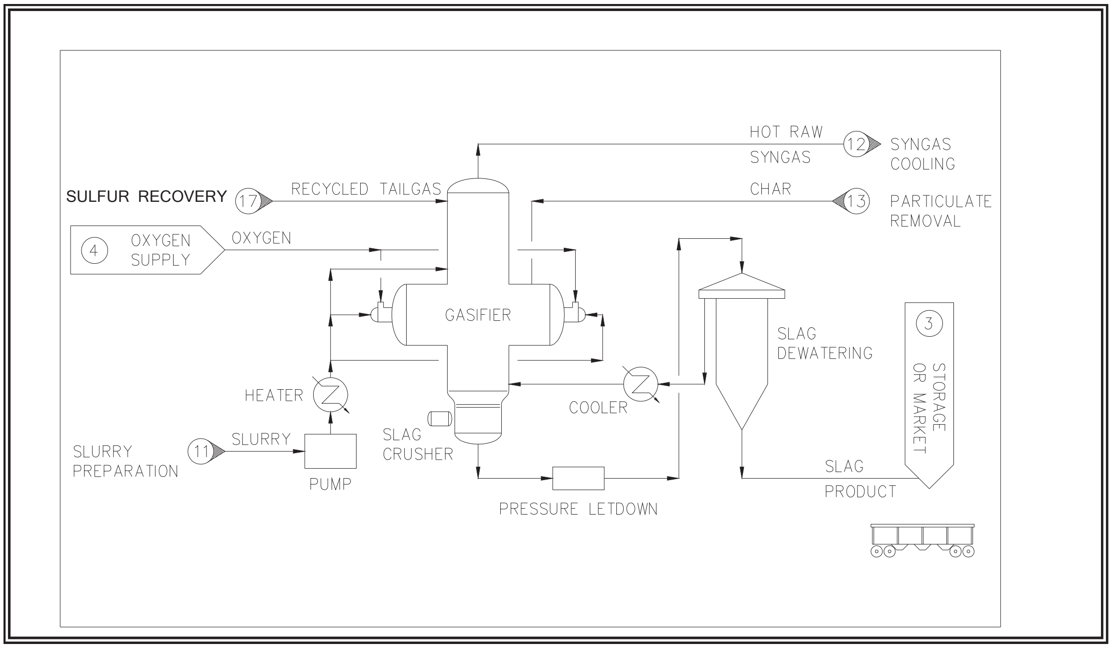

Figure 2.2-4. Gasification and Slag Handling

Most of the sulfur in the feedstock is converted to hydrogen sulfide (H_2S) during gasification, although a small portion of the sulfur is converted into carbonyl sulfide (COS). Most of the nitrogen in the feedstock is converted to ammonia (NH_3). The energy in the feedstock is ultimately converted into CO and H_2 with a small amount of methane (CH_4). Low-grade coals with lower heating values and higher moisture contents would generate a syngas with more CO_2 and H_2. Higher quality coals and petroleum coke would result in a syngas that has a much higher CO content. Further processing of the syngas would remove over 99 percent of the sulfur from high-sulfur feedstocks and over 97 percent of the sulfur from low-sulfur, sub-bituminous coal feedstocks. The lower removal rate from low-sulfur coal would result in approximately equal sulfur emissions rates as the higher removal rate from higher sulfur coal. Hence, the final SO_2 emission rate achieved using E-Gas™ technology would be independent of the starting sulfur concentration in the feedstock.

Mineral matter in the feedstock and any added flux forms a molten slag, which flows continuously into a water-quench bath. The characteristics of the slag produced in the gasifier would vary with the mineral matter content of the feedstock. The slag/water slurry would then be directed to a dewatering and handling area. Slag production at full load would vary from about 500 tons per day up to a maximum of about 800 tons per day per phase depending upon the ash content of the coal or petroleum coke received. The slag would be dewatered at the facility and transported via rail or truck to market or storage. Section 2.2.3.4 discusses the marketable byproducts of the Mesaba Energy Project, including slag. The impacts associated with materials and waste management during plant operations are described in Section 4.16.2.2.

The raw syngas generated in the first stage flows into the second stage of the gasifier. The gasifier second stage is a vertical refractory-lined vessel in which additional slurry would be reacted with the hot syngas stream exiting the first stage. The feedstock undergoes devolatilization (separation of organic components) and pyrolysis (high temperature decomposition), thereby generating more syngas with higher heat content (less carbon being converted to CO_2), because no additional O_2 would be introduced into the second stage. This additional slurry lowers the temperature of the syngas exiting the first stage by the endothermic nature of the devolatilization and pyrolysis reactions. Also, water reacts with a portion of the carbon to produce additional CO, CO_2, and H_2 for subsequent use as syngas fuel for power generation. Unreacted solid fuel (char) would be carried out of the second stage with the syngas. Certain metals present in the feedstocks in trace quantities and volatile at the temperatures typical of the gasifier would be carried out in their gaseous state as components of the syngas and removed in the cleanup stage. The slag/water slurry would flow continuously into a dewatering bin. The bulk of the slag would settle out in the bin while water overflows into a basin in which the remaining slag fines would settle. The clear water from the settler would pass through heat exchangers where it would be cooled as the final step before being returned to the gasifier quench section. Dewatered slag would be transferred to the slag storage area to be loaded into trucks or rail cars for transport to market or storage. The slurry of fine slag particles from the bottom of the settler would be recycled to the slurry preparation area to be fed back into the gasifier to maximize carbon utilization.

Syngas Cleanup and Desulfurization

The syngas cleanup and desulfurization systems include the processes for syngas cooling, particulate matter removal, syngas scrubbing, acid gas removal, mercury removal, and potential future retrofit for carbon capture as described in the following paragraphs. In syngas cooling, the hot raw syngas exiting the gasifier system would be cooled converting a significant portion of the heat from the gasifier to high-pressure steam via heat exchangers for use in power generation. After cooling, the syngas (including entrained particulate matter containing carbon that remains available for gasification) would be directed to the particulate matter removal system, as shown in Figure 2.2-5. The gas flows first through a hot gas cyclone for removal of relatively large particles and then passes to the particulate matter filter. The filter vessel contains numerous porous filter elements to remove particulate matter from the syngas (>99.9 percent removal efficiency). Removed particulate matter from both the hot gas cyclone and the dry filter vessel would be recycled to the first stage of the gasifier to further convert particle-bound carbon to syngas and thereby improve carbon conversion efficiency. Continually recycling captured particulate matter to the gasifier promotes higher thermal efficiencies and lowers the carbon content of the slag, making the slag more marketable. Generally, less than 1 percent of the carbon originally present in the feedstock would be expected to end up in the slag confirming that near complete gasification of the carbon content of the feedstock would be obtained. The particle-free syngas would then proceed to the low temperature heat recovery system.

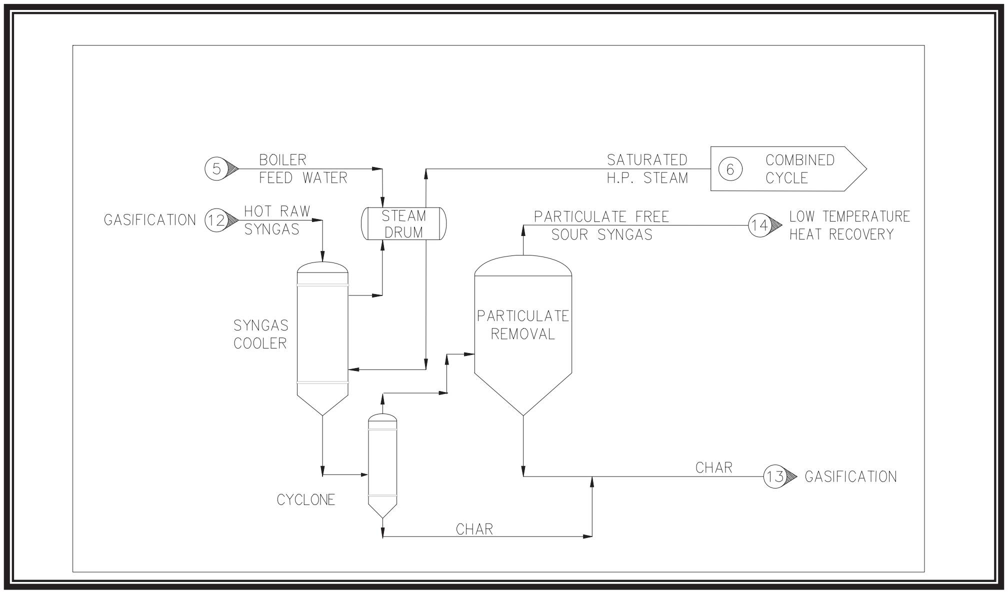

Figure 2.2-5. Particulate Matter Removal

Next, the syngas would be scrubbed with recycled sour water (water with dissolved sulfur compounds and other contaminants condensed from the syngas) to remove chlorides and trace metals and to reduce the potential for equipment corrosion and formation of undesirable products in the acid gas removal (AGR) system. A COS hydrolysis unit would be incorporated to achieve a high level of sulfur removal, which would convert the small amount of COS in the syngas to H_2S that could then be efficiently removed in the AGR system.

After hydrolysis, the syngas would be cooled in process heat exchangers to efficiently utilize the relatively low-temperature heat available. Most of the NH_3 and a small portion of the CO_2 and H_2S present in the syngas would be absorbed in the water condensed by this cooling step. Additionally, some of the trace metals that remained in their gaseous state during the particulate matter removal process would condense. The water would be collected and sent to the sour water treatment unit. The cooled sour syngas would be fed to the AGR system, where the sulfur compounds would be removed to produce a low-sulfur product syngas. The syngas scrubbing process is illustrated in Figure 2.2-6. Each phase of the Mesaba Energy Project would include two gas treatment systems.

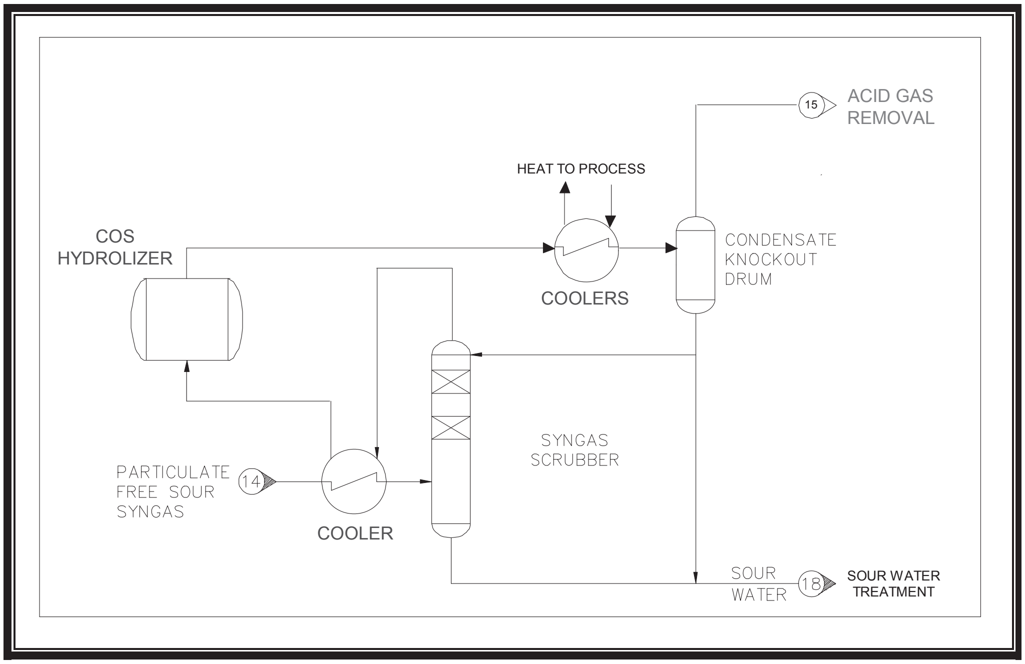

Figure 2.2-6. Syngas Scrubbing

The AGR system (Figure 2.2-7) would cause the cool sour syngas to contact an aqueous solution of methyl-diethanolamine (MDEA), which is an amine absorbent that would remove the H_2S to produce a clean product syngas. The H_2S-rich MDEA from the bottom of the absorber would flow to a cross heat exchanger to recover heat. The heated rich MDEA would then be directed to the H_2S stripper where the H_2S and CO_2 are removed at near atmospheric pressure. A concentrated stream of H_2S and CO_2 would exit the top of the H_2S stripper and flow either to the carbon-capture system or directly to the sulfur recovery unit. The lean MDEA would be pumped from the bottom of the stripper to the heat exchanger. The lean MDEA would be further cooled before being stored and then recirculated to the absorber. This unit is a totally enclosed process with no discharges to the atmosphere.

Mercury Removal and Moisturization

After removal of sulfur, the syngas would pass through fixed beds of activated carbon prepared with a special impregnate to remove mercury (Figure 2.2-7). Each phase of the Mesaba Energy Project would have two mercury removal units. Multiple beds would be used to obtain optimized adsorption. The lower temperature and lower moisture content of the syngas after the AGR would allow the carbon beds to operate at high efficiencies. The activated carbon capacity for mercury ranges up to 20 percent by weight of the carbon (Parsons, 2002). The mercury removal system would remove enough mercury from the syngas so that the mercury content of the syngas fuel would be no more than 10 percent of the mercury contained in the solid IGCC feedstock. After mercury removal, the product syngas would be moisturized, heated, and diluted with nitrogen for control of nitrogen oxides (NO_x) before being used as fuel for power generation in the CTGs.

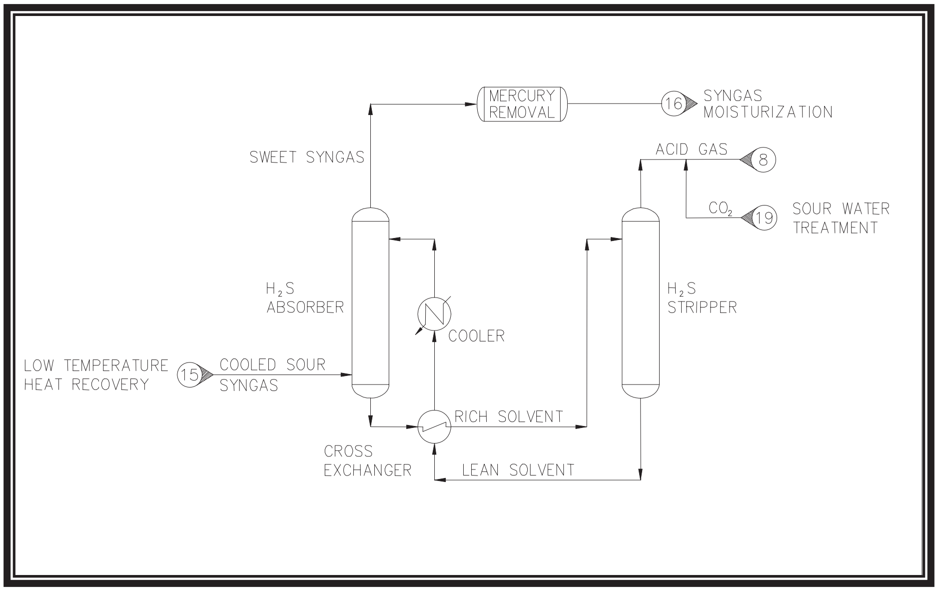

Figure 2.2-7. Acid Gas Removal and Mercury Removal

Potential Carbon Capture Retrofit

> The Mesaba Energy Project design would enable a potential carbon capture retrofit if reductions in CO_2 emissions become regulated or economically favorable in the future.

Global emissions of CO_2 resulting from fuel combustion have increased from 16 billion tons in 1973 to 27 billion tons in 2005 (IEA, 2007). Another study estimated global emissions of CO_2 from fuel combustion to be 28 billion tons in 2003 (Marland et al., 2006). Although CO_2 emissions from power plants are not currently regulated under the Clean Air Act (CAA), concerns about global warming may result in future controls on emissions of this greenhouse gas. Therefore, the plant would be designed so that it could be modified to allow for the capture of CO_2 in the event that reductions in these emissions are required by regulation or encouraged by economic incentives at some time. Because the implementation of carbon dioxide capture and storage technologies for the Mesaba Energy Project is not included in the DOE demonstration project for the CCPI Program (as explained in Section 2.1.1.2), the potential impacts from implementing these technologies are addressed within Section 5.1.2.1 as aspects of the commercial operation of the power station.

There are two primary options for the capture of CO_2 in this power plant: (1) removal of CO_2 present in the syngas itself, prior to combustion; and (2) converting CO in the syngas to CO_2 by catalyzing CO and water into CO_2 and H_2. Under the first option, the removal of CO_2 from the syngas would result in roughly a 30 percent reduction in overall CO_2 emissions from the power plant **if sub-bituminous coal is used as feedstock**. This would be accomplished by the installation of amine scrubbers upstream or downstream of the acid gas removal system in the IGCC. This approach would remove up to 85 percent of the CO_2 in the syngas that fuels the plant and result in an overall CO_2 capture rate of 30 percent from the plant. The technology for this option is currently available and could be implemented as early as **2016**, following the commercial operation date of Mesaba Phase I, if required by regulation or encouraged by economic incentives. The CO_2 capture facilities would likely be located within the existing site requiring an area of approximately 100 by 150 feet to accommodate necessary equipment.

For the second CO_2 removal option, the technology to remove the CO_2 from the combustion gases is not currently available commercially, but will be demonstrated in the future as part of **the** DOE **Carbon Sequestration Program.** This technology would likely increase the capital cost and reduce overall efficiency of the plant, making it more expensive than the first option (30 percent removal). However, the implementation of the first option does not preclude the potential implementation of the second option at some point in the future. Additionally, the project proponent has performed a preliminary study of potential storage (or sequestration) of the carbon dioxide emissions (see Appendix A1). Excelsior has contracted with the Plains CO_2 Reduction Partnership (one of seven regional partnerships funded by DOE's Regional Carbon Sequestration Partnership Program) to investigate and, if possible, produce a CO_2 sequestration/mitigation plan. As a part of its 4-year Phase II Studies initiated in 2005, the Plains CO_2 Reduction Partnership would seek to produce a CO_2 management plan specifying conditions required by potential purchasers of CO_2.

There are two basic carbon sequestration options: (1) use the captured CO_2 for enhanced oil recovery (EOR); and (2) store the captured CO_2 within a compatible geologic formation. Both of these options would require the construction of a CO_2 pipeline system to convey the pressurized gas from the Mesaba Energy Project to the sequestration site(s). CO_2 has proven to be very effective for secondary and tertiary oil recovery by both displacing and decreasing the viscosity of otherwise unrecoverable oil. Under the first carbon sequestration option, the captured CO_2 would be pressurized and transported to existing oil fields in north central North Dakota and southwestern Manitoba. This option would require the construction of at least 405 miles of pipeline to convey the gas to sequestration sites required to accommodate the CO_2. The captured CO_2 could also be stored in geologic formations that act as CO_2 sinks, which are typically saline formations. Under the second sequestration option, the captured CO_2 would be conveyed via pipeline, to a suitable saline formation located approximately 265 miles from the Mesaba Energy Project area in eastern North Dakota.

All of the CCS options presented above are based on a potential future requirement to reduce CO_2 emissions from the Mesaba Energy Project, along with the potential for financial incentives (such as carbon removal credits) that would limit the costs of capture/sequestration from being entirely borne by the utility customers. See Appendix A1 "Excelsior's Plan for Carbon Capture and Sequestration" and Appendix A2 "DOE Analysis of Feasibility of Carbon Capture and Sequestration for the Mesaba Energy Project."

Based on an analysis of the commercial readiness of carbon capture and sequestration presented in Appendix A2, CCS is not considered technically or economically feasible for the Mesaba Energy Project **during the DOE demonstration period**. While both carbon capture and carbon dioxide transport are technically feasible, the technical feasibility of carbon sequestration for the Mesaba Energy Project cannot be validated in the near-term until extensive field tests are conducted to fully characterize potential storage sites and the long-term storage of sequestered carbon has been demonstrated and verified through ongoing efforts conducted under the DOE Carbon Sequestration Program.

Furthermore, commercially available combustion gas turbines envisioned for this project cannot operate on carbon monoxide-depleted syngas where the hydrogen concentration approaches 100 percent. With regard to economic feasibility, imposition of CCS on the project would increase the cost of electricity such that the Mesaba Energy Project would not be economically viable without an order from the PUC that incorporates the costs associated with CCS within the power purchase agreement. However, the design and construction of the facility would be compatible with future implementation of carbon capture and sequestration options.

Sulfur Recovery

The H_2S carried along in the acid-gas from the AGR system would be converted to elemental sulfur in the sulfur recovery unit (SRU) as illustrated in Figure 2.2-8. Each phase of the Mesaba Energy Project would include two SRUs. The sulfur would be condensed and collected in molten form and could be sold as a by-product raw material for fertilizer or other beneficial uses. The tail gas from the SRU is composed mostly of CO_2 and nitrogen with trace amounts of H_2S and SO_2 as it exits the last condenser. The liquid sulfur would be pumped from the sulfur pit to a sulfur-degassing unit. The sulfur-degassing unit strips dissolved H_2S out of the liquid sulfur. The degassed sulfur would be pumped from the degassing unit to the sulfur storage tank. The stripped H_2S stream is routed to the tail gas recycle stream to the gasifier. Liquid sulfur from the sulfur storage would be pumped to trucks or rail cars. The sulfur loading equipment would include vapor recovery systems to control fugitive emissions by returning displaced vapors to the storage tank. The SRU is a totally enclosed process with no discharges to the atmosphere.

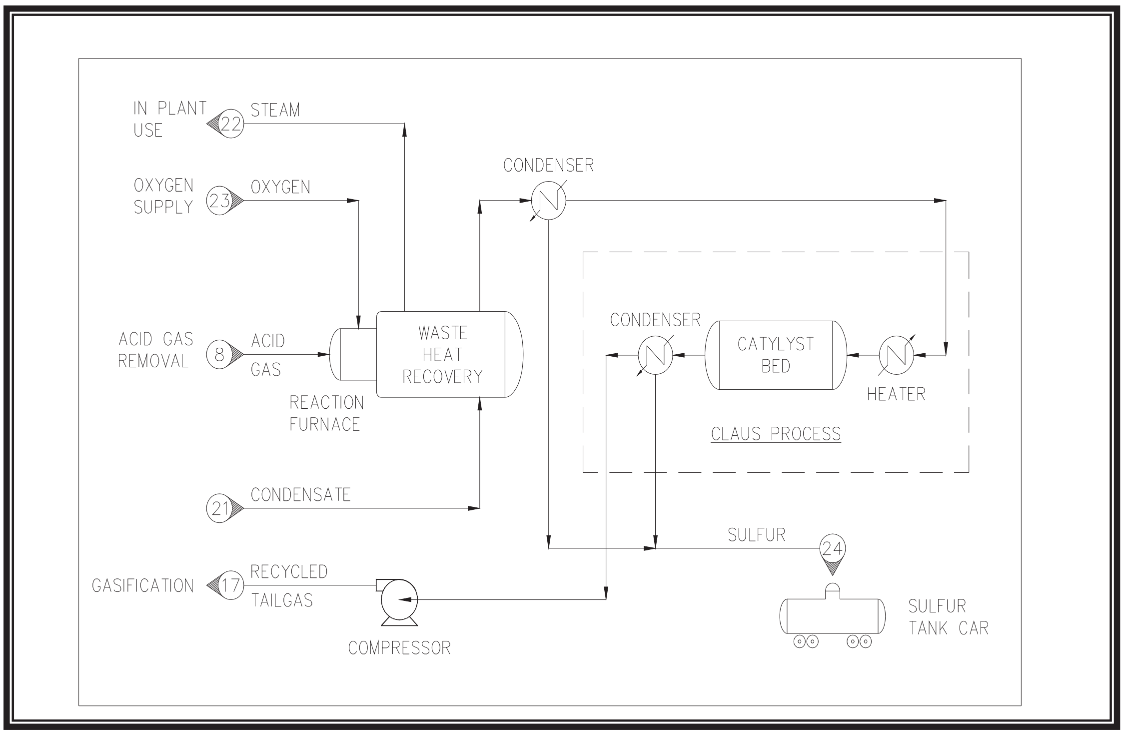

Figure 2.2-8. Sulfur Recovery Unit

Air Separation

The ASU would provide oxygen for the gasification process and nitrogen for CTG NO_x control and for purging. The ASU contains an air compression system, an air separation cryogenic distillation system ("cold box"), an oxygen pump system, and a nitrogen compression system. Two ASU equipment trains would be provided for each phase of the facility. A multi-stage, electric motor-driven centrifugal compressor would compress filtered atmospheric air that may be combined with additional compressed air extracted from the gas turbines in the power block. The combined air stream would be cooled and directed to the molecular sieve absorbers where moisture, CO_2 and atmospheric contaminants are removed to prevent them from freezing in the colder sections of the plant. The dry CO_2-free air would be separated into O_2 and nitrogen gas (N_2) in the cryogenic distillation system. A stream containing mostly oxygen would be discharged from the cold box as a liquid and stored in an intermediate oxygen storage tank, from which it would be fed to the gasifier.

The remaining portion of air mainly containing nitrogen would leave the ASU in three separate nitrogen streams. A small portion of high-purity nitrogen would be used in the gasification plant for purging and inert blanketing of vessels and tanks. The largest, but less-pure, portion of the nitrogen would be compressed and sent to the combustion turbines for NO_x emission control. A waste/excess nitrogen stream would be vented to the atmosphere. There would be no emission of regulated air pollutants from the ASU.

Slag Handling, Storage & Loading

The slag/water slurry from the gasifier (see Figure 2.2-4) would flow continuously into a dewatering system where slag would be removed in a two-phased settling process. The clear water from the settler would be passed through heat exchangers where it would be cooled as the final step before being returned to the gasifier quench section. Dewatered slag would be transferred by in-plant trucks to the slag storage area to be loaded into on-road trucks or rail cars for transport to market or storage. The dewatered slag would be relatively inert and very moist, and it would not be a source of fugitive emissions.

Combined-Cycle Power Block

The power generation portion of the Mesaba Generating Station would be similar to a conventional natural gas combined-cycle plant, which is one of the most efficient commercial electricity generation technologies currently available. Each phase of the station (Phase I and Phase II) would include two advanced (F Class) CTGs configured to utilize syngas, two HRSGs, and a single STG. Each plant phase would convert the chemical energy contained in the syngas fuel to electricity both directly, through combustion, and indirectly, through steam generation.

In the process, preheated syngas from the gasification section would be mixed with compressed air and supplied to the combustor of the CTG. Diluent nitrogen added to the syngas fuel would reduce the flame temperature in the combustor and thereby reduce the production of nitrogen oxides. The hot exhaust gas exiting the combustor would flow to the expander turbine driving the generator to produce electricity and turning the air compressor section of the combustion turbine. Hot exhaust gas from the expander would be ducted through the HRSG to generate high-energy steam used to produce additional electricity in the STG. The HRSG would generate three pressure levels of steam and heat boiler feed water for the syngas cooler in the gasification section. Following heat recovery, the cooled exhaust gas would be discharged to the atmosphere through the HRSG stacks. The HRSG stacks would include emission monitoring instruments as required to verify compliance with applicable emission standards and permit conditions.

2.2.1.4 Plant Utility Systems

Tank Vent Boiler System

A tank vent system would be used to convert each off-gas component in the tank vents to its oxidized form (SO_2, NO_x, H_2O, and CO_2) before venting them to the atmosphere. The tank vent streams would be composed primarily of air purged through various in-process storage tanks and, with the exception of the off-gas from the slag handling dewatering system, would be routed to the tank vent boiler (TVB). The tank purge gas may contain very small amounts of sulfur-bearing components. The high temperature produced in the TVB would thermally convert any H_2S present in the tank vents to SO_2. Heat recovery (in the form of steam generation) would be provided for the hot exhaust gas from the TVB before it is directed to a stack and emitted. Since the slag handling dewatering system off-gas contains high H_2S concentrations, it would be recycled to the gasifier to eliminate a potential source of SO_2 emissions if released to the tank vent system.

Sour Water Treatment

Water reuse within the gasification plant would minimize water consumption and discharge. Process water containing dissolved contaminant gases produced within the gasification process must be treated to remove dissolved gases before being recycled to the coal grinding and slurry preparation area or being diverted to the Zero Liquid Discharge (ZLD) system.

The dissolved gases would be driven from the water by steam-stripping. Water condensed during cooling of the sour syngas would contain small amounts of dissolved gases (CO_2, NH_3, and H_2S) and other trace contaminants, which would be stripped from the sour water in a two-step process as illustrated in Figure 2.2-9. The CO_2 and most of the H_2S would be removed in the CO_2 stripper and directed to the SRU. The water exiting the bottom of this column would be cooled, and most would be recycled in the feedstock grinding and slurry preparation. The remaining water would be treated in the NH_3 stripper to remove the ammonia and remaining trace components. The stripped ammonia would be combined with the recycled slurry water. A portion of the treated water from the NH_3 stripper would be blown down to the ZLD system; the rest would be reused within the plant. The sour water treatment system would be a totally enclosed process with no discharges to the atmosphere.

Zero Liquid Discharge System

At either the West Range or East Range location for the generating station, treated water from the NH_3 stripper in the gasification process would be released to a ZLD system. The blowdown stream would be pumped to a brine concentrator that uses steam to indirectly heat and evaporate water from the wastewater stream. Resulting water vapor would be compressed and condensed, and the high quality distillate would be recycled to the syngas moisturization system. The concentrated brine would be further processed in a heated rotary drum dryer. There the remaining water would be vaporized and a solid filter cake material collected for appropriate disposal. The use of the ZLD system would prevent the contaminants in the feedstocks from being discharged to receiving waters.

For the East Range Site, an enhanced ZLD system would also treat cooling tower blowdown to eliminate all direct wastewater discharges to receiving waters as necessitated by the stringent requirements applying to discharges of mercury in the Lake Superior Basin watershed. **After the publication of the Draft EIS, Excelsior announced its commitment on January 21, 2008 to implement an enhanced ZLD system for the West Range Site. Therefore, ZLD systems employed at either site would eliminate all direct wastewater discharges to receiving waters.**

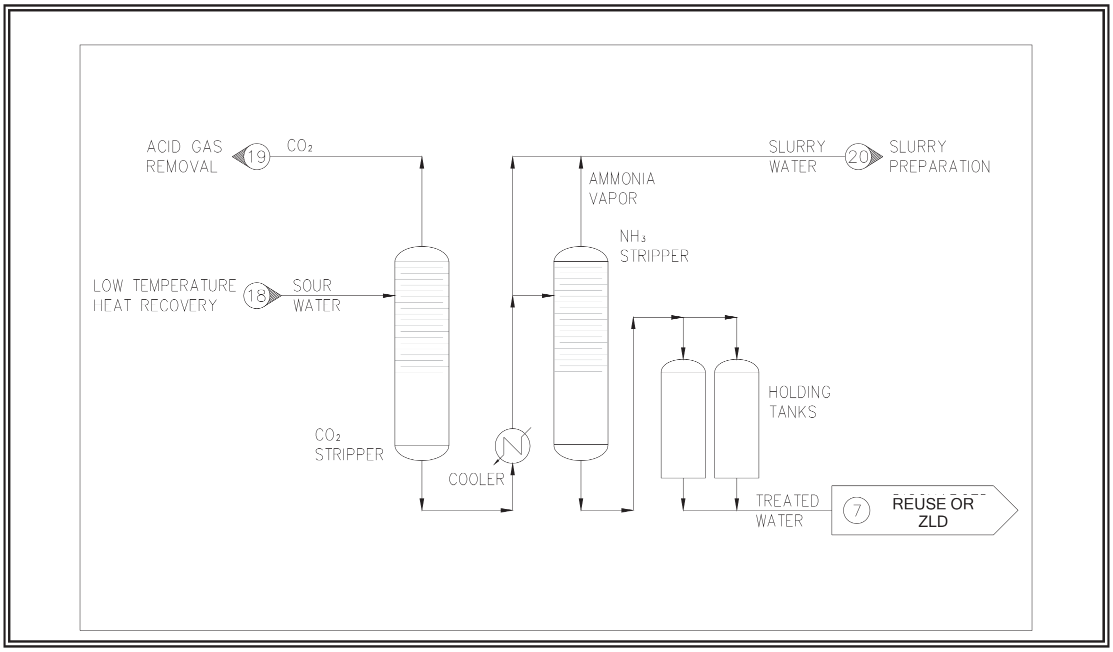

Figure 2.2-9. Sour Water Treatment System

Auxiliary Boilers

Two auxiliary boilers, one for each phase of the Mesaba Generating Station, would provide steam for pre-startup equipment warm up and for other miscellaneous purposes when steam from the gasifiers or HRSGs is not available. The boilers would provide steam in addition to, or in lieu of, the steam that would be generated from the TVBs. Each boiler would produce a maximum of about 100,000 pounds per hour of steam and would be fueled by natural gas. Annual operation of each boiler would be equivalent to or less than 25 percent of the year at maximum capacity. Boilers would be equipped with low NO_x burners to minimize emissions.

Flare

During unit startup or during short-term combustion turbine outages, an elevated flare at the gasification island would be used to burn off partially combusted natural gas and scrubbed/desulfurized off-specification syngas. Syngas sent to the flare during normal planned flaring events would be filtered, water-scrubbed, and further treated in the AGR and mercury removal systems to remove **air** contaminants prior to flaring. Flaring of untreated syngas or other streams would only occur as an emergency safety measure during unplanned plant upsets or equipment failures.

Emergency Diesel Engines

A 2-MWe emergency diesel generator would be used for the gasification island and a 350-kW emergency diesel generator would be used for the power block. One or two nominal 300-horsepower diesel-driven firewater pumps would be provided for each plant phase. These engines would burn very low sulfur distillate oil. Other than for plant emergency situations, each engine would be operated less than 5 hours per month for routine testing, maintenance, and inspection purposes.

2.2.2 Resource Requirements (and Inputs)

The primary resource requirements for the Mesaba Generating Station (Phases I and II) would include feedstock, natural gas, process water, infrastructure, transportation facilities, and land area. Each resource is discussed in general terms below. Specific sources for these inputs for the West Range Site and the East Range Site are described in Sections 2.3.1 and 2.3.2, respectively. Resources required for construction of the Mesaba Generating Station are discussed in Section 2.2.4, Construction Plans.

2.2.2.1 Feedstock Requirements

The Mesaba Generating Station would be designed to be "fuel flexible," which means it could operate at or near maximum capacity using various fuels or blends of fuels. This would provide future cost benefits, because it would allow the station to adapt its fuel mix over the life of the facility thereby minimizing the cost of power. Fuel flexibility would also reduce the dependence on a single fuel supplier or transportation provider.

> The Mesaba Generating Station could operate using bituminous coal, sub-bituminous coal, coal/petroleum coke blends, or other blends of these fuels. This fuel flexibility would allow the facility to minimize the cost of power.

The facility would be designed to utilize the following fuels:

- Bituminous coal (e.g., Illinois No. 6) up to 100 percent;
- Sub-bituminous coal (e.g., Powder River Basin [PRB]) up to 100 percent;
- Petroleum coke blended up to 50 percent with coal; or
- Blends of these fuels.

Coal and petroleum coke are typically characterized by their heating value, elemental analysis (percent carbon, hydrogen, nitrogen and sulfur by weight), mineral matter (known as ash), and moisture content.

Phase I would utilize approximately 2.7 million tons of feedstock annually assuming operation at 90 percent capacity. Under maximum feedstock input, and assuming the gasifiers operated in full slurry quench mode, each phase would require a maximum of 8,230 tons of coal (sub-bituminous) per day on an as-received basis. Assuming partial slurry quench operation of the gasifiers, the daily maximum would increase to 8,550 tons on an as-received basis, or about 3 million tons of feedstock per year. With Phase I and Phase II operating at full load with the gasifiers in full slurry quench mode, a maximum 16,460 tons of coal feedstock per day would be consumed. With the gasifiers operating in partial slurry quench mode at full load, Phase I and Phase II would require a maximum of about 17,100 tons of sub-bituminous coal per day.

Operating in full slurry quench mode would result in reduced fuel use and, consequently, reduced pollutant emissions/discharges, and Excelsior intends to operate the Mesaba Energy Project in the more-efficient full slurry quench mode to the extent feasible. However, full slurry quench is an IGCC design improvement that is subject to further engineering and verification by experience at Wabash River Plant. Therefore, to avoid unrealistic expectations, neither the maximum resource requirements nor maximum pollutant emissions/discharges operating under full slurry quench are considered in this EIS.

Coal and petroleum coke feedstocks would normally be received by rail in dedicated unit trains from a mine (or refinery). The proposed on site rail line would be designed based on the following assumptions:

- Unit trains would include up to 135 cars (the average unit train shipment would be comprised of 115 cars).
- Each unit train car would carry an average of 119 tons of feedstock.
- A maximum of three unit trains per day (midnight to midnight) **would** be received and unloaded based on an unloading rate of 4 hours per train.

Unloading facilities would include a thawing shed to loosen frozen cargo during the winter season, and a partially enclosed rotary car dumping system with an automatic electro-hydraulic positioning system, which would reduce the run time and associated emissions of the locomotive or switch engine during the entire unloading process. Feedstock materials would fall from the rotated cars into an enclosed unloading pit and would be transferred via a feeder/conveyor system to active storage pile stackers. Four active storage piles for each phase (a total of eight for the Mesaba Generating Station) would provide working feedstock storage. Reclaimers and conveyors would move coal/coke from the active piles to the slurry feed preparation area. Additional inactive storage would be located on the opposite side of the rail sidings to provide a reserve source of feedstock material in the event normal deliveries of unit trains are interrupted. If needed, feedstock from the inactive pile would be moved by mobile equipment (bulldozers, scrapers, and/or front-end loaders) to the unloading pit.

The feedstock handling system would include facilities necessary to unload solid feedstock materials, convey them to storage areas, store them until required, reclaim them from storage, blend them as necessary, and convey the blended materials to the slurry preparation system. On-site storage facilities would be provided for two feedstock materials: coal and petroleum coke. Storage facilities would also be provided for flux, which is a feedstock-conditioning material, described below. The feedstock storage facilities would include, for each phase of the generating station, approximately 20 days of active storage and approximately 25 days of inactive storage. The storage areas would incorporate dust suppression systems (including covered conveyers and other enclosures, dust suppression sprays, and vent filters) and would be paved, lined, or otherwise controlled to enable collection and treatment of stormwater runoff and prevent infiltration of chemical species leached from feedstock materials and/or flux to groundwater.

At the high operating temperatures of the E-Gas™ gasifier, ash in feedstock material would normally melt and drain to the bottom of the gasifier where it would be removed as molten slag and cooled in a water bath until it solidified. Mineral matter in the ash determines the melting temperature of the slag and its viscosity at a specific operating temperature. If too viscous, the slag would not easily flow from the gasifier and could potentially plug the bottom. If too fluid, the slag could be excessively erosive to the refractory in the gasifier. Flux, typically silica/sand, limestone, iron oxide, or a mixture of these materials, would be blended with the feedstock under carefully monitored conditions to control the slag melting point and viscosity.

Flux would be received by truck (or railcar) and pneumatically conveyed to enclosed storage silos equipped with fabric filters for dust control. Flux from storage silos would be automatically blended with feedstock by a weigh belt feeder system. The required quantity of flux would be a small fraction of the total feed, typically less than 250 tons per day per phase.

2.2.2.2 Natural Gas Requirements

Although the primary fuel source for electric power production would be coal-derived syngas, the Mesaba Generating Station would also be capable of operating on natural gas. Natural gas would be used during startup of the facility and as a backup fuel. This ability to operate on natural gas would provide an additional source of available generating capacity (and reliability for periods when the gasification island is unavailable). In addition, it would offer the option of installing the combined-cycle power island early in the construction process (that is, ahead of the gasification island), thereby allowing for electricity production from natural gas until the gasification island could be installed and the unit would begin full baseload operation on coal-derived syngas. Although not currently planned for the Mesaba Energy Project (Phase I), the ability to come online early using natural gas would be a very useful resource planning option for Phase II. Excelsior has proposed permits to allow for natural gas firing at capacity factors of 30 percent, 20 percent, 10 percent, and 5 percent for years 1, 2, 3, and thereafter, respectively. The expected maximum natural gas flow would be about 105 million standard cubic feet of gas per day per phase of the Mesaba Generating Station.

Two major natural gas pipeline transmission companies serve Minnesota's Iron Range: GLG and NNG. The GLG natural gas pipeline system interconnects with NNG's natural gas pipeline system near Carlton, Minnesota. Section 2.3 describes the gas pipeline interconnection alternatives for the West Range and East Range Sites.

2.2.2.3 Process Water Requirements

The Mesaba Generating Station would require process water for the following purposes:

- As the prime mover in the steam cycle (Raw water must be treated to ultra purity standards to be used in the HRSG for steam production. The steam produced in the HRSGs is delivered to the steam turbine and condensed for reuse.);
- To condense steam used in the power cycle (Water used for steam production in the HRSGs would be of very high quality and, for economic reasons, would not simply be vented to the atmosphere as low grade steam.);
- To slurry coal for feed to the gasifier; and
- For various other contact/non-contact cooling purposes.

As described in Section 2.2.1.4, Excelsior announced its decision to implement an enhanced ZLD system for the West Range Site, after the publication of the Draft EIS, which would be the same as proposed for the East Range Site. The enhanced ZLD system is made up of two separate ZLD units to treat two different wastewater streams—contact wastewater (process water from the gasification that has been through sour water treatment) and non-contact wastewater (primarily cooling tower blowdown). As previously discussed in Section 2.2.1.4, in the gasification process, a portion of the treated water from the NH_3 stripper would be released to a ZLD unit. This ZLD unit would recover distilled water for reuse in the power plant, reducing fresh water consumption and would prevent the contaminants in the feedstocks from being discharged to receiving waters. Figure 2.2-10 (shown later in this chapter) illustrates integration of this ZLD unit treating the contact wastewater. All other industrial wastewaters (i.e., non-domestic wastewaters) generated beyond those already used in the gasification and slag processing operations would be processed through a separate ZLD unit such that there would be no process-related wastewaters (including non-contact cooling tower blowdown) discharged from the Mesaba Generating Station.

Without the enhanced ZLD system at the West Range Site, the cycles of concentrations (COCs) would have been reduced from five for the Mesaba Energy Project (Phase I only) to three for the Mesaba Generating Station (both Phases I and II) to meet state water quality standards. The reduction of COCs would have resulted in a more than doubling of water requirements for the combined phases. By using the enhanced ZLD system, the average annual water appropriation rate can be reduced by 900 gallons per minute per phase (1,800 gallons per minute total) in comparison to operating at five cycles of concentration with discharge of cooling tower blowdown. The average and peak water requirements are indicated in **revised** Table 2.2-3. Peak rates would occur on hot, humid days.

Table 2.2-3. Process Water Requirements

Phase	West Range Site[1]		East Range Site	
	Average Annual Demand (gpm [cfs])[2]	Peak Demand (gpm [cfs])	Average Annual Demand[3] (gpm [cfs])	Peak Demand (gpm [cfs])
Mesaba Energy Project (Phase I)	**3,500** (**7.8**)	**5,000** (**11.1**)	**3,500** (**7.8**)	5,000 (11.1)
Mesaba Generating Station (Phases I & II)	**7,000** (**15.6**)	**10,000** (**22.3**)	**7,000** (**15.6**)	10,000 (22.3)

[1] **Revised from Draft EIS to reflect implementation of an enhanced ZLD system at the West Range Site.**[2] gpm – gallons per minute; cfs – cubic feet per second
[3]**Correction from values presented in the Draft EIS.**

The maximum process water requirement would be dependent upon many factors including, but not limited to, the cycles of concentration in the cooling towers, fuel consumed, ambient conditions, extent to which cooling tower blowdown is treated to remove total dissolved solids, chemistry of the receiving waters, and water quality criteria standards applied to those waters. The cycles of concentration in the cooling towers would be dependent upon source water chemistry, specifically the concentrations of mercury, total dissolved solids; and hardness. In general, if the source water is relatively low in total dissolved solids the cycles of concentration in the Mesaba Generating Station's cooling towers could be increased, resulting in lower make-up rates.

Abandoned mine pits would be the primary source of water at the West Range Site. At the East Range Site, the primary sources of water would come from: i) dewatering nearby lands for purposes of mining them, ii) nearby abandoned mine pits (e.g., the Stephens and Knox Mine Pits), and iii) Colby Lake. Water would be conveyed to the Mesaba Generating Station at the West Range Site via a single pipeline from the Canisteo Mine Pit. Water would be conveyed to the generating station at the East Range Site via a pipeline from an unutilized mine pit that would receive additional water from sources described in Section 4.5.4.1. If needed, water from Colby Lake could be conveyed directly to the generating station. At either site, water conveyed to the Mesaba Generating Station would be filtered prior to use and softened, if necessary. Solids from the raw water treatment process would be taken to a local non-hazardous landfill for disposal.

2.2.2.4 Infrastructure Requirements

The project's generating facilities would connect to the power grid via new and existing HVTL corridors to substations located near the unincorporated communities of Blackberry (West Range Site) or Forbes (East Range Site). The HVTL infrastructure would need to be reconstructed and/or reinforced under the Proposed Action for either the West Range Site or the East Range Site as described in Section 2.3.

Electric power would be produced in two CTGs (about 220 MWe each) and in one STG (up to 300 MWe). The electrical output of the CTG and STG at 16.5-kV and 18-kV, respectively, would be below the level needed for electrical transmission to the grid; hence, transformation to the appropriate voltage would occur prior to the Mesaba Generating Station's switchyard. Excelsior's design and cost for the power plant have been based on such transformation delivering electric power to the switchyard at a voltage of 230-kV.

Based on a nominal net electric output of **600** MWe at a 0.90 power factor, one bundled conductor 230-kV transmission line rated at 1,585 Amperes would be sufficient to carry the peak electrical output of either plant phase. A single 345-kV bundled conductor rated at 2,113 Amperes could carry the full **1,200** $MWe_{(net)}$ output from both phases. However, a single transmission line interconnecting the plant to the point of interconnection (POI) would not meet the single failure (n-1) criterion and would result in a total loss of output from the plant in the event of a forced line outage or when line maintenance is required. Therefore, a minimum of three 230-kV HVTLs, two 345-kV HVTLs, or a combination of two 230-kV HVTLs and one 345-kV HVTL would be required to satisfy the single failure criterion design element.

The choice of transforming voltage level for the Mesaba Energy Project between 230 and 345-kV is not solely dependent on the plant site and length of transmission lines. This choice is also dependent on the voltage levels at which the substation currently operates as well as existing "downstream" power flow constraints. Presently, there is no 345-kV voltage transmission infrastructure at either the Blackberry Substation or the Forbes Substation. Efforts to bolster Minnesota Power's (MP) ability to exchange power between regions with fewer attendant losses would dictate that new transmission developments in the region operate at higher voltages. Excelsior believes that 345-kV would be the future standard on which such transmission developments on the Iron Range will be focused and has based its decision for the interconnection voltage on that premise. The results of the Midwest Independent System Operator's (MISO) Interconnection Studies will confirm whether Excelsior's decision regarding the likelihood of future 345-kV development at the two substations is appropriate.

Because of pending MISO decisions that could affect the interconnection voltage for Phases I and II, Excelsior has requested an HVTL Route Permit that allows flexibility to change its West Range Site interconnection voltage plans. The use of 345 kV at the East Range Site is dictated by the increased power losses that would otherwise occur if the system were operated at 230 kV. Section 2.3 summarizes Excelsior's plans to deal with uncertainties related to MISO's ongoing studies and pending decisions.

Based upon the results of studies completed to date, MISO has determined that the output of Mesaba Phase I would be fully deliverable within the MISO footprint**, and that no network upgrades would be required for either the West or East Range Sites. For the West Range Site, the original June 2006 System Impact Study indicated a need for network upgrades between the Boswell and Riverton substations. More recently, an Optional System Impact Study conducted for Mesaba Phase I on behalf of MISO (Siemens PTI, 2008) confirmed that no network upgrades would be required to interconnect and inject 600 MWe of power from Mesaba Phase I to the regional electric grid at the Blackberry Substation. The Optional System Impact Study was justified (1) by the addition of MISO Transmission Expansion Plan Projects to the regional electric grid after the original June 2006 System Impact Study for Mesaba Phase I had been completed, and (2) by the commencement of construction of energy-intensive projects in the immediate vicinity of the IGCC Power Station.**

Since the completion and final posting of the Optional Study results, a new concern was raised by Minnesota Power, the local transmission owner, about potential adverse impacts that the Mesaba Phase I output would have on one of their existing 115kV lines (the 11 Line). Upon further evaluation and through additional System Impact Studies conducted since then (but not yet posted) to reflect a rating limitation imposed on the existing 11 Line 115-kV HVTL between Minnesota Power's Grand Rapids and Riverton Substations, it appears that there are some adverse network impacts on the 11 Line that will require mitigation. However, it is believed that the adverse impacts can be overcome by relatively simple changes to the existing infrastructure (e.g., raising selected tower heights on the 11 Line) and MISO has proposed a Facility Study to determine the costs to implement such changes.

For the East Range Site, the System Impact Study (Siemens PTI, 2006a) also concluded that no network upgrades are required; however, the study was based on a maximum winter output of 552 MWe. A sensitivity analysis conducted by the same contractor that performed the East Range Site System Impact Study, and using the same base models and methodology as that study, demonstrated that no injection limits requiring network upgrades were identified if the East Range IGCC Power Station would distribute 600 MWe (Siemens PTI, 2006b and Sherner, 2006).

MISO studies are underway to identify network upgrades required to ensure that Mesaba Phase II would be deliverable within the MISO footprint at the West Range Site. **A Feasibility Study Report prepared by MISO's Transmission Asset Management (MISO, 2006) provided the starting point for such efforts by identifying the potential number and location of HVTLs that would exceed their rated capacity if the total electric power output of Mesaba Phase II (i.e., nominally 600 MWe) was injected at the Blackberry Substation. Since completion of the Feasibility Study Report, MISO has completed System Impact Studies for Mesaba Phase II, but each time the results of such studies have been rendered useless due to changes in the status of projects queued ahead of it (Sherner, 2009). Regardless of the uncertainties,** it is likely that additional 230-kV and/or 345-kV network upgrades would be required to resolve local injection issues **at the West Range Site** and to ensure the full power deliverability **of Mesaba Phase II to the regional grid. The same general conclusion can be reached for Phase II at the East Range Site (Siemens PTI, 2007).**

DOE considers the possible network upgrades that may be required for Mesaba Phase II to be unavailable information that is not essential for a reasoned choice among alternatives available to DOE (see 40 CFR 1502.22). Furthermore, if network upgrades or new HVTL's were to be required for Mesaba Phase II, the potential environmental impacts would be evaluated and disclosed to the public through the MDOC environmental review process.

Easements across public and private lands would be required to provide HVTLs, pipelines, rail, and highway access to the Mesaba Generating Station. Two HVTL corridors traverse the West Range Site and one HVTL corridor traverses the East Range Site. Easements would also be required for infrastructure associated with the Phase I and Phase II developments, construction of such infrastructure, and operation of the Mesaba Generating Station. Water pipelines would require access from RGGS Land & Minerals, LTD., L.P. (RGGS) for the West Range Site, and from Cliffs-Erie, LLC (CE) and the USDA Forest Service for the East Range Site.

Potable water demand would be generated by construction and operational personnel. Approximately 30 gallons per day per person would be required. During construction, peak water demand would be 45,000 gallons per day based on 1,500 construction workers. Once operational, water demand would decrease to 7,500 gallons per day based on 250 workers on site. Use of city water would be anticipated, although on-site treatment of water from abandoned mine pits through filtration and clarification could also be performed to meet potable water standards.

2.2.2.5 Transportation Requirements

Coal and other materials would be delivered to the Mesaba Generating Station primarily by rail, with some materials delivered by truck. The BNSF Railway (BNSF) and the Canadian National Railroad (CN) are the two principal rail providers in the region. Rail loop access to either site would be required, and potential rail alignments are described in Section 2.3. The plans for connecting the BNSF and/or CN with the Mesaba Generating Station on the West or East Range Sites would require plan approvals from the respective companies. **No other public approvals would be required for the interconnection itself;**

however, the construction of the rail line would require permits, such as a Section 404 permit from the USACE for dredging or filling *waters of the U.S*.

Rail cars arriving via unit trains would be unloaded using a state-of-the-art rapid discharge rotary dumper with an automatic railcar positioning system. The rail loop and system would allow a full-length 8,000-foot long coal train (i.e., 135-car unit train) to be pulled through the site without uncoupling any of the cars. Each rail car would be rotated upside down inside the rotary dumper building to unload the coal contained therein. The dumper building would be enclosed and maintained under negative pressure during the unloading process to minimize fugitive emissions. Each unit train would take approximately 3 to 4 hours to unload.

Other incoming materials delivered via rail could include petroleum coke, flux, and construction materials and equipment. Construction deliveries would require two trains per week. Depending upon the fuel being used, Phase I would produce between 500 and 800 tons per day of slag, which is a black, non-hazardous, glass-like material that has broad industrial uses. Also, depending upon the fuel being used, approximately 30 to **165** tons per day of elemental sulfur would be produced that would be sold and transported off site. Sulfur would be transported off site by rail. Excelsior expects that slag would be sold to local markets and transported off site by truck; however, the project would provide the capability to load slag onto rail cars for transport to more distant markets depending upon economics.

An access road would also be required at either site for the plant. Roadway access would be required for personnel and for deliveries by truck during construction and operation of the plant. Potential access road alignments for the West Range and East Range Sites are described in Section 2.3.

2.2.2.6 Land Area Requirements

The Phase I site layout would encompass approximately 100 acres. An additional 80 acres of land would be required for a temporary construction staging and lay-down area for the Phase I equipment and 5 acres for a concrete batch plant. Since Phase II would be similar to Phase I with respect to its balance of plant equipment, a total of approximately 200 acres would be required for Phases I and II, excluding construction staging and lay-down areas. Phase I would use the footprint reserved for Phase II as the construction staging and lay-down area**. For Phase II construction, a total of 85 acres of land would be acquired temporarily at off-site locations (see further discussion in Section 2.2.4.1).** On-site rail alignments, access roads, and utility corridors would also affect the amount of acreage required for project components. The balance of land area on the West or East Range Site would remain wooded to the extent practicable to maintain a buffer area (for visual screening and noise reduction) between the power plant footprint and surrounding land uses. The site layout plans would be developed to reduce the extent of impact on environmental resources as practicable within design constraints for the generating station components.

Construction of the proposed rail line to accommodate Phase I and Phase II would require additional off-site ROWs to be obtained. The proposed ROW would be 100 feet wide with additional width needed in some of the cuts or fill sections. The track work would begin immediately after construction approval was received to allow for delivery of construction materials. Rail line construction would require approximately 15 months.

The rail line would be constructed on a 32-foot wide prepared roadbed within the 100-foot wide right-of-way. Permanent or temporary easements may be required in some areas. The side slopes would be 1:3 with a 5-foot wide flat bottom ditch for drainage. **During detailed design, 1:2 side slopes** would **be studied and specified in areas where steeper slopes would reduce wetland impacts, provided the detailed geotechnical and soil survey data indicate that construction of those slopes c**ould **be**

supported. The prepared roadbed would have the track offset to one side of centerline to allow for a 12-foot railroad inspection road alongside. The coal unloading process would require the final track elevation to be level; therefore, the approach grades would be limited to 0.3 percent. The grading and track work would conform to the American Railway Engineering and Maintenance of Way Association standards.

Storage requirements for the major process feedstocks and byproducts are shown in Table 2.2-4. The volumes of material storage requirements are for each phase; total storage for both phases would be double the amounts shown.

Table 2.2-4. Feedstock and Byproduct Storage Requirements for Each Phase

Material	Storage Requirements
Coal Pile	385,000 tons (20/25 days active/inactive storage based on maximum PRB1 coal usage); Dust control; Water runoff control
Pet Coke Pile (Storage would be subset of total coal storage)	105,000 tons (20/25 days active/inactive storage); Dust control; Water runoff control
Flux Silo	4,660 tons (20 days active storage)
Sulfur Tanks	Max 162 tons/day generated, based on Illinois No.6 coal (7 days on-site storage; 30 rail cars parked on site)
Slag Pile	34,800 tons (45 day storage, wet basis, using PRB2:PRB3 coal blend)

2.2.3 Discharges, Wastes, and Products (Outputs)

2.2.3.1 Air Emissions

Air emissions by the Mesaba Generating Station would be largely independent of the project site. The block flow diagram in Figure 2.2-1 shows air emission sources and their associated control equipment for the Mesaba Energy Project (Phase I); the Phase II plant would be identical. Refer to Table 2.1-1 for estimated air emissions. Excelsior's design team estimated the maximum and average emission quantities from each emission point using:

- Equipment supplier data;
- Best available control technology (BACT) as proposed for the Mesaba Generating Station in the **company's application for a** New Source Review Construction Authorization Permit (Air Permit application);
- Test results for similar equipment at other IGCC facilities, especially the existing Wabash River Plant (which also uses E-Gas™ gasification technology);
- Engineering calculations, experience, and professional judgment; and
- Published and accepted average emission factors, such as the EPA Compilation of Air Pollutant Emission Factors (AP-42).

<u>Criteria Pollutants</u>

Emissions of criteria pollutants would occur from the operation of the combustion turbines; TVBs; flares; auxiliary boilers; cooling towers; fugitive emissions from handling, preparation, and storage of coal/coke and slag during the operational phase; and emergency generators and emergency fire and water pump engines. **Additionally, emissions from trains and trucks would occur as a result of feedstock delivery and sulfur and slag transport to and from the power plant. The six criteria air pollutants**

are SO_2, CO, ozone, NO_x, lead (Pb), and inhalable particles, which are also known as respirable particulate matter (PM). The PM_{10} standard covers particles with an aerodynamic diameter of 10 micrometers or less and the $PM_{2.5}$ standard covers particles with an aerodynamic diameter of 2.5 micrometers or less. Ozone is not emitted directly from a combustion source. It is formed from photochemical reactions involving emitted VOCs and NO_X.

IGCC power plants that are currently in operation have achieved the lowest levels of criteria air pollutants, mercury and other HAPs emissions of any coal-fueled power plant technologies (DOE, 2002). Similarly, the Mesaba Energy Project's goal is to improve power plant technology and reduce emission levels. Table 2.2-5 (new in Final EIS) provides baseline emissions to show the differences in air emissions between the Mesaba Energy Project performance targets for air emissions and existing IGCC power plants and non-IGCC state-of-the-art conventional pulverized coal-fueled power plants.

Table 2.2-5. Comparison of Mesaba Energy Project Performance Target to Other IGCC and state-of-the-art Power Plant Technologies

Air Emissions (tons per year/MWe)	2016 Mesaba Energy Project-Phase 1 (600 MWe)[1]	1996 Polk IGCC (275 MWe)[1,2]	2000 SOTA (275 MWe)[1,3,4]	1990 SOTA (275 MWe)[1,3,5]
SO_2	**1.158**	**2.985**	**10.513**	**65.502**
NO_x	**2.393**	**2.255**	**23.771**	**28.171**
PM_{10} (WR/ER)	**0.443/0.592**	**0.273**	**2.375**	**2.756**
Hg	**0.00002**	**0.00006**	**0.00041**	**0.00037**

[1] Dates represent the construction date for the respective power plant.
[2] Polk is the Tampa Electric Company Polk Power Station, which is an operating IGCC power plant. SO_2 emissions for this power plant are actual rates reported for Acid Rain Program (EPA, 2007a). Hg emissions are from limiting conditions in Title V permit (FLDEP, 2007c). NO_2 and PM_{10} emissions from limiting conditions in Title V permit modification (FLDEP, 2007d). **PM_{10} emissions do not include sulfuric acid mist.**
[3] The SOTA facilities are conventional coal-fueled power plants.
[4] SO_2 emissions are actual rates reported for Acid Rain Program from Hayden, Routt, CO facility. NO_X are actual rates reported for Acid Rain Program from E.D. Edwards, Peoria, IL facility. PM_{10} emissions calculated from rates obtained from DOE database for Hayden, Routt, CO facility. Hg emission factors and heat value as reported in EPA's Locating and Estimating Air Emissions from Sources of Mercury and Mercury Compounds (EPA, 1997).
[5] SO_2 and NO_2 emissions are actual rates reported for Acid Rain Program from Meramac, St. Louis, MO facility. Hg emissions for 2005 as reported in EPA Envirofacts website from Cholla, Navajo, AZ facility. PM_{10} emissions calculated from rates obtained from DOE database for C G Allen, Gaston, NC facility (275 MWe) that made modification in 1996.
MWe = megawatt electricity; SOTA=State-of-the-art; SO_2 = sulfur dioxide; NO_x = nitrogen oxides; PM_{10} = particulate matter $\leq$ 10 microns; Hg = mercury.

Emissions of Greenhouse Gases

The Mesaba Generating Station would emit significant quantities of CO_2; it would emit other greenhouse gases as well. The amount of CO_2 emitted by the power plant would vary depending on the feedstock, as indicated in Table 2.1-1, and the net heat rate. When both phases of the Mesaba Generating Station are operating at a 100 percent capacity factor (i.e., at full capacity), the station would emit approximately 10.6 million tons of CO_2 per year burning sub-bituminous coal. Based on a study of life cycle greenhouse gas emissions from IGCC power systems (Ruether et al., 2004), DOE estimates that plant operations support, maintenance, coal mining, and coal transportation could increase annual CO_2 emissions attributable to the operation of the generating

> ***CO_2- equivalent*** is a measure used to compare greenhouse gases based on their global warming potential, using the functionally equivalent amount or concentration of CO_2 as the reference. The CO_2-equivalent for a gas is derived by multiplying the amount of the gas by its global warming potential; this potential is a function of the gas's ability to absorb infrared radiation and its persistence in the atmosphere after it is released.

station by about 300,000 tons (for a total of 10.9 million tons annually). DOE estimates that annual emissions of other greenhouse gases (methane and nitrous oxide) from the station and its associated activities would total about 272,000 tons of CO_2-equivalents per year.[1] Total emissions of greenhouse gases caused by construction activities would be about 900,000 tons of CO_2-equivalents (less than 10 percent of one year's operating emissions).

Operating at full capacity and without CCS, Phases I and II of the station would constitute the second largest point source of CO_2 emissions in Minnesota (Excelsior, 2006e and 2006g). Neither Federal law nor state law in Minnesota place limits on CO_2 emissions from the Mesaba Generating Station, and generally there are few economic incentives or regulatory requirements for utilities to reduce emissions of greenhouse gases from their power plants at this time. However, as discussed in Section 3.3.4, the Federal government is considering several approaches to addressing global warming by limiting emissions of greenhouse gases, including regulating them under the CAA. As described in the *Potential Carbon Capture Retrofit* subsection of Section 2.2.1.3, the plant would be designed to allow for the future addition of CO_2 capture technology, and the project proponent has performed a preliminary study of the potential for geologic sequestration of CO_2 emissions from the plant.

The greenhouse gases emitted by the Mesaba Generating Station would add a relatively small increment to emissions of these gases in the United States and the world. Overall greenhouse gas emissions in the United States during 2007 totaled about 8,026 million tons (7,282 million metric tonnes) of CO_2-equivalents, including about 6,638 million tons (6,022 million metric tonnes) of CO_2. These emissions resulted primarily from fossil fuel combustion and industrial processes. About 40 percent of CO_2emissions came from the generation of electrical power (EIA, 2007b). By way of comparison, annual operational emissions of greenhouse gases from the proposed generating station would equal about 0.14 percent of the United States' total emissions in 2007.

The release of anthropogenic greenhouse gases and their potential contribution to global warming are inherently cumulative phenomena. That is, emissions of greenhouse gases from the proposed power plant by themselves would not have a direct impact on the global, regional, or local environment. Similarly, current scientific methods do not allow one to correlate emissions from a specific source with a particular change in either local or global climates. Accordingly, the potential impacts of the Mesaba Energy Project are analyzed as cumulative impacts in Section 5.2.8.

Combustion Turbine Generators

The production of syngas at relatively high pressure allows efficient and cost-effective syngas cleanup prior to combustion in the CTGs to produce electricity. Air emissions would be controlled using the following treatment steps applied to the syngas:

- Hot gas particulate matter filtration via cyclone and ceramic filter to achieve more than 99.9 percent removal of particulate matter;
- Water scrubbing to remove soluble contaminants, condensable materials, and suspended particulate matter;
- Amine treatment combined with COS hydrolysis;
- Carbon adsorption for removal of mercury and other trace contaminants; and
- Moisturization (water saturation) for NO_x control and improved power production.

[1] These other greenhouse gases would be released by combustion of syngas to generate electricity; combustion of fuels (diesel and gasoline) for transportation and coal mining activities; and combustion of fuels to produce energy needed for operations and maintenance.

In addition to the syngas treatment, the moisturized product syngas fuel would be diluted approximately 100 percent (1:1) with ASU nitrogen for additional NO_x reduction. Steam injection, in lieu of nitrogen dilution and moisturization, would be used for NO_x control when operating on natural gas. Finally, each CTG would be equipped with inlet air filters to minimize particulate matter emissions potentially caused by advection of suspended atmospheric materials contained in the combustion air.

Emissions from the CTGs are based on the following gas concentrations as emitted at the HRSG stack (or, in the case of particulate matter, the stack emission rate):

Syngas

- SO_2, based on 50 parts per million, volumetric dry (ppmvd) as H_2S in the undiluted syngas, rolling 30-day average and assuming 100 percent conversion of H_2S to SO_2
- NO_x, 15 ppmvd (at 15 percent O_2)
- CO, 15 ppmvd (at 15 percent O_2)
- PM_{10}, 25 lb/hr/CTG
- Volatile Organic Compounds (VOC), 2.4 ppmvd (at 15 percent O_2)

Natural Gas

- SO_2, pipeline-quality natural gas (assumed 1.0 grain/100 standard cubic feet (scf) total sulfur) and assuming 100 percent conversion of sulfur to SO_2
- NO_x, 25 ppmvd (at 15 percent O_2)
- Other criteria pollutants, equal to or less than syngas emission rates

Tank Vent Boilers

Two TVBs, one for each phase, would be designed to safely and efficiently dispose of recovered process vapors from various process tanks and vessels associated with the gasification process. The TVBs would prevent the atmospheric emission of reduced sulfur compounds and other gaseous constituents to the atmosphere that could cause nuisance odors and other undesirable environmental consequences. The TVBs may also be operated on natural gas to produce steam for the Mesaba Generating Station during gasifier shutdowns.

Flares

The elevated flares for each phase would be designed for a minimum 99 percent destruction efficiency for CO and H_2S. The flares would normally be used only to oxidize treated syngas and natural gas combustion products during gasifier startup operations. The flares would also be available to safely dispose of emergency releases from the Mesaba Generating Station during unplanned upset events.

Fugitive Emissions

Fugitive emissions are those emissions not caught by a capture system, and that are often due to equipment leaks, evaporative processes, or wind. Such fugitive emissions for the proposed IGCC facility would likely occur based on normal equipment leakage, and were estimated using standard U.S. EPA fugitive emissions factors for valve seals, pump and compressor seals, pressure relief valves, flanges, and similar equipment. **These emissions are likely to occur from gasification, syngas treatment, and mercury removal. A Leak Detection and Repair Plan has been developed for the Mesaba Energy Project to monitor leaks from valves and components in the equipment train with modification for coal and/or petroleum-coke derived syngas. Because syngas does not have a significant level of**

VOC, the traditional Leak Detection and Repair Plan, which focuses on the detection and measurements of VOC leaks, will be modified. The plan will utilize the measurement of CO to estimate the leak rate from valves and components, which is consistent with the EPA 1995 Protocol for Equipment Leak Emission Estimates (EPA Protocol), Section 2.4.7. CO is the highest expected gas constituent and is most readily analyzed with current portable analyzers.

The sampling and analysis method for CO will follow the general requirements of EPA Method 21. The leak rate of hazardous air pollutant (HAP) emissions will be calculated assuming the leak composition is identical to the expected composition of the syngas at the specific stage of clean up. This is consistent with the EPA Protocol, Section 2.4.1, which states that this assumption is accurate for single phase streams containing any gas/vapor material. A sample from each of the syngas process areas will be taken one time for each general feedstock to establish the composition of the syngas, including hydrogen, carbon monoxide, carbon dioxide, methane, nitrogen plus argon; and the HAP emissions of primary interest, including carbon disulfide (CS_2), carbonyl sulfide (COS), hydrochloric acid (HCl), and hydrogen cyanide; as well as hydrogen sulfide (H_2S), which is not a HAP but a compound of interest. The appropriate EPA Reference Test Methods would be used for measuring the gas composition characteristic at each stage for each general feedstock. Each valve and component in syngas service would be tested. The default frequency of component testing would be once per permit cycle, with an additional test within the first twelve months of operation. If the results indicate a level of fugitive emissions that would alter the Mesaba Energy Project's classification as a non-major source of HAP emissions (i.e., annual emissions of less than 25 tons of total HAPs or less than 10 tons of any individual HAP), the results would be verified through a repetition of the testing program, followed by repair of the leaking component(s) or taking the necessary compliance steps required for a major source classification. Because the organic HAPs concentration in the syngas would be less than 5 percent by weight, the Mesaba Energy Project is not subject to leak detection and repair regulations (see 40 CFR 180 (d)(1)).

Material Handling Systems

Fugitive particulate matter emissions (fugitive dust) would be generated by coal/coke and slag handling, preparation, and storage during the operation of the Mesaba Generating Station. Sources of these emissions would include the active and inactive coal/coke storage piles, conveyors/transfer points, slurry preparation area, and the slag storage area. Estimated fugitive emissions are provided in Section 4.3, Air Quality and Climate.

Wet spray dust-suppression systems would be employed at various points in the coal handling and storage and coal slurry processes, which would require that water be supplied to the various injection points. This water could be blended with glycol for freeze point suppression, and/or surfactants (wetting agents) or chemical binding or encrusting agents. Because of the glycol addition, any free water draining from the solids would be captured and treated as required before re-use on site or disposal off site.

Fugitive dust would be generated from in-plant trucks hauling slag from the gasifier slag handling area to the slag storage pile or bins to await shipment by rail or truck to off-site users. Watering of the roadway near the pile to suppress dust and periodic removal/cleanup of dust-producing material would minimize potential emissions from this source. **Additionally, for the rail unloading building a bag filter dust collection system would be used to control fugitive dust.**

Train and Truck Emissions

Train emissions (new Table 2.2-6) would predominantly result from delivery of feedstock to operate the power station.

Table 2.2-6. Emissions (tons per year) from Trains Delivering Feedstock for Phases I and II of the Mesaba Energy Project

Site	CO_2	SO_2	NO_X	PM	CO
West Range	150,000	1.5	2,300	80	410
East Range	170,000	1.7	2,600	90	460

These emissions are calculated based on the worst-case scenarios of the maximum annual tonnage of feedstock delivery (i.e., partial slurry quench on 100 **percent subbitumimous coal) from the farthest distance source (i.e., Powder River Basin).**

Truck emissions (new Table 2.2-7) would predominantly result from transporting slag and ZLD salt from the power station assuming the greatest distance of truck transportation. Slag production at the power station would depend on the amount of feedstock used. Total ZLD salt production would depend on the water quality of the water source, which is lower at the East Range Site.

Table 2.2-7. Emissions (tons per year) from Trucks Transporting Solid Byproducts and Waste from Phases I and II of the Mesaba Energy Project

Site	CO_2	SO_2	NO_X	PM	CO
West Range	7,700	0.1	60	0.8	7
East Range	8,100	0.1	61	0.8	7

The worst-case scenario of feedstock use and ZLD salt production were used to calculate truck emissions. Detailed discussion of the worst-case situation used in the Mesaba Energy Project's NEPA analysis is provided in Table 2.1-1 of this **EIS.**

Except for NO_X, emissions from the trains and trucks would be much smaller than those from operation of the power plant; therefore, impacts would be considered negligible. Though **NO_X emission rates would be comparable to those from power plant operations, the impacts from the train and truck emissions would be far less than those of the power plant, because the trains and trucks are mobile. Unlike a stationary source** with localized **emissions, emissions from trains and trucks would be dispersed over a large area and distance**. Therefore**, depending on the train or truck** speed and **wind and other meteorological factors, localized impacts would be negligible.**

Cooling Tower Drift

Particulate emissions would also occur from the cooling towers as a result of drift. The total dissolved solids (TDS) content of the drift is the maximum value estimated from water quality measurement data for the makeup water.

The high concentration of TDS found in process water from mine pits at the East Range Site would be the source of increased PM_{10} emissions from the East Range Site cooling towers relative to such emissions from the West Range Site. TDS in process waters for the East Range Site have been shown to be present at concentrations up to 1,800 milligrams per liter, whereas peak concentrations of TDS in mine pits associated with the West Range Site are about 340 milligrams per liter.

Auxiliary Boilers

The auxiliary boilers would normally operate only when no steam would be available from the gasifiers or HRSGs. The annual capacity factor for these boilers would be 25 percent or less. The auxiliary boilers would include low-NO_x burners for emission control.

Emergency Diesel Engines

Diesel engines driving the emergency generators and fire protection pumps would be operated for emergency purposes only and would not operate otherwise for more than 100 hours per year each. The operation of these engines would be an additional although minor source of overall operational air emissions.

2.2.3.2 Wastewater Effluents

Process Water Effluents

[Text relating to process water discharges in this section of the Draft EIS has been deleted]

A generalized water balance diagram that applies to both potential sites is shown in Figure 2.2-10. Wastewater generated from gasification and slag processing operations containing levels of heavy metals and other contaminants from the feedstocks would be treated in a ZLD system. This system would recover distilled water for reuse in the power plant, thereby reducing fresh water consumption, and it would concentrate heavy metals **(e.g., arsenic and selenium based on results from the Wabash River plant)** and other contaminants of concern into a solid waste stream. The solid waste, which is likely to be classified as a hazardous waste **based on the results of toxicity testing conducted in accordance with Method 1311 in "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," EPA Publication SW–846, as incorporated by reference in 40 CFR §260.11 (the Toxicity Characteristic Leaching Procedure)**, would be disposed of at off-site waste management facilities. Therefore, no wastewater streams from the ZLD system serving the gasification island would require disposal at either site. **Also, as described in Section 2.2.1.4, an enhanced ZLD system would treat cooling tower blowdown at either site to eliminate all direct wastewater discharges to receiving waters. Hence, all process wastewater and cooling tower blowdown would be reused in the plant.**

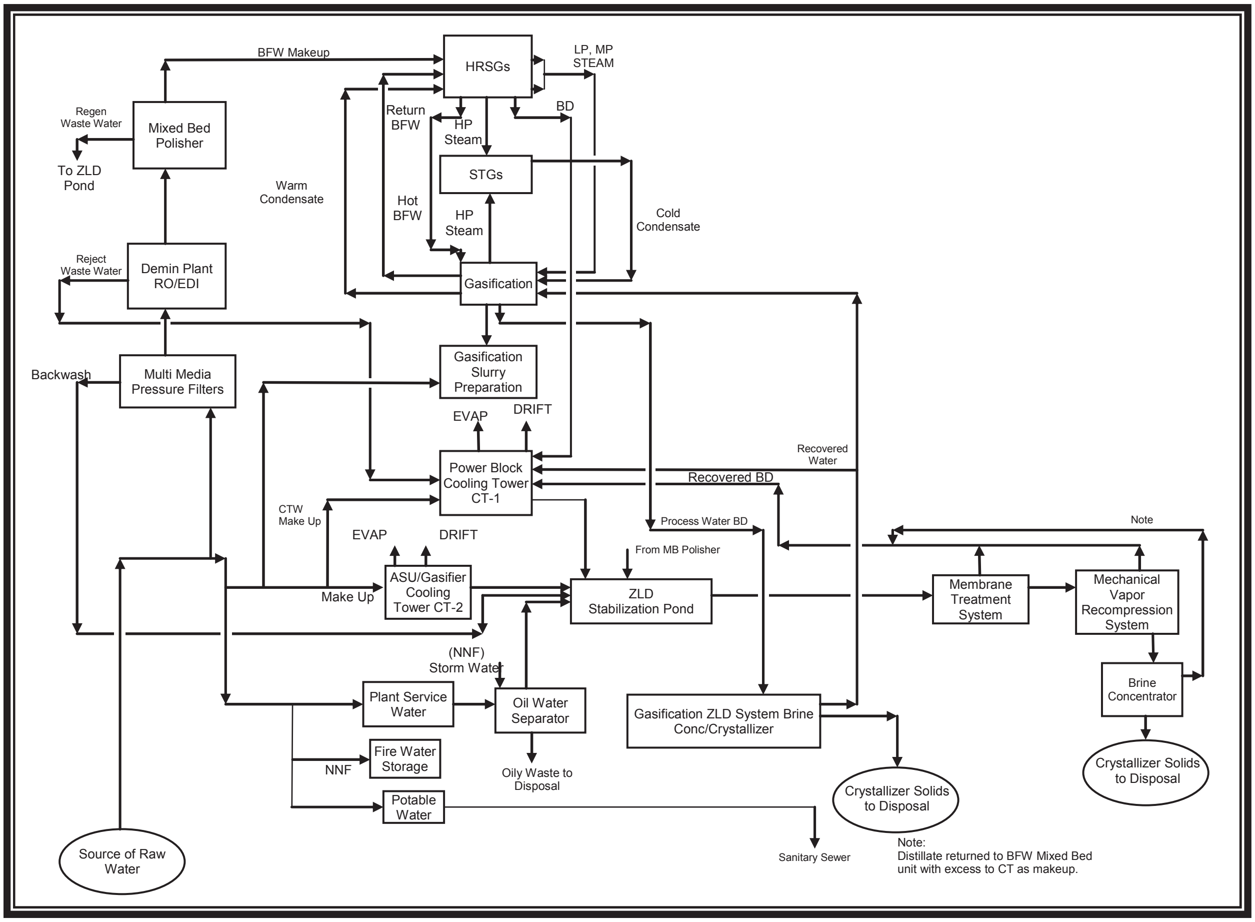

Figure 2.2-10. Water Balance Diagram Applicable to Phases I & II

Stormwater Management

Stormwater runoff from the plant site during operation of the Mesaba Generating Station would be **collected in the stabilization pond for the ZLD system. Stormwater that could become contaminated with oil (such as water runoff from parking lots) would be routed through an oil/water separator before entering the ZLD pond.** The ZLD system would treat t**he stormwater (along with blowdown from cooling towers)**, **allowing it to be reclaimed and reused within the plant. The ZLD stabilization pond and on-site storage areas would be designed with adequate capacity to accommodate the 24-hour, 100-year storm event, even if that event were to occur during a plant outage. Therefore, the plant would be designed such that all stormwater from the plant footprint would be captured and reused, excluding scenarios exceeding a 100-year storm. [Text relating to stormwater discharges in this section of the Draft EIS has been deleted]**

Sanitary Wastewater

Alternatives for treating sanitary (domestic) wastewater produced by plant employees include connecting to the local/regional publicly owned treatment works (POTW) or providing an on-site septic system with leach field. Excelsior’s preferred alternative would be to discharge sanitary wastewater to a local POTW.

Based on the number of personnel required for the operation of Phase I and Phase II (see Section 2.2.5), and using an estimate of 30 gallons per day generated per person, the expected sanitary wastewater discharge would total approximately 3,300 gallons per day for Phase I and 5,500 gallons per day for both phases combined. These flows are based on the generating station having restrooms, locker rooms, showers, and break room facilities. To accommodate flows when additional people would be on site during tours, special maintenance activities, and outages, the capacity of the system would be based on 7,500 gallons per day of sanitary wastewater.

2.2.3.3 Solid Wastes

Solid wastes produced during plant operations would include spent catalyst materials (associated with the COS hydrolysis and SRU systems), spent activated carbon beds associated with mercury removal processes, spent activated carbon beds and char sludge associated with the sour water treatment system, the solid waste stream produced by the ZLD system, commercial waste paper, and miscellaneous janitorial streams.

The use of a ZLD process would prevent the discharge of heavy metals and other gasification wastes with the plant wastewater effluent. The solid waste stream from this process, consisting mainly of crystallized solids in a "filter cake," would likely be classified as a hazardous waste **based on the results of toxicity testing conducted in accordance with Method 1311 in EPA's "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods." For example, the ZLD waste from the Wabash River plant contact process water has exceeded limitations for arsenic and selenium in past testing. Solid waste from the Mesaba Energy Project classified as hazardous waste** would be disposed in an approved hazardous waste landfill or other licensed facility **designed to contain the wastes and prevent their release to the environment**.

Excelsior would manage operational wastes in accordance with applicable regulations, good industry practices and established internal company procedures. Hazardous and non-hazardous wastes would be properly collected, segregated, and recycled or disposed at approved waste management facilities within regulatory time limits and in accordance with requirements. Plant staff would be adequately trained in proper waste handling procedures. Waste manifests and other records and reporting would be maintained as required by regulations and company procedures.

Typically, the ash content of coal would be in the range of 5 to 11 percent as received, and ash in petroleum coke would average about 0.6 percent as received. However, the advanced features of E-Gas™ technology avoid two significant solid waste streams associated with some other types of coal-based power generation: flue gas desulfurization solids and ash. Removal of sulfur from IGCC syngas in a relatively concentrated form and the subsequent production of elemental sulfur eliminate these significant solid wastes. Slag production at full load would vary from about 500 tons per day up to a maximum of about 800 tons per day per phase. Slag and elemental sulfur are considered potential revenue-producing streams that would be actively marketed by Excelsior. **Minnesota Rules 7035.2860 (Beneficial Use of Solid Waste) addresses standing beneficial use determinations in Subparagraph 4. Item K applies to the use of coal combustion slag as a component in manufactured products such as roofing shingles, ceiling tiles, or asphalt products. Item L applies to the use of coal combustion slag as a sand blast abrasive. The rules permit these uses as specified without contacting the Minnesota Pollution Control Agency (MPCA).**

2.2.3.4 Marketable Products

Although the primary product of the Mesaba Generating Station would be electric power, the plant would also produce elemental sulfur and a glass-like, inert slag. A worldwide market exists for elemental sulfur, although its value varies considerably with location, purity, and end use. The sulfur recovered from the SRU would be stored in molten form and could be sold as a raw material for fertilizer and other beneficial uses. No large-scale market exists for slag at this time; however, it is expected that slag can be marketed for asphalt aggregate, construction backfill or landfill cover applications. Slag with a carbon content of less than 5 percent by weight should be marketable as a higher value product such as roofing shingle applications. There is also a potential to market the slag produced from petroleum coke gasification for metals recovery. **Refer to Section 2.2.3.3 regarding the beneficial use of solid waste rule.**

The plant also would be designed to be retrofit for carbon-capture technology. Studies for Excelsior to be undertaken as part of the Phase II Plains CO_2 Partnership (one of seven regional partnerships funded by the DOE Regional Carbon Sequestration Partnership Program) would produce a CO_2 management plan that would specify conditions required by potential purchasers of CO_2. The carbon capture system may be added after the generating station is in operation. For PRB coal, Excelsior would expect to capture approximately one third of the carbon (as CO_2) in the solid IGCC feedstock. This capture would come at a reduction in capacity and an increase in heat rate.

2.2.3.5 Toxic and Hazardous Materials

Hazardous materials that would be used or stored for project operations include relatively small quantities of petroleum products, liquid oxygen and nitrogen, molten sulfur, catalysts, flammable and compressed gases, amine replacement and reclamation chemicals, water treatment chemicals, and minor amounts of solvents and paints (Table 2.2-8). Materials and estimated quantities for the gasification/ASU blocks were based on experience at the Wabash River Plant.

Natural gas and syngas, which are flammable fuels, would be used in the Mesaba Generating Station, specifically for the power block. Natural gas would be used as a startup or auxiliary fuel; it would be utilized directly from the on-site pipeline (connecting to the off-site main pipeline) and would not be stored on site. Syngas, which is a mixture of CO, H_2, CO_2, and water vapor, would be the primary fuel for the combustion turbines generated on site and not stored. H_2 would be used as a generator coolant. The H_2 would be stored in pressurized gas tubes on a multi-tube trailer. The tube trailer would be stored outside near the turbine-generators and would meet required building and fire codes. CO_2 would be stored and utilized for purging the generators after normal and emergency shutdowns.

Bulk quantities of liquid oxygen and nitrogen would be stored in tanks in the ASU to provide capacity for startups and continued plant operation during short-duration ASU system outages. Other gases stored and used at the facility would include those typically used for maintenance activities, such as shop welding, and emission monitoring and laboratory instrument calibration. These gases would be stored in approved standard-sized portable cylinders, and in appropriate locations.

Water treatment chemicals would be required and stored on site. Bulk chemicals, such as acids and bases for pH control would require storage in appropriately designed tanks, with secondary containment and monitoring. Gaseous chlorine (used/stored in compliance with all applicable regulatory requirements) or hypochlorite bleach may be used for biological control of the various circulating and cooling tower streams. Other water treatment chemicals would be required and used as biocides, pH control, dissolved oxygen removal, and corrosion control for boiler feed water, cooling tower and cooling water treatment. For raw water treatment, coagulants and polymers may also be used. Chemicals used for these purposes are generally specified by the water treatment provider, and are available under a number of trade names. Stored quantities of these materials would be small, ranging from 55-gallon drums to 500-gallon tanks.

Table 2.2-8. On site Toxic and Hazardous Materials (Totals for Phase I and II)

Material	Form	Quantity (Phases I and II)	General Location On Site	Use
GASIFICATION/AIR SEPARATION UNIT AREAS				
BULK CHEMICALS				
Chlorine or Sodium Hypochlorite	Gas or Liquid	TBD*		Cooling Towers
Sodium Hydroxide	Liquid	60,000 gallons	Outdoors	Amine Reclamation and Sour Water Treatment
Potassium Hydroxide	Liquid	2,000 gallons	Indoors	Dry Char Filter Cleaning
Water Treatment Chemicals	Liquid	Typically 55-gallon drums to less than 500-gallon tank	Indoors	Pump Bldg, Slurry Prep Bldg, Cooling Towers
Oxygen (95%)	Liquid	1,800 tons	Outdoors (Tanks)	ASU* Backup Supply
Nitrogen	Liquid	5,000 tons	Outdoors (Tanks)	ASU Backup Supply
Molten sulfur	Liquid	200,000 gallons	Outdoors	By-product for Sale
Ammonium lignosulfonate	Liquid	TBD	Indoors	Slurry Prep Bldg for maintaining % solids in slurry
MISCELLANEOUS/DISTRIBUTED MATERIALS				
Paint/Thinners/etc.	Liquid	Minimal	Indoors	Shop/Warehouse
Lubrication Grease/Oils	Solid/Liquid	Minimal	Indoors	Pump Bldg, Slurry Prep Bldg., Shop/Warehouse
Compressed Gases (Ar, He, H_2)*	Pressurized Gas	Minimal	Indoors	Lab
Chemical Reagents (acids/bases/standards)	Liquid	Minimal	Indoors	Lab
OTHER HAZARDOUS MATERIALS				
Flammable/Toxic Gases (H_2, CO, H_2S, SO_2)*	Pressurized Syngas Mixture	TBD	Outdoors	Process Piping/Vessels
Acetylene, Oxygen, other welding gases	Gas	Minimal (approved cylinders)	Indoors	Welding
Natural Gas	Gas (high pressure)	Gas Pipeline	Supply piping only	Startup/Backup Fuel
Diesel Fuel	Liquid	2,000 gallons	Outdoors	Emergency generator/fire water pump fuel

Table 2.2-8. On site Toxic and Hazardous Materials (Totals for Phase I and II)

Material	Form	Quantity (Phases I and II)	General Location On Site	Use
POWER BLOCK AREA				
Sulfuric Acid	Liquid	12,000 gallon aboveground storage tank	Outdoors	Cooling water and boiler feedwater pH control; battery acid
Sodium Hypochlorite	Liquid	20,000 gallon aboveground storage tank	Outdoors	Cooling Tower biological control
Circulating Water Chemical Additives (e.g., Magnesium nitrate, magnesium chloride, 2-bromo-2-nitropropane-1,3-Diol, 5-chloro-2-Methyl-4-Isothizaoline-3-one)	Liquids	Typically 55-gallon drums to less than 500-gallon tank	Indoors	Corrosion Inhibitor/Biocides
Boiler Feedwater Chemicals (e.g., Carbonic Dihydrazide, Morpholine, Cyclohexamine, sodium sulfite)	Liquids	Typically 55-gallon drums to less than 500-gallon tank	Indoors	Boiler feedwater pH/Corrosion/ Dissolved Oxygen/Biocide control
Mineral Insulating Oil	Liquid	30,000 gallons (estimated, to be confirmed)	Indoors	Electrical Transformers
Lubricating Oil	Liquid	21,000 gallons (estimated, to be confirmed)	Indoors	Combustion Turbine/Steam Turbine/Misc. Equipment Lube Oils
Combustion turbine wash chemicals	Liquids	Intermittent use/Chemicals not stored on site/cleaning by contractor	NA*	Combustion Turbine Generator cleaning
HRSG* Cleaning Chemicals (e.g., HCl, Citric acid, EDTA Chelant, Sodium Nitrite)	Liquids	Multiyear cleaning requirement/ Temporary storage only	Indoors	HRSG Chemical Cleaning
Carbon Dioxide	Pressurized Gas	50,000 standard cubic feet	Outdoors	Generator purging after normal and emergency shut down
Hydrogen	Pressurized Gas	29,000 standard cubic feet	Outdoors (Assumes use of multi-tube trailer. Active volume based on 1 of 10 tubes per trailer)	Generator cooling (To be verified - Assumes use of H_2-cooled generators – dependent on selected manufacturer)

*Ar- argon; ASU – air separation unit; CO – carbon monoxide, HCl – hydrochloric acid; He – helium; HRSG – heat recovery steam generator H_2 – hydrogen gas, H_2S – hydrogen sulfide; NA – not applicable; SO_2 – sulfur dioxide; TBD – to be determined

Diesel fuel would be used for the emergency generator and for the fire water pump. The expected stored quantity (2000 gallons) was based on approximately 8 hours of operation of the diesel generator at full output (about 3 MWe). This limited storage would require the plant to have contracts with fuel providers specifying that deliveries of diesel fuel could be provided in less than 8 hours in the case of an emergency. Appropriate containment and monitoring for spillage control would be provided.

Other petroleum-containing hazardous materials include the combustion and steam turbine lube oils, steam turbine hydraulic fluid, transformer oils and miscellaneous plant equipment lube oils. These materials would be delivered and stored in approved containers, stored in areas with appropriate secondary containment, and would be used within curbed areas that only drain to internal drains connected to an oil-water separator system. Oil reservoirs, containment areas, and the separators would be checked regularly to identify potential leaks and to initiate appropriate actions.

2.2.3.6 Pollution Prevention, Recycling, and Reuse

The Mesaba Generating Station would be designed to minimize process-related discharges to the environment while demonstrating industrial technology in the use of coal for power generation. Table 2.2-9 lists the key pollution prevention, recycling, and reuse features that would be employed as part of that plan.

Table 2.2-9. Key Pollution Prevention, Recycling and Reuse Features

Spill Prevention Control and Countermeasure (SPCC) Plan	The SPCC Plan would develop measures to take in the event of a spill, thereby insulating environmental media from the effect of accidental releases. All aboveground chemical storage tanks would be lined or paved, curbed/diked, and would have sufficient volume to meet all regulatory requirements. A site drainage plan would also be developed that would isolate routine, process-related operations from affecting the surrounding environment.
Feed Material Handling	The coal storage area would be paved or lined so that runoff can be collected, tested, and treated as necessary. The coal storage area has facilities to control fugitive dust emissions. The coal conveyors would be covered.
Coal Grinding and Slurry Preparation	The coal grinding equipment would be enclosed and any vents would be routed to the tank vent incinerator/auxiliary boiler. The water used to prepare the coal slurry would be stripped process condensate (recycled).
Gasification, High Temperature Heat Recovery, Dry Char Removal and Slag Grinding	The char produced in gasification would be removed and returned to the first stage of the gasifier (recycled). This improves the carbon conversion in the gasifier and reduces the amount of carbon contained in the gasifier slag. Reduced carbon content makes the slag more marketable and reduces the likelihood that it must be disposed in a landfill.
Slag Handling	The slag dewatering system would generate some flash gas that contains hydrogen sulfide (H_2S). The flash gas would be recycled back to the gasifier via the syngas recycle compressor. Water that is entrained with the slag would be collected and sent to the sour water stripper for recycling.
Sour Water System	Sour water would be collected from slag dewatering and the low temperature heat recovery system, and the ammonia and H_2S would be stripped out and sent to the sulfur recovery unit. The stripped condensate would be used to prepare coal slurry. Surplus stripped condensate would be sent to the zero liquid discharge system.

Table 2.2-9. Key Pollution Prevention, Recycling and Reuse Features

Zero Liquid Discharge (ZLD) System	The ZLD system would concentrate and evaporate the process condensate. The ZLD system would produce high purity water for reuse and a solid filter cake for disposal off site. The ZLD would concentrate and dispose of heavy metals and other contaminants in the process condensate. The ZLD would also be a recycle unit because the recovered water would be reused, reducing the total plant water consumption. **An enhanced ZLD system would also recover and treat cooling tower blowdown water for recycle and reuse within the plant, thereby eliminating all discharges to surface waters.**
Carbonyl Sulfide (COS) Hydrolysis	The gasifier would produce small quantities of COS that cannot be absorbed in the AGR system. The COS hydrolysis unit would convert COS to hydrogen sulfide (H_2S), which would then be removed in the acid gas removal unit. The COS hydrolysis unit would improve the sulfur recovery efficiency and reduce the total amount of sulfur in the syngas, and ultimately, the release of sulfur dioxide (SO_2) from the heat recovery steam generator (HRSG) stacks.
Mercury Removal Features	The mercury removal unit would use specially formulated activated carbon to capture trace quantities of mercury that may remain in the syngas. Mercury in the sour water handling system would be captured via activated carbon filters strategically placed prior to potential release points.
Acid Gas Removal (AGR)	The AGR system would remove H_2S from the raw syngas and produce a sweet (low sulfur) syngas for use in the combined cycle power block. The AGR would produce concentrated H_2S feed for the SRU.
Sulfur Recovery Unit (SRU)	The SRU would convert the H_2S to elemental sulfur that would be marketed for use as a fertilizer additive or for production of sulfuric acid. The tail gas from the SRU would be recycled back to the gasifier.
Fuel Gas Moisturization	The fuel gas moisturization system would improve the recovery of low level heat from the gasification process and serve as a diluent for the syngas used in the combustion turbines. Nitrogen from the air separation unit would also be used as a diluent. Dry, clean syngas typically has a heating value in the range of 250 to 300 British thermal units per standard cubic foot. If the dry syngas was used directly in the combustion turbines, the thermal nitrogen oxides (NO_x) formed would be too high. Earlier IGCC plants used steam injection for NO_x control, which is less efficient than using fuel moisturization and nitrogen.
Integration of the Air Separation Unit (ASU) and Power Block	The ASU would produce nitrogen as a by-product; this is an effective diluent for NO_x control. The ASU would require large amounts of electrical power for air compression. Part of the air compression requirements would be provided by the combustion turbine compressors, further integrating the gasification and combined cycle power block portions. This integration reduces the ASU auxiliary power requirement and increases the net power output by the plant.
Boiler Blowdown and Steam Condensate Recovery	Boiler blowdown and steam condensate would be recovered from the combined cycle power block and gasification facilities and would be reused as cooling tower makeup.
Training and Leadership	All corporate and plant personnel would be trained on continuous improvement in environmental performance especially as such training and programs apply to: i) setting, measuring, evaluating and achieving waste reduction goals and ii) reporting the results of such programs in annual reports made available to the public.

2.2.4 Construction Plans

2.2.4.1 Construction Staging and Schedule

Under Excelsior's proposed schedule, construction of Phase I would begin on the selected site in **2010** and would be completed by **2014**. Construction of Phase II would begin in **2012** and it would be operational by **2016**. For Phase I start-up, system and feedstock testing, and long-term performance and reliability demonstration of the project would require a minimum of 1 year (beginning in **2014**), after which the plant could continue in commercial operation.

Prior to construction, environmentally sensitive areas at the selected site would be identified and flagged such that these areas would not be disturbed during site preparation activities. In accordance with 40 CFR Part 122.26(b)(14)(x), a Storm Water Pollution Prevention Plan (SWPPP) would be developed to identify best management practices (BMPs) for erosion prevention and sedimentation control that would be implemented during construction. The plan would include a description of construction activities and address the following:

- Potential for discharging sediment and/or other potential pollutants from the site;
- Location and type of all temporary and permanent erosion prevention and sediment control BMPs along with procedures to be used to establish additional temporary BMPs as necessary for the site conditions during construction;
- Site map with existing and final grades, including dividing lines and direction of flow for all pre and post-construction stormwater runoff drainage areas located within the project limits. The site map must also include impervious surfaces and soil types;
- Locations of areas not to be disturbed;
- Location of areas where construction would be phased to minimize duration of exposed soil areas.
- Identify surface waters and wetlands either on site or within one-half mile from the site boundaries, which could be affected by stormwater runoff from the construction site, during or after construction; and
- Methods to be used for final stabilization of all exposed soil areas.

Initial site preparation activities would include building access roads, clearing brush and trees, leveling and grading the site, bringing in necessary utilities, and undertaking dewatering activities that may be required. Construction of temporary parking, offices, and material storage areas at this time would involve the use of large earthmoving and logging equipment to clear and prepare the site for construction of the plant. Trucks would be required to bring fill material for roadways and the plant, removing harvested timber, removing debris from the site, and stockpiling fill material. Gravel and road base would be utilized for the temporary roads, material storage, and parking areas.

The construction plan description generally would apply to both Phases I and II of the project. The Phase II portion of the Mesaba Generating Station would be installed in the equipment staging and lay-down area utilized for Phase I construction. Therefore, **for** Phase II **construction, temporary off-site** staging and lay-down areas would be **acquired** and prepared at the beginning of the Phase II work, with the required permits and approvals obtained prior to beginning the site preparation work.

Excelsior has identified several candidate locations for off-site staging and lay-down areas in the vicinities of both potential plant sites as shown on figures in Section 2.3. Collectively these locations contain sufficient land area to provide the 85 acres needed during construction for stockpiling materials, storing equipment, and temporary operation of a concrete batch plant. In identifying candidate locations, Excelsior considered properties owned by mineral extraction firms or tax

forfeiture lands that have been cleared or disturbed during prior activities and, therefore, do not contain surface waters, wetlands, or sensitive natural resources. Candidate sites also have access to local roadways and are within a 10-mile radius of the respective plant footprint. Excelsior would select one or more of the candidate locations for staging and lay-down use near the permitted generating station site prior to Phase II construction. For the purposes of assessing potential impacts in this EIS, it is assumed that the entire lay-down area would be cleared, and high-use portions would be graveled or lined in some manner. Consistent with BMPs for erosion and sedimentation control, the site would be ringed by silt fencing, and appropriate measures would be implemented to reduce the transport of dust and soils off site by construction vehicles. Depending upon security requirements, a perimeter fence may be constructed. At the end of construction for Phase II, the site would be restored to pre-existing conditions; materials, wastes, and equipment would be removed; and the site would be replanted with vegetation similar to that currently existing.

Detailed construction plans and specifications for Phase II would include provisions necessary to protect construction and plant operating personnel and equipment from potential impacts from the adjacent operating Phase I plant and to minimize operational disruption during Phase II construction.

2.2.4.2 Construction Materials

Construction material would be delivered to the site by truck and rail. A plant access road would be developed for construction traffic. Completion of the rail spur at the start of construction activities would allow plant equipment to be delivered by rail. An estimated 15 to 20 semi-trailer trucks daily would be required to deliver material to the site. Construction deliveries by rail would likely require two trains per week. The relatively small amounts of ballast required for construction of the rail loop would be obtained from existing quarries that serve the BNSF and CN railway companies. The impacts of the small incremental demand for ballast would not affect the production capacities of the quarries.

During construction, temporary utilities would be provided to support construction offices, worker trailers, lay-down areas and the construction areas. Temporary construction power would be provided by the local utility company. Temporary generators could also be used until the temporary power system would be completed. Area lighting would be provided and strategically located for safety and security. Local telecommunication lines would be installed for phone and IT communications. Potable water bottles would be provided for drinking water. Construction water would be supplied either by pumping and treating surface waters in the vicinity or by connection to the local municipal water system.

2.2.4.3 Construction Wastes

Construction of the Mesaba Generating Station would generate certain amounts of wastes. The predominant waste streams during construction would include site clearing vegetation, soils, and debris, hydrostatic pressure-testing (hydrotest) water, used lube oils, surplus materials, and empty containers.

Surplus and waste materials would be recycled to the extent practical. If feasible, removed site vegetation would be salvaged for pulp and paper production, or recycled for mulch. Construction water use would be heaviest during the testing phase. Hydrotest water would be reused for subsequent pressure tests if practical. Spent hydrotest water would be tested to determine if it exhibits hazardous characteristics. If hazardous, the hydrotest water would be sent off site for treatment; if non-hazardous, it would be routed to the detention basin for discharge to local surface waters (in accordance with an NPDES permit). Potential scrap and surplus materials and used lube oils would be recycled or reused to the maximum practical extent. Temporary sanitation facilities would include portable toilets that would be cleaned daily and the wastes hauled to a local disposal facility.

Although Excelsior would ultimately be responsible for the proper handling and disposal of construction wastes, construction management, contractors, and their employees would be responsible for minimizing the amount of waste produced by construction activities and would be expected to fully cooperate with project procedures and regulatory requirements for waste minimization and proper handling, storage, and disposal of hazardous and non-hazardous wastes. Each construction contractor would be required to include waste management and waste minimization components in their overall project health, safety, and environmental site plans. Typical construction waste management measures may include:

- Dedicated areas and a system for waste management and segregation of incompatible wastes. Waste segregation should occur at time of generation;
- A waste control plan detailing waste collection and removal from the site. The plan would identify where waste of different categories would be collected in separate stockpiles, bins, etc., with appropriate signage to clearly identify the category of waste;
- Hazardous wastes, as defined by the applicable regulations, would be stored separately from non-hazardous wastes (and other, non-compatible hazardous wastes) in accordance with applicable regulations, project-specific requirements, and good waste management practices;
- Periodic construction supervision inspection to verify that wastes are properly stored and covered to prevent accidental spills and wastes from being blown away;
- Appropriately labeled waste disposal containers; and
- Good housekeeping procedures. Work areas would be left in a clean and orderly condition at the end of each working day, with surplus materials and waste transferred to the waste management area.

2.2.4.4 Construction Labor

The average number of construction personnel during Phase I (**2010** through **2014**) would be about 600, with as few as 50 and as many as 1,400 construction personnel on site at any given time. It is estimated that the on-site work force at the time of peak construction activities would be approximately 1,500 personnel, which would include Excelsior's staff, consultants, and visitors in addition to construction personnel. Excelsior expects that labor would be provided through the local Building Trades.

It is estimated that most of the construction activities would occur during a single shift between the hours of 7:00 am and 5:30 pm, Monday through Saturday. Additional hours and/or a second shift may be necessary to make up schedule deficiencies or to complete critical construction activities. During the warm weather season, a second shift may be utilized to complete civil work activities. There would be X-ray inspection, weld stress-relieving, and some production welding that typically occurs during a second shift. The commissioning activities, prior to initial plant startup, would occur 24 hours per day.

2.2.4.5 Construction Safety Policies and Programs

Emergency services during construction would be coordinated with the local fire departments, police departments, paramedics, and hospitals. A first aid office would be provided on site for minor first aid incidents. Trained/certified Health Safety and Environmental personnel would be on site to respond and coordinate emergencies. All temporary facilities would have fire extinguishers, and fire protection would be provided in work areas where welding work would be performed.

The natural gas pipeline facilities would be designed, constructed, tested, and operated in accordance with all applicable requirements included in the DOT regulations in Title 49 CFR Part 192 Transportation of Natural and Other Gas by Pipeline: Minimum Federal Safety Standards; and other applicable Federal and state regulations, including U.S. Department of Labor, Occupational Safety and Health Administration (OSHA) requirements. These regulations are intended to ensure adequate protection for the public and to prevent natural gas pipeline accidents and failures. Among other design standards, Part 192 specifies pipeline material and qualification, minimum design requirements, and protection from internal, external, and atmospheric corrosion.

2.2.5 Operational Plans

2.2.5.1 Operational Demonstration Test Plans

Excelsior would develop and submit an Operational Demonstration Test Plan to the DOE for review and comment prior to plant startup. The plan would be intended to achieve the following objectives:

- Demonstrate mercury removal, activated carbon life expectancy, and operational costs in an IGCC application;
- Demonstrate smooth ramp-up to full capacity and greater than 90 percent annual availability with the spare gasification train;
- Demonstrate manifolding of gasification trains and operational swapping;
- Demonstrate that phased refractory repair contributes to improved gasifier availability; and
- Demonstrate the feedstock-flexible design.

2.2.5.2 Plant Demonstration and Operations

The plant demonstration would require approximately 12 months. Excelsior would implement the Operational Demonstration Test Plan and document the results of the demonstration in relation to the project objectives.

Following the demonstration phase, Mesaba Generating Station would be operated as a baseload generation facility. The station would operate 24 hours per day except during scheduled outages for maintenance. The facility would be designed for high reliability with multiple process trains. Although the plant would include three gasification trains (from slurry preparation through dry char removal), only two gasification trains would be required for full output (at 50 percent capacity each). The spare train would normally be in standby service unless maintenance was being performed on one of the gasifier trains. The Mesaba Generating Station would be designed to achieve an availability of greater than 90 percent during full operation.

The Mesaba Generating Station would be capable of “single train operation” where only one gasifier and one combustion turbine would operate. The single train plant output would be somewhat below one half of the full load output. Additional turndown would be possible by reducing the gasifier throughput in either of the two trains or single train operation. Operation at reduced loads would be limited by physical constraints, as well as the combustion turbine supplier’s emission guarantees, to about 70 percent of the full load output.

The combustion turbine generators must be started on natural gas and loaded to a minimum level before the fuel can be switched to syngas. The combustion turbine generators would be able to co-fire natural gas and syngas within limits set by the combustion turbine manufacturer. The CTGs could also operate on 100 percent natural gas. The power block would be designed to operate on 100 percent natural gas when required, but at reduced capacity relative to operation on syngas.

2.2.5.3 Operational Labor

Operator hiring and training would begin about 1 year before the commencement of start-up. Gasification area personnel would need extensive training in plant operations, reactive chemicals and safety, industrial hygiene, and environmental compliance similar to that of operators in refineries and chemical plants. Process simulators would be used as part of the training program. Generally, the staff would consist of management and engineers, shift supervision and operations management, and shift operating personnel. The operations staff would be integrated into the commissioning team so that they would have hands-on experience with the plant when each system is operational after construction.

In addition to operations and management personnel, the Mesaba Generating Station would require qualified staffing to support power production planning; equipment maintenance; procurement; laboratory chemists and technicians; health, safety, and environmental specialists; administrative support; benefits/human relations; and other necessary functions. The expected number of personnel during operations is presented in Table 2.2-10.

Table 2.2-10. Estimated Operating Staff Required for the Mesaba Generating Station

System	Phase I Staff	Phase II Staff	Total Staff (Phases I and II)
Gasification and Air Separation Unit Subtotal	96	64	160
Combined Cycle Power Block Subtotal	11	11	22
Total Staff Requirement	107	75	182

2.2.5.4 Health & Safety Policies and Programs

Facility design features and management programs would be established to address hazardous materials storage locations, emergency response procedures, employee training requirements, hazard recognition, fire control procedures, hazard communications training, personal protection equipment training and accidental release reporting requirements. Significance criteria would be determined on the basis of Federal, state and local guidelines, and on performance standards and thresholds adopted by responsible agencies.

Basic approaches to prevent spills to the environment include comprehensive containment and worker safety programs. The comprehensive containment program would ensure that appropriate tanks, walls, dikes, berms, curbs, etc. are sufficiently contained. Worker safety programs would be established to ensure that workers are aware and knowledgeable about spill containment procedures and related health and environmental protection policies.

The Minnesota Office of Pipeline Safety would have jurisdiction over the gas pipeline. Pipeline facilities would be designed, operated, and maintained in accordance with DOT Minimum Federal Safety Standards in 49 CFR Part 192, which defines and specifies the minimum standards for operating and maintaining pipeline facilities. The regulations require an Emergency Plan that would provide written procedures to minimize hazards from a gas pipeline emergency. Key elements of any emergency plan would include procedures for:

- Receiving, identifying, and classifying emergency events such as gas leakage, fires, explosions, and natural disasters;
- Establishing and maintaining communications with local fire, police, and public officials and coordinating emergency responses;

- Making personnel, equipment, tools, and materials available at the scene of an emergency;
- Proactive protection for people and insuring human safety from actual or potential hazards; and
- Emergency shutdown of the system and safely restoring service.

The safety standards specified in Part 192 require each pipeline operator to:

- Develop an emergency plan, working with local fire departments and other agencies, to identify personnel to be contacted, equipment to be mobilized, and procedures to be followed in responding to a hazardous condition caused by the pipeline or associated facilities;
- Establish and maintain a liaison with the appropriate fire, police, and public officials in order to coordinate mutual assistance when responding to emergencies; and
- Establish a continuing education program to enable customers, the public, government officials, and those engaged in excavation activities to recognize a natural gas pipeline emergency and report it to appropriate public officials.

Before placing the pipeline in service, a procedural manual for operation and maintenance of the proposed pipeline would be prepared. The pipeline facilities would be operated and maintained in compliance with Minnesota Office of Pipeline Safety regulations. The operator would become a member of the Gopher State Excavators One-Call system that is utilized to prevent damage to underground pipelines by excavators and others performing underground construction. Periodic aerial and ground inspections by pipeline personnel would be conducted to identify dead vegetation, soil erosion, unauthorized encroachment, or other conditions that could result in a safety hazard or require preventative repairs or maintenance. In addition, gas leak detection and cathodic protection surveys would be conducted periodically to ensure proper and adequate corrosion protection and proper operation.

2.2.5.5 Worst-Case Operating Scenario

For development of its “worst case” operating scenario, parameters yielding maximum emissions were identified. Operating conditions producing maximum emissions/discharges from the Mesaba Generating Station are identified in Table 2.2-11, which assumes operation of the gasifiers under partial slurry quench conditions and considers known seasonal influences and the range of potential feedstocks for which the Mesaba IGCC Generating Station would be designed to utilize. Pollutant emissions, discharges, and waste products described in this chapter were quantified by Excelsior assuming the conservative partial slurry quench conditions.

Table 2.2-11. Key Performance Indicators Used to Assess Worst Case Environmental Impacts or Emissions of Mesaba Energy Project (Phase I, partial slurry quench Mode)

Performance Parameter	Estimated Range*	Comments
CTG gross power, MWe	440	Total for two CTGs
STG gross power, MWe	265 – 300	Varies depending on quantities of steam generated by Gasification Island and HRSGs
Net plant generation, MWe	580 – **605**	Output from CTGs plus STG, less internal consumption and losses
Coal/coke feed rate, tons/day (as received)	5,300 – 8,550	Feed rate to gasifiers
Coal/coke feed energy, million Btu/hour (HHV)	5,280 – 5,910	Energy content of gasifier feedstock
Product syngas energy, million Btu/hour (HHV)	4,190 – 4,368	Energy content of syngas fuel delivered to CTGs
Coal conversion efficiency	0.71 – 0.80	Fraction of solid feedstock energy in syngas feed to CTGs
Net overall heat rate, Btu/kWh (HHV)	8,900 – 9,500	Solid feedstock energy used per unit of net electricity to grid
Flux feed, tons/day	0 – 250	Conditioning agent for gasifier feedstock
Slag by-product production, tons/day	500 – 800	Varies depending on feedstock composition and flux use
Sulfur by-product production, tons/day	30 – 165	Varies depending on feedstock composition

*generation, emission, or discharge range
Acronyms: Btu – British thermal unit; CTG – combustion turbine generator; HHV – higher heating value; kWh – kilowatt hour; MWe – megawatt electricity; STG – steam turbine generator

Full slurry quench would be achieved by increasing the slurry feed to the second stage of the gasifier to the point where only slurry is used to quench the syngas, thereby eliminating the thermal loss associated with water used to cool the syngas and increasing the overall efficiency of the plant. These efficiency gains would translate into reduced feedstock use and, consequently, reduced pollutant emissions/discharges. However, full slurry quench is an IGCC design improvement that is subject to further engineering and verification by experience at Wabash River Plant. Therefore, **as stated in Section 2.2.2.1,** full slurry quench**'s** expected benefits have not been reflected in the maximum resource requirements or maximum pollutant emissions/discharges quantified in this EIS.

2.3 DESCRIPTION OF ALTERNATIVE SITES AND CORRIDORS

This section describes the unique features of alternatives considered by Excelsior to implement the Mesaba Generating Station at either the West or East Range Site, including potential plant sites and respective alternatives for water sources and receiving waters, natural gas sources, rail and road alignments, and HVTL corridors.

2.3.1 West Range Site and Corridors

2.3.1.1 Proposed IGCC Plant Site

The West Range Site, including the plant footprint and buffer land, is located within the city limits of Taconite in Iron Range Township, Itasca County, Minnesota. The site is generally bounded by County Road (CR) 7 to the west, a HTVL corridor to the north, and the Township boundary to the east (Figure 2.3-1). The site encompasses approximately 1,**708** acres zoned by Itasca County for industrial use. Only the northern-most 200 acres of the site are outside the Taconite city limits.

Two HVTL corridors traverse the buffer land, one in a north-south direction and a second in an east-west direction. The HVTLs that occupy the north-south corridor are not currently in use. The closest residential properties are located along CR 7, approximately 3,800 feet west of the proposed power plant footprint, and on the north shore of Big Diamond Lake, approximately 3,850 feet to the southeast.

As described in Section 2.2.4.1, off-site staging and lay-down areas would be acquired to provide 85 acres of land supporting construction of Mesaba Phase II. Figures 2.3-1 and 2.3-3 show the candidate locations for the West Range Site.

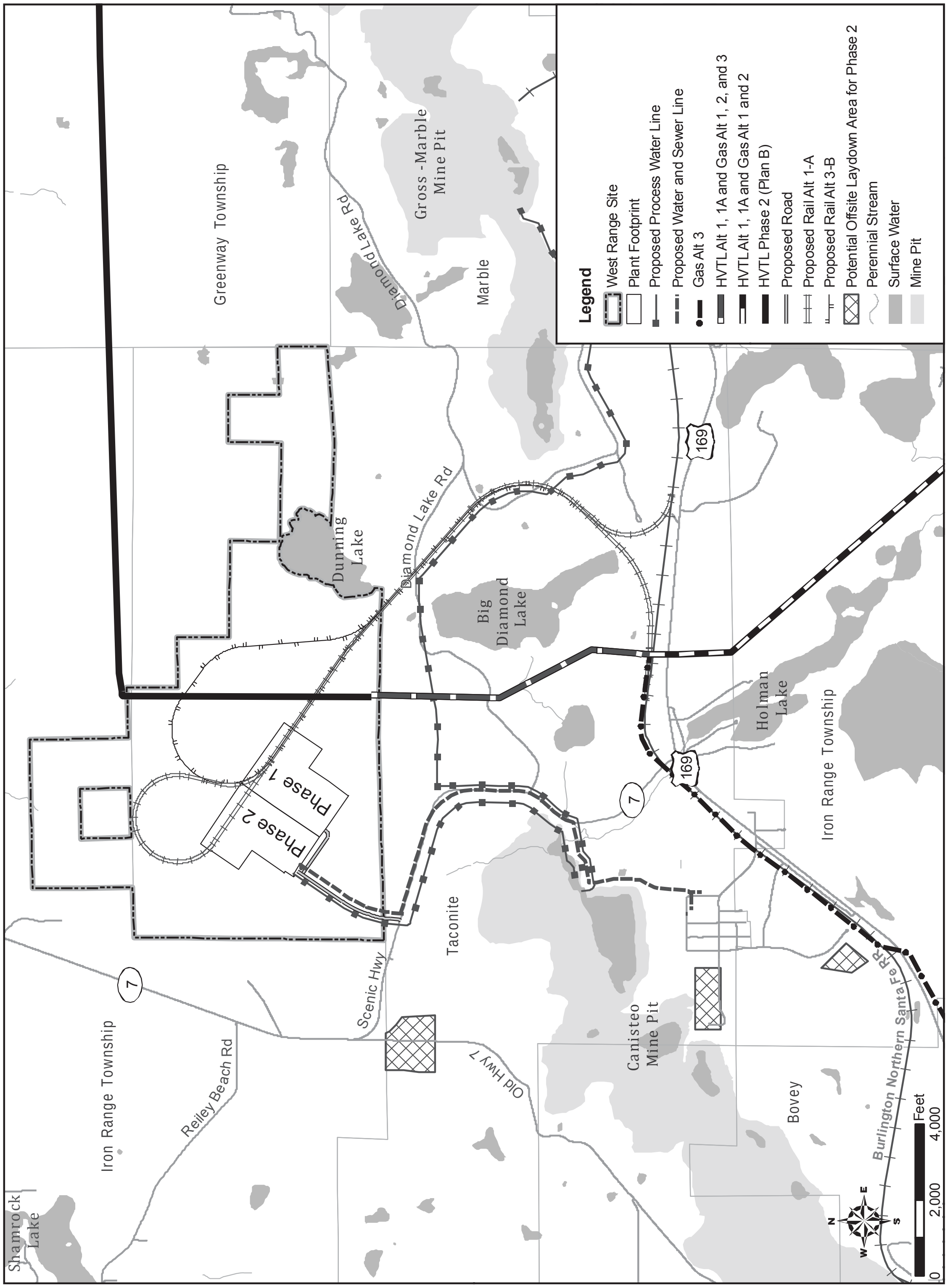

Figure 2.3-1. West Range Plant Site

2.3.1.2 Transportation Facilities

Existing Rail Lines in Vicinity of the West Range Site

The West Range Site is located approximately 1.5 miles north of the mainline tracks of the BNSF and CN Railroads.

BNSF Rail Line

Rail shipments of coal from the PRB would be transported on the BNSF rail line across North Dakota and then to Gunn and Taconite, Minnesota. Currently, about six trains per day travel along the BNSF rail line from North Dakota to Gunn at speeds up to 25 miles per hour. From Gunn to the West Range Site (approximately 12.5 miles) BNSF carried about 4 to 10 trains per day. This track is now closed because of danger associated with pit wall collapse. Alternately, the BNSF rail line could be used from Brookston northward to Kelly Lake and Keewatin westward to the West Range Site. This route would primarily be used to transport materials other than coal to the West Range Site. Unit coal trains would only use this route if there were a track problem east of Gunn; use of this route to transport coal from Powder River Basin would increase the travel distance by 100 miles in each direction.

CN Rail Line

CN would deliver coal by way of the Superior, Wisconsin, area northward to Virginia, Minnesota, and then west past Hibbing and Keewatin to Taconite/Bovey. CN unit coal trains would approach the West Range Site from the east, travel past the site, and either back into the site or stop in Bovey, have the locomotives disconnect and reconnect to the other end of the train, and access the site from the west. A reverse move would be required for the empty train. Unit coal trains supplied by CN would use an existing siding in Bovey that would need to be lengthened to accommodate this move. Delivery of other materials to the plant would occur via the same type of movement, but with shorter trains.

A short span of existing CN track near the site is temporarily out of service because of the water elevation in the Canisteo Mine Pit (CMP). Since the cessation of mining, the pit has filled with water and affected the integrity of the CN track along the steep edge of the CMP near Bovey. CN has determined that repairs to this line would not be appropriate without a solution to the rising water levels in the CMP. Under common carrier regulations, the track would be required to be repaired and returned to service at the request of BNSF or another shipper. Development of the West Range Site would lower water levels in the pit allowing this section of the rail line to be redeveloped and returned to operation (Excelsior, 2006b).

Rail Access to the West Range Site

Coal could be delivered to the West Range Site by either BNSF or CN, which operate on a single track located less than 2 miles from the West Range Site. Direct access to the site would be achieved by the construction of short spurs from the mainline tracks onto the site boundary. Construction of 2 miles of new track would be required between the existing mainline track and the boundary of the West Range Site; an additional 4 miles of new track would be required for the portion of the rail loop within the site boundaries.

The Draft EIS considered three alternative rail access alignments for the West Range Site, identified as Alternatives 1A, 1B, and 2. Based on the Draft EIS, Excelsior eliminated Alternatives 1B and 2 from further consideration for the project. Following publication of the Draft EIS, USACE, EPA, and other agencies submitted comments expressing their concerns about the extent of

wetlands impacted by the rail alternatives. USACE particularly expressed the need for avoidance and minimization of wetland impacts in the siting of the Mesaba Energy Project and associated infrastructure. DOE discussed these concerns with USACE in several telephone conferences and meetings during 2008 and conferred with Excelsior to address the need for avoiding and minimizing impacts to wetlands. The efforts made by Excelsior in coordination with DOE are summarized in DOE's updated Wetland and Floodplains Impact Assessment (Appendix F2). As a result of those efforts, Excelsior identified a new preferred rail alignment Alternative 3B that has been evaluated in the Final EIS. Revised Figure 2.3-2 shows the alignments of Alternatives 1A and 3B. Revised Table 2.3-1 provides a comparison of key aspects of the two rail alternatives.

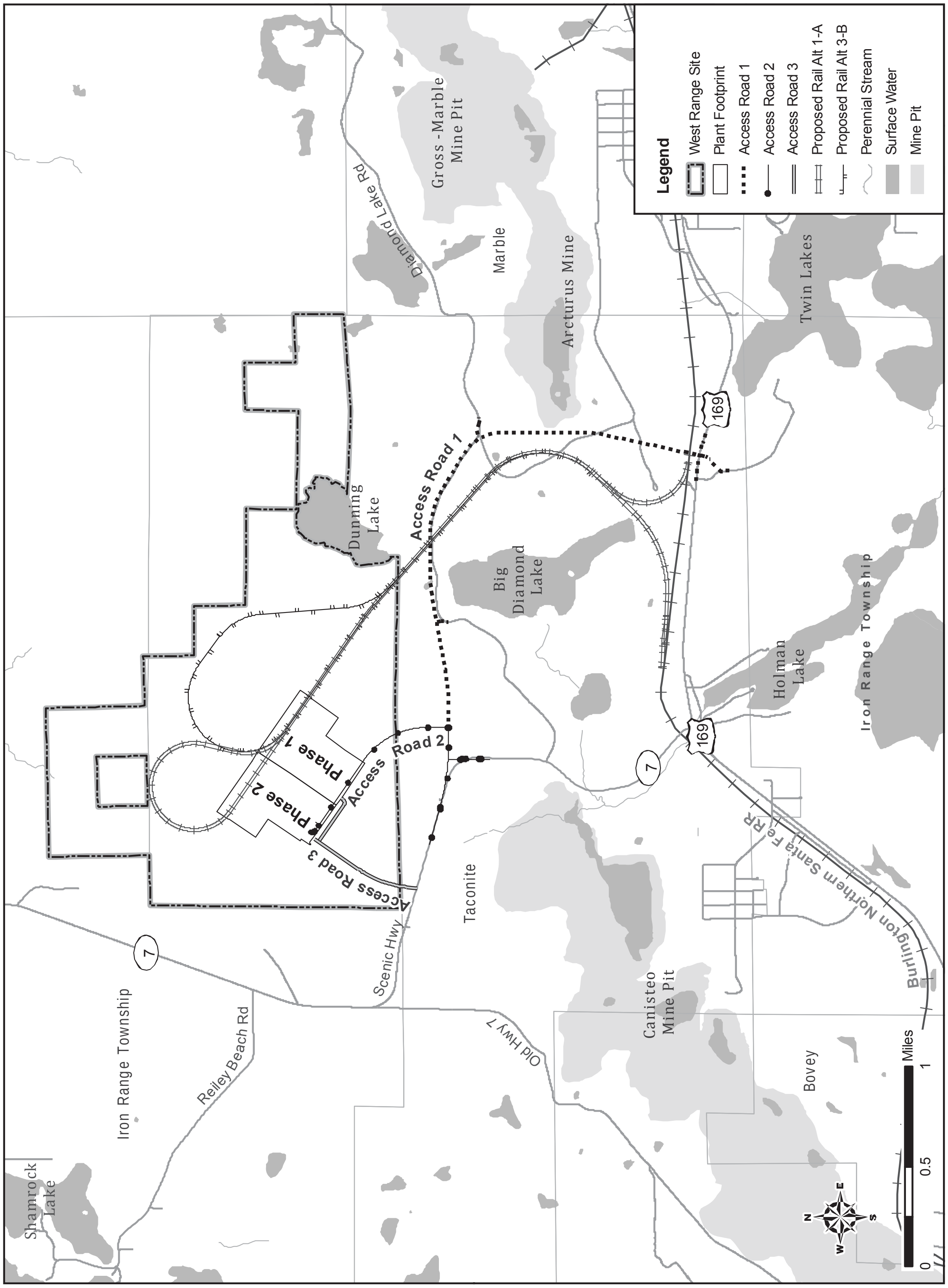

Figure 2.3-2. West Range Rail and Road Alternatives

Table 2.3-1. Rail Access Alternatives – West Range Site

Attribute	Alternative 3B	Alternative 1A
Total length of track (feet)	22,070	21,539
Rail loop elevation (feet)	1,405	1,390
Off-site length of track (feet)	15,419	15,419
Train speed (mph)	10	10
Maximum grade	0.34%	0.30%
Maximum Curvature (loaded coal train)	3 degrees	2 degrees 30 minutes
Off-site right-of-way (acres)	15	15
Largest Cut (feet)	65	65
Largest Fill (feet)	55	25
Approximate Cut Qty (cubic yards)	2,620,000	3,725,000
Approximate Fill Qty (cubic yards)	620,000	610,000
Total area disturbed (acres)	107.4	117.9
Direct wetland impact (acres)	5.7	17.9
Wetland adjacent to and enclosed by rail loop (acres)	0	58.3
No. of residences within 1,000 feet	3	3
Closest residence (feet)	470	470
Alignment Meets Applicable Standards	Yes	Yes
Comments	Preferred	Alternative

Rail Alignment Alternatives 1A and 1B

NOTE: Following publication of the Draft EIS, Excelsior eliminated Alternative 1B from further consideration. The factors justifying its elimination as reviewed by DOE include the identification of Alternative 3B, which has much lower impacts to wetlands and other environmental parameters, and concerns about the practicability of constructing Alternative 1B, which would require very large cuts through waste rock piles and filling a very deep wetland northeast of Dunning Lake. Therefore, the description of Alternative 1B in the following discussion is no longer relevant to the Final EIS, and Alternative 1B has been removed from Figure 2.3-2.

As shown in Figure 2.3-2, the common alignment for Alternatives 1A and 1B would divide from the existing CN and BNSF main lines that run parallel to U.S. Highway (US) 169, generally following an old railroad grade around the southern tip of Big Diamond Lake. East of the lake, Alternative 1A would turn to the northwest between Big Diamond Lake and Dunning Lake to the proposed generating station. The alignment for Alternative 1B would follow the same route east of Big Diamond Lake. However, instead of diverting northwest between Big Diamond and Dunning Lakes, it would continue north on the east side of Dunning Lake. Once north of the lake, it would bear west to the site. Both Alternatives 1A and 1B would include a loop to the north of the proposed Mesaba Generating Station.

The alignments for Alternatives 1A and 1B would meet a Railroad Design Guideline developed by Excelsior based on BNSF and CN unit train standards and could accommodate access by both rail service providers. Acceptable curve radii require that the track alignment be directed east of Big Diamond Lake. To provide an acceptable grade for Alternative 1A, track would require filling low areas located between the two lakes and cutting from terrain obstacles approaching the plant site. To provide an acceptable grade for Alternative 1B, construction would require cutting through a large tailing pile east of Big Diamond

Lake and through a large wetland area on the northeast corner of Dunning Lake; it would require significant additional contouring near the plant site. The rail loop for either alternative would be mostly on a fill section.

Alternative 1A would be located within 400 feet of a residence on the north shore of Big Diamond Lake and within 700 feet of a residence on the south shore of Dunning Lake. Alternative 1B would pass within about 1,200 feet of the residence on Dunning Lake. Either Alternative 1A or 1B would require construction of a bridge over the proposed new access roadway to the West Range Site to avoid public crossings that could cause traffic disruption near the Mesaba Generating Station. Existing forest roads affected by the rail alignment could be re-routed to avoid traffic disruptions.

Excelsior identified Alternative 1A as the preferred alignment **for the Draft EIS** based on cost, better alignment of curves, and lower anticipated environmental impacts. Alignment 1B would place the rail dumper building in an area that would require coal to be conveyed across a greater distance to the Mesaba Generating Station and would require significant earth removal work (as the route would cut across several large tailing piles). The only practical benefit the alignment offers over Alternative 1A is that it would divert rail traffic away from the several residential properties located on Big Diamond and Dunning Lakes. Alternative 1A would require easements over, or acquisition of, some private property. Both alternatives would have a surplus of cut/fill material that would require disposal.

Rail Alignment Alternative 2

Excelsior initially considered Alternative 2 for a rail alignment west of Big Diamond Lake (Figure 2.3-2 **in the Draft EIS**). However, due to railway routing restrictions, BNSF would not be able to originate a shipment to the site using the CN tracks. Instead, the origination point for the BNSF alignment would be west of the CN rail spur. To maintain acceptable curvatures for this alignment in accordance with the Railroad Design Guideline, based on BNSF standards, the origination point would require the alignment to be routed across a portion of Big Diamond Lake. Excelsior determined that such an alignment would not be economically or environmentally feasible and, therefore, eliminated it from further consideration **with concurrence by DOE**. **Alternative 2 has been removed from Figure 2.3-2 in the Final EIS.**

Rail Alignment Alternative 3B

Excelsior, with support from DOE, developed Alternative 3B in response to concerns raised by USACE and other agencies about the need to avoid and minimize wetland impacts identified in the Draft EIS. An important factor in this decision was that a design change in the short line rail serving the Minnesota Steel project raised its elevation, which helped Alternative 3B become a practicable alternative. Excelsior has since identified Alternative 3B as its preferred rail alignment for the Mesaba Energy Project. The alignment would follow the same route as Alternative 1A from the point of interconnection with the CN and BNSF main line to the Mesaba plant site. However, Alternative 3B would begin its rail loop approximately at a point between the footprints for Phases I and II as indicated in Figure 2.3-2. The rail loop would follow a relatively level grade around a hill located northeast of the plant footprint and rejoin the rail spur near Dunning Lake at the southeastern corner of the property.

The coal dumper would be located on the straight segment of rail alignment before the first curve in the loop, at a point approximately 2,000 feet closer to the southeastern property boundary. In conjunction with Alternative 3B, Excelsior proposes to switch the configuration of the plant site such that the Phase I footprint would be on the southeast side, closest to the coal offloading facility, and the Phase II footprint would be on the northwest side of the combined plant site. Additionally, in conjunction with Alternative 3B, Excelsior proposes to move the combined plant footprint

approximately 280 feet to the northwest on the property along the same axis as the originally proposed footprint. Finally, due to the short line rail design change mentioned above, Excelsior determined that the rail elevation can be increased, resulting in a base plant and rail yard elevation of 1,405 feet, approximately 15 feet higher than originally planned, which would reduce grading requirements.

Other Rail Alternatives Considered

Excelsior considered other rail alignments, including CN access from the west side of Big Diamond Lake and BNSF access from the east side of Big Diamond Lake. These alternatives were eliminated from further consideration because of the duplication of tracks, track alignments making it difficult to position the coal dumper, topographic limitations on rail placement to avoid unacceptable curves, and the impact on a larger area around Big Diamond Lake as compared to the other alternatives.

Roadway Access to the West Range Site

The West Range Site is located about 1.5 miles north of US 169, which is a two-lane east-west highway locally, and about 0.25 mile to the east of Itasca CR 7, commonly referred to as "Scenic Highway 7," which is a two-lane highway running mainly in a north-south direction. Other roadways include the Cross-Range Heavy Haul Road **(Diamond Lake Road)**, which is a gravel road used to allow heavy or slow loads to be transported between mines across the Iron Range. The Cross-Range Heavy Haul Road also provides access to a cluster of homes in the Big Diamond Lake/Dunning Lake area. The existing roadway system in the area of the West Range Site is shown on Figure 2.3-2.

As described in the Draft EIS, Excelsior considered two access road components (Access Road 1 and Access Road 2) to provide access to the West Range Site. **Following publication of the Draft EIS, coordination between DOE and Excelsior resulted in the consideration of an additional road access alternative to meet the objective of avoiding and minimizing impacts to wetlands in response to comments by USACE and other agencies. Excelsior's new preferred alignment for the plant access road would also avoid reliance on the proposed realignment of CR 7 by Itasca County, which has been deferred for the foreseeable future due to funding priorities as described below.**

Proposed Access Road 1

NOTE: Following publication of the Draft EIS, Itasca County deferred its planned realignment of CR 7 due to changes in funding priorities at the state level. Therefore, the construction of Access Road 1 as discussed in the following paragraphs is no longer anticipated to be available for the Mesaba project.

The Itasca County engineer expressed the county's interest in re-routing the alignment of CR 7 to better serve local traffic patterns and the additional traffic related to the two large projects undergoing environmental review (the Mesaba Energy Project and a Minnesota Steel Industries, LLC project designed to produce sheet steel from taconite ore). The current intersection of CR 7 and US 169 has poor visibility, relatively steep grades, and problems with slope stability. The realignment of CR 7 (Figure 2.3-2) would serve as the primary access road (Access Road 1) to the Mesaba Generating Station, and would better handle heavy equipment and increased traffic volumes resulting from construction activities tied to the two projects. Itasca County would construct and own the realigned roadway, which would involve constructing a new two-lane roadway beginning at a new access point on US 169, approximately 7,000 feet east of the existing CR 7 intersection. The new road would cross underneath the adjacent rail line, proceed north, then curve west between Big Diamond and Dunning Lakes before terminating in its connection with existing CR 7, just southwest of the West Range Site. The road would pass within a half mile of 22 residences, including 6 residences within 500 feet. The closest residence would be within 300 feet.

Itasca County would seek to move the CR 7 designation to the new roadway and include it as part of the county's state aid system. This would put all future maintenance of the road under the County's responsibility. The section of existing CR 7 between the plant and US 169 would remain in place as either a lower level county road, or be turned over to the City of Taconite as a city street.

Proposed Access Road 2

NOTE: Access Road 2 has been eliminated from further consideration based on Itasca County's decision to defer the realignment of CR 7, as well as on comments by USACE and other agencies requesting DOE to avoid and minimize impacts on wetlands from plant infrastructure.

Access Road 2 would provide access to the Mesaba Generating Station from Access Road 1 (the new CR 7 alignment). If Access Road 1 were in place prior to construction of Phase I, all construction and plant employee traffic would use it to access the plant site. However, based on the timing of Itasca County's construction of Access Road 1, it might be necessary for the plant to be served by an access road from existing CR 7 (an extension of Access Road 2) until Access Road 1 was completed. If Access Road 1 were never constructed, special turning lanes onto CR 7 and US 169 would be required.

Proposed Access Road 3

Excelsior, with DOE support, developed Access Road 3 in response to concerns raised by USACE and other agencies about the need to avoid and minimize wetland impacts identified in the Draft EIS. Access Road 3 would intersect with the existing alignment of CR 7 west of the Itasca County Solid Waste Transfer Station and enter the West Range Site near the southwestern corner of the property boundary (Figure 2.3-2). The alignment of Access Road 3 would not be dependent upon the realignment of CR 7 by Itasca County; however, Excelsior anticipates that improvements to the intersection of CR 7 and US 169 would be required, including the provision of turning lanes at the intersection.

2.3.1.3 Water Sources and Discharges

Process Water Supply

For the West Range Site, the process water requirements would range from an annual average of **3,500** gallons per minute for Phase I to **7,000** gallons per minute for Phases I and II. The peak requirements would range from **5,000** gallons per minute (Phase I) to **10,000** gallons per minute (Phases I and II). Excelsior considered three alternatives for providing process water to the West Range Site, including the use of nearby abandoned mine pits, the Mississippi River, and groundwater sources. Each alternative is described below. Excelsior identified Alternative 1 (obtain water from nearby abandoned mine pits) as the preferred alternative.

Process Water Alternative 1 (Obtain Water from Abandoned Mine Pits and Prairie River)

Alternative 1 (Excelsior's preferred alternative) would involve pumping water from nearby abandoned mine pits, including the CMP, the Lind Mine Pit (LMP), and the Hill Annex Mine Pit (HAMP) Complex (Figure 2.3-3). The HAMP Complex includes the Arcturus, Gross-Marble, Hill-Trumble, and Hill Annex Mine Pits. These pits currently are filled with water and overflowing, are being pumped to avoid flooding of important historical resources (the Hill Annex Mine State Park) due to rising water levels, or are threatening to flood due to rising water levels. **Therefore, areas within these pits shown as surface waters on Figure 2.3-3 (and other figures in this EIS) based on available geographic information system data may not represent the actual extent of surface waters currently in these pits.** Both the CMP and the HAMP Complex could support the water requirements for Phase I, while additional water resources from the LMP and possibly the Prairie River would be sufficient to support Phase II. Excelsior proposes to withdraw water from the Prairie River at a point downstream of the Prairie Lake Hydropower Facility, so water withdrawals would not affect power production at the hydropower facility.

Routings for the pipelines would be located on public property adjacent to existing transportation corridors wherever practicable. The pumps would be operated remotely from the Mesaba Generating Station.

Alternative 2 (Obtain Water from the Mississippi River)

For Alternative 2, water would be piped from the Mississippi River to the West Range Site. This would require approximately 10 miles of pipeline and several pump stations, electrical facilities, support structures, and land acquisitions. This alternative was not considered feasible due to the distance from the river and the cost to construct and operate the necessary facilities.

Alternative 3 (Obtain Water from Groundwater Wells)

For Alternative 3, groundwater wells would be pumped to provide water to the site. Most wells in the area produce only between 200 and 300 gallons per minute; therefore, this alternative would require the development, operation and maintenance of up to 50 groundwater wells, pump stations, force mains, electric services, and support structures to provide adequate flow for the Mesaba Generating Station. For these reasons, Alternative 3 was not considered feasible and was eliminated from further consideration.

Process Wastewater Discharges

NOTE: Following publication of the Draft EIS, Excelsior announced its commitment on January 21, 2008 to undertake a major regional water quality improvement program in connection with the Mesaba Energy Project Phases I and II. The program would include the installation of additional equipment to enhance the planned ZLD system at the power plant, which would result in all water used in the plant being recycled, eliminating all process water and cooling tower blowdown discharges into the Upper Mississippi River watershed. Therefore, the blowdown water discharges as described below in the Draft EIS would be eliminated. The enhanced ZLD system would be the same as proposed for the East Range Site in Section 2.3.2.3.

Process wastewater discharges would consist primarily of cooling tower blowdown blended with relatively low-flow additional wastewater streams from other plant systems (including HRSG blowdown, boiler feed water demineralizers and intermittent treated water from the oil/water separator serving the plant drainage system). All other contact process water would be managed and treated in the ZLD system. All sanitary wastewater would be treated separately. The projected peak and annual average process wastewater discharge rates for the Mesaba Generating Station are summarized in Table 2.3-2. As described in Section 2.2.3.2, nearly all of the wastewater discharged from the Mesaba Generating Station would be condenser cooling water for control of dissolved solids (cooling tower blowdown). Hence, the constituents in the discharge essentially would be the same as those in the water supply to the plant but more concentrated.

Table 2.3-2. Estimated Wastewater Discharge Rates to Receiving Waters – West Range Site

Phase	Cycles of Concentration	Peak Discharge (gpm)	Average Annual Discharge (gpm)
I	5	1,300	550-900
I and II	3	5,140	2,200-3,500

The receiving waters for process water discharges from the West Range Site would be the CMP (proposed Outfall 001) and Holman Lake (proposed Outfall 002) as shown in Figure 2.3-3. Wastewater discharge rates to the CMP and Holman Lake would be inversely proportional to the cycles of concentration at which the cooling towers would be operated. The number of cycles of concentration operative in the Mesaba Generating Station would be determined by the concentration of mercury in the CMP waters and the conditions of an NPDES permit for discharges to Holman and Panasa Lakes. Excelsior expects that the Mesaba Generating Station would operate at five cycles of concentration during Phase I and at three cycles of concentration during combined Phases I and II. A NPDES permit would establish limits for parameters such as total concentration of mercury, TDS, and hardness.

Potable Water Supply

During construction, the Mesaba Generating Station would require a peak of 45,000 gallons per day of potable water based on 1,500 personnel using 30 gallons of potable water per day each. After construction of Phase I and II, the water demand will drop to about 7,500 gallons per day assuming 250 individuals on site year around. The annual usage for the facility during normal operation is estimated at approximately 2.7 million gallons. Two alternatives were considered to provide potable water to the West Range Site as described below. Alternative 1 is Excelsior's preferred alternative based on economic and permitting considerations.

Alternative 1 (Obtain Potable Water from the City of Taconite)

The closest potable water source to the site is the City of Taconite. To provide potable water to the West Range Site, an 8-inch diameter pipeline would be constructed from the Taconite system to the site as shown in Figure 2.3-3. A booster station would be needed near the connection point to the city water distribution system in order to provide the required water pressure for the Mesaba Generating Station. The booster station would pump water from the Taconite system at a variable rate from 20 to 100 gallons per minute. The wide pumping range would be required due to the fluctuations in water use that would occur throughout the day at the facility.

Taconite is currently authorized via Minnesota Department of Natural Resources (MNDNR) Water Appropriation Permit No. 1976-2206 to withdraw a total of 20 million gallons of groundwater per year to provide for its potable water needs. The most recently published records from the MNDNR show that between 1988 and 2005, inclusive, Taconite's groundwater withdrawal rates varied between 11.3 and 17.3 million gallons per year. The Mesaba Energy Project would require a peak usage rate of 16.5 million gallons per year during construction and average roughly 2.7 million gallons per year of potable water during operations. This indicates that, at present, the Taconite water supply system does not have sufficient capacity to supply potable water to the Mesaba Energy Project during the construction phase and that the system will be close to full capacity once operations of the Mesaba Energy Project begin.

In March 2007, the City of Taconite prepared and adopted a Water Management Plan (SEH, 2007) that identified the improvements required to supply for the needs of the community and the Mesaba Energy Project. These improvements include two additional groundwater wells, additional pumping facilities, and booster stations, along with future expansion of water storage facilities. If these system improvements are completed by the time construction begins on the Mesaba Energy Project, there will be sufficient water supply capacity, without affecting the existing firefighting and community needs. However, if these improvements were not completed prior to construction, Excelsior would provide potable water to meet construction workers' needs by bringing in tanker trucks or through development of its own wells.

Alternative 2 (Construct On-Site Water Treatment Facility)

Alternative 2 would consist of constructing an on-site treatment facility with the capacity to treat 7,500 gallons per day of water from the CMP and HAMP Complex to provide potable water to the Mesaba Generating Station. A micro-filtration system would be used to treat raw water pumped to the site from the local mine pits at a rate of 10 gallons per minute to meet potable drinking water standards. This treatment rate was determined based on a run time of approximately 12.5 hours to provide the daily water requirement of the facility. Construction of a building to house the filtration system, a 5,000-gallon underground reservoir, and pump would be required. The pump would supply the water from the reservoir to the facility at the required flow rate and pressure. Excelsior would own the water treatment facility and be responsible for the operation and maintenance of the facility.

The EPA classifies any facility that provides potable water to 25 or more of the same individuals every day as a non-transient non-community public water supply system. Because the Mesaba Generating Station would employ 182 permanent employees, it would fall into that classification. Therefore, the treatment facility must be operated by a certified water operator and the treated water must meet all standards of the Federal Safe Drinking Water Act and the Minnesota Department of Health (MDH). **Also, plans and specifications of any new water treatment facility would require MDH approval prior to construction.**

During construction of the Mesaba Generating Station, potable water would not be available until the process water features were completed. Therefore, potable water would be supplied to the site by other means (e.g., tanker trucks) during construction.

Domestic Wastewater Treatment Alternatives

Excelsior considered two alternatives for treating and disposing of domestic wastewaters produced during construction and operation of Phase I and Phase II. Alternative 1 would include the construction of an on site wastewater treatment plant. Alternative 2, preferred by Excelsior based on economic and permitting considerations, would connect the Mesaba Generating Station to the Coleraine-Bovey-Taconite wastewater treatment system via the Taconite pump station located approximately 2 miles south of the West Range Site. The alternatives are illustrated in Figure 2.3-3.

Alternative 1 (Construct On-Site Wastewater Treatment System)

Alternative 1 would consist of constructing an on site wastewater treatment facility using a stabilization pond adjacent to the Mesaba Generating Station with a capacity to treat 45,000 gallons per day of domestic wastewater (the maximum projected flow during construction). Once Phase I were operational, the wastewater treatment facility would receive a maximum of 7,500 gallons of domestic wastewater per day due to the reduced staff required to operate the station relative to that required during construction, and part of the wastewater treatment facility would be closed in accordance with Minnesota Rules.

Treated effluent from the domestic wastewater treatment facility would be routed off-site either through an 8-inch diameter gravity sewer to Little Diamond Lake or via the cooling tower blowdown pipeline to Holman Lake (or CMP) approximately 1.4 miles south of the West Range Site. The facility would require a NPDES permit to discharge treated domestic wastewater to Little Diamond Lake, Holman Lake, or the CMP. A part-time on-site licensed operator would be required to monitor discharges and ensure that the wastewater treatment facility meets the monitoring and discharge requirements specified in the NPDES permit.

Alternative 2 (Connect to the Coleraine-Bovey-Taconite Wastewater Treatment Facility)

Alternative 2 would discharge domestic wastewater to the Coleraine-Bovey-Taconite (CBT) wastewater collection and treatment system, which receives wastewater from the three cities and discharges treated effluent to the Swan River. The system has a design capacity of 499,000 gallons per day and received an average flow of 334,000 gallons per day during the period from January 1 through May 31, 2005. During the wettest 30-day period, the system received an average of 444,000 gallons per day with a peak day of 969,000 gallons per day.

Alternative 2 would consist of constructing approximately 10,000 feet of 12-inch gravity sewer, a pump station, and 2,400 feet of force main from the West Range Site to the City of Taconite's main pump station located in the northeast corner of the city (Figure 2.3-3). The alternative would require a 50-foot construction right-of-way and a permanent 30-foot ROW affecting approximately 14 acres and 8 acres, respectively. The facilities would have the capacity to convey a maximum projected wastewater flow of 30,000 gallons per day during construction (7,500 gallons per day during generating station operations), which is within the existing capacity of the Coleraine-Bovey-Taconite wastewater treatment facility (CBT WWTF).

NOTE: As explained in response to comments on the Draft EIS, the CBT WWTF has capacity available to treat sanitary wastewater from the Mesaba Energy Project as discussed in Sections 3.14.2.1 and 4.14.3.3 of this volume. However peak flows in collection sewers during wet-weather conditions can exceed the capacity of Taconite's main wastewater pump station and result in untreated sewage overflowing into a nearby wetland upstream of the Swan River. Also, during periods of heavy rainfall, the CBT collection system just north of Trout Lake can become overwhelmed by incoming wastewater. At such times, overflow pumps are activated to transfer untreated wastewaters into an adjacent holding tank. If the tank's capacity is exceeded, untreated wastewater can overflow into Trout Lake.

Therefore, in its commitment on January 21, 2008, Excelsior agreed to make significant capital improvements to the CBT WWTF when construction commences on the Mesaba Energy Project and to address excessive inflow and infiltration (I/I) rates exhibited by the Taconite collection system during periods of high rainfall or high groundwater. Excelsior proposes to help address this concern by expanding I/I studies for Taconite, helping fund efforts to fix major problems, and/or expanding the capacity of the overflow tank.

Also, although the CBT WWTF is equipped for addition of alum to flocculate dissolved phosphorus entering the system, no such additions are currently in practice. Excelsior proposes to fund the addition of such flocculants for as long as the Mesaba Generating Station is operative and the disposal of the biosolids collected. This would significantly reduce phosphorus loading to the Swan River from the CBT WWTF. Finally, Excelsior proposes to fund studies to determine whether sand filters would be effective for reducing mercury concentrations in the CBT WWTF effluent.

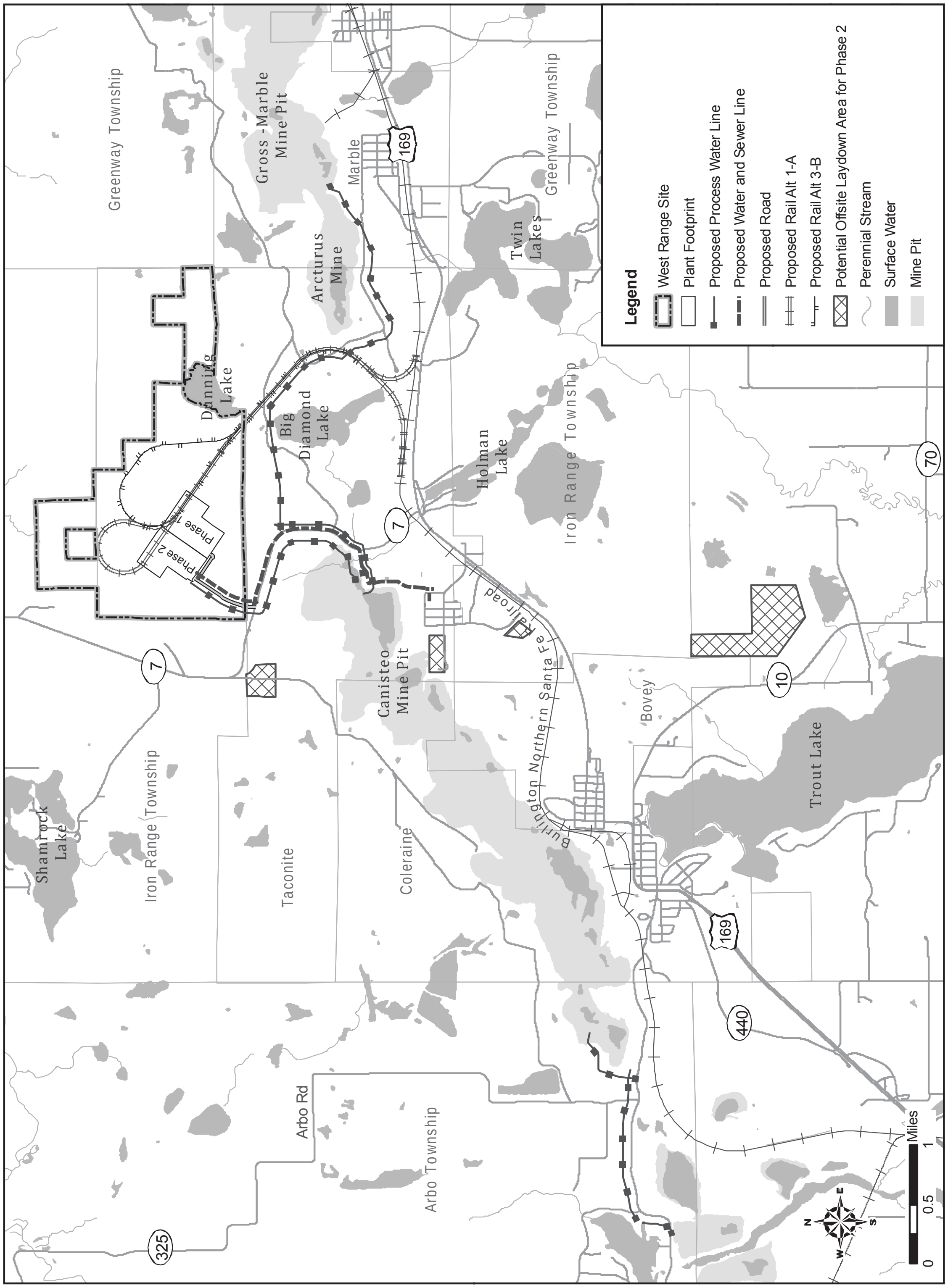

Figure 2.3-3. West Range Water Sources and Pipelines

Excelsior prefers Alternative 2 for treatment of domestic wastewater from the Mesaba Generating Station because it would avoid the discharge of treated domestic effluent to public waters impaired for DO and nutrients.

2.3.1.4 Natural Gas Facilities

As described in the Draft EIS, Excelsior **proposed** to construct, own, and operate one 16-inch (or potentially 24-inch) diameter gas pipeline to supply natural gas to the Mesaba Generating Station that would tap the two existing 36-inch GLG pipelines approximately 12 miles due south of the West Range Site. Three potential natural gas pipeline alternatives were initially considered by Excelsior to provide natural gas to the West Range Site as indicated in Table 2.3-3. Excelsior identified Alternative 1 as the preferred route (Figure 2.3-4) based on economic factors.

On March 7, 2007, Nashwauk Public Utilities Commission submitted a permit application (PUC Docket No. PL, E280/GP-06-1481**; http://energyfacilities.puc.state.mn.us/Docket.html?Id=19035**) proposing to construct and operate a 24-inch diameter, high-pressure natural gas pipeline between a take-off point on the existing 36-inch GLG pipelines in Blackberry Township and a termination point near the City of Nashwauk. The new pipeline would follow essentially the same alignment as proposed by Excelsior for its natural gas pipeline Alternative 1 between Blackberry and Taconite near the West Range Site. From Taconite, the proposed pipeline would follow an additional 9-mile alignment to the City of Nashwauk. The commission indicated in its application that the proposed pipeline would provide natural gas required to fuel the proposed Minnesota Steel facility and that the Nashwauk Public Utilities Commission would be seeking other industrial customers in the future. Therefore, the proposed gas pipeline would be sized to allow for industrial expansion near Nashwauk. Excelsior has indicated that if this pipeline were approved by PUC and constructed in sufficient time as to be available for use by the Mesaba Energy Project, Excelsior would enter into negotiations with the Nashwauk Public Utilities Commission to purchase nature gas from the utility and would not construct a separate natural gas pipeline for the power plant. **After publication of the Mesaba Draft EIS, the Minnesota PUC issued a Pipeline Route Permit dated April 16, 2008 for Nashwauk Public Utilities Commission to construct the pipeline.**

Table 2.3-3. Natural Gas Pipeline Alternative Routes – West Range Site

Attribute		Alternative 1	Alternative 2	Alternative 3
Pipeline Length	Existing Corridor	2.5 miles	10.5 miles	7 miles
	New Corridor	10.7 miles	4.5 miles	5.5 miles
Residential Dwellings	Within 300 ft	3	5	29
Water Crossings	Stream	4	4	4
	Lake	0	0	0

Both alternate routes, like the preferred route, would involve tapping the two existing 36-inch diameter GLG pipelines. Unlike the preferred route, a pipeline developed along either of the other routes would be licensed/permitted, constructed, owned and operated by NNG (as an interstate pipeline operator) rather than Excelsior. Both alternate routes would originate approximately 9.4 miles southwest of the West Range Site at the La Prairie tap and metering point located in La Prairie, Minnesota. Excelsior or the gas pipeline owner would negotiate with landowners for easements to install the pipeline on each individual tract that the route would cross.

2.3.1.5 HVTL Corridors

Overview

As discussed in Section 2.2.2.4, power systems are designed according to the single failure (n-1) criterion, which means that the power system must withstand the loss of a single line, generator, transformer or bus bar without any severe disturbance of power supply. Excelsior applied for a HVTL Route Permit including a combination of circuits and routes that would provide the necessary reliable interconnection of Phases I and II to the power grid in accordance with the single failure criterion.

Point of Interconnection

The POI for the Mesaba Generating Station at the West Range Site would be the existing, 230/115-kV Blackberry Substation owned and operated by MP and located approximately 8.5 miles south-southeast of the West Range Site. The substation is located at the intersection of CR 10 and CR 434 about equidistant between the unincorporated community of Blackberry and the community of Marble. The Blackberry Substation is the major HVTL hub in the area (Figure 2.3-4).

Alternative HVTL Routes to Support the West Range Site

As described in Section 2.2.2.4, Excelsior believes that 345-kV will be the future standard for transmission developments on the Iron Range. Currently, however, there is no 345-kV transmission infrastructure at the Blackberry Substation, and the likelihood of future 345-kV development at the station is dependent on the results of MISO Interconnection Studies. Until MISO confirms its decision on the interconnection voltage for Phases I and II, Excelsior has requested an HVTL Route Permit that would allow flexibility to change its West Range Site interconnection voltage plans. Excelsior's Plan A assumes the use of 345-kV circuits, while Plan B provides a contingency to allow the use of 230-kV circuits. Both plans provide capacity for the Phases I and II combined output and allow for redundancy to meet the single failure criterion. Accordingly, and in compliance with Minnesota Rules Chapter 4400, Excelsior's plans provide for preferred and alternative routes (that follow three potential alignments) as described below and illustrated in Figure 2.3-4.

Plan A

Plan A would utilize two 345-kV HVTLs on a single steel pole structure (single ROW) from the Mesaba Generating Station to the Blackberry Substation. This double-circuit 345-kV plan would accommodate the full **nominal 1,200**-MWe output of Phases I and II while meeting the single failure criterion. Each 345-kV HVTL would have sufficient transfer capacity to carry the entire station electrical output, and both lines would be installed during construction of Phase I. For Phase I, each of the two 345-kV HVTLs would be operated at 230 kV, and either line would be capable of supporting the entire output of the plant in the event of a contingency forcing one line out of service. Before Phase II would come on line, each of the 345-kV HVTLs operating at 230-kV would be upgraded to its rated 345-kV capacity and thereafter be capable of conveying the entire output capacity of the generating station to the substation. The necessary upgrades would apply only to electrical substation equipment and involve no modification to the HVTL structures or conductors installed to accommodate Phase I.

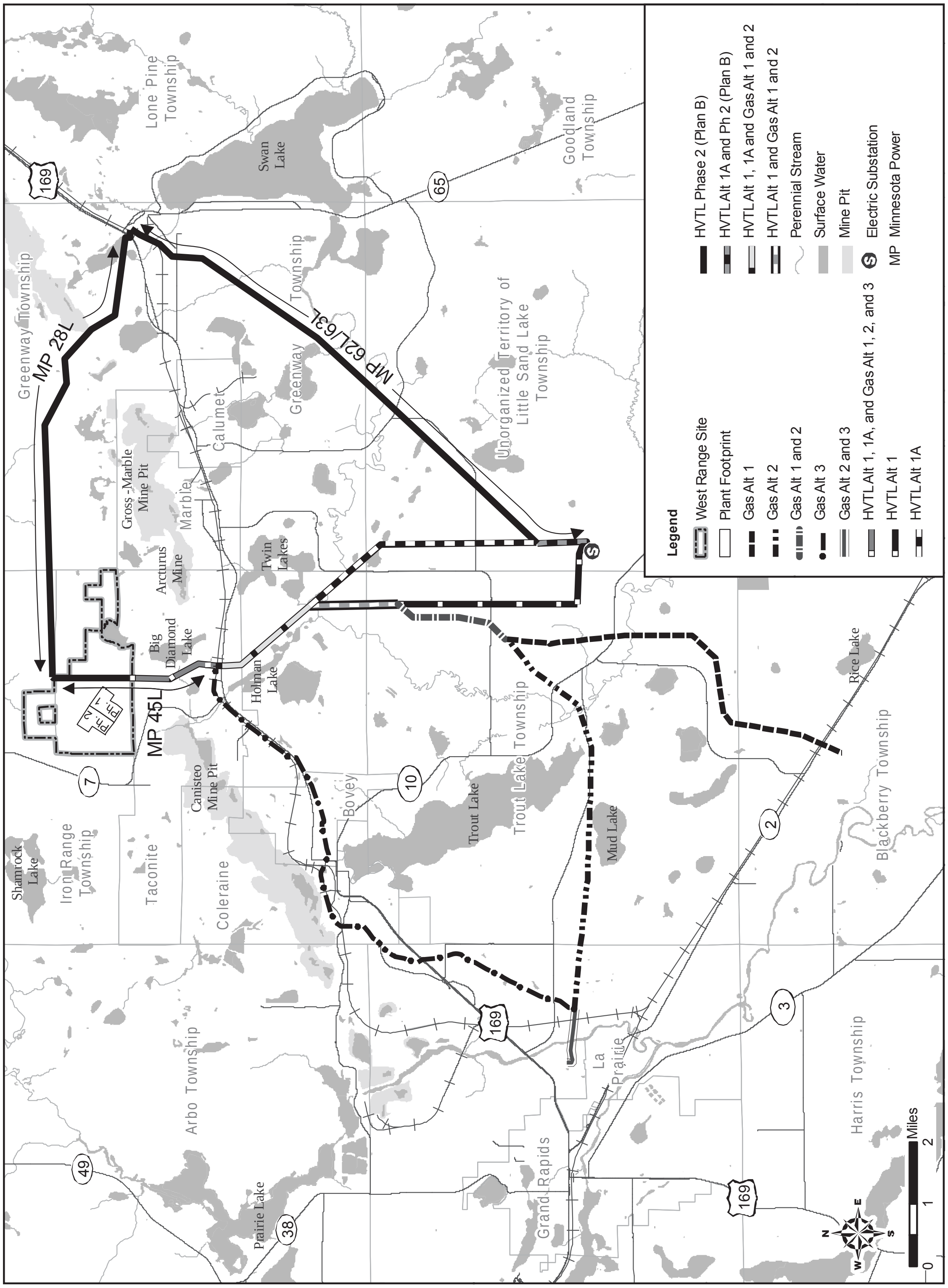

Figure 2.3-4. West Range Natural Gas Pipeline and HVTL Alternatives

Plan A provides for a preferred route (WRA-1, following alignment HVTL-1) and an alternative route (WRA-1A, following alignment HVTL-1A) as illustrated in Figure 2.3-4. Both routes would share two common segments (one existing and one new ROW), and each route would include two unique segments (one existing ROW and one new ROW). The major difference between the routes is that WRA-1A would run east of and parallel to Twin Lakes Road, while WRA-1 would run west of and parallel to Twin Lakes Road. Both routes would avoid residences located on the road. Excelsior prefers WRA-1 because it would have fewer water crossings, would cross fewer open fields, would avoid gravel mining operations, and would generally be less visible **from public recreation areas**. Both routes are similar in that they traverse areas that have a similar residential density and are the shortest and most direct routes to the substation.

Plan A – Excelsior's Preferred Route (WRA-1)

The preferred 345-kV double circuit HVTL route (WRA-1) would follow an alignment HVTL-1 including the following four segments:

(1) Approximately 1.6 miles of existing ROW shared with a MP 45 Line (45L) from the southern boundary of the West Range Site south to the retired Greenway Substation located just south of US 169.

(2) Approximately 1.7 miles of new ROW from the retired Greenway Substation south and southeast to a point near Twin Lakes.

(3) Approximately 4.6 miles of new ROW from the point near Twin Lakes south to the point of intersection with MP's 83L (230-kV) and 20L (115-kV) HVTL ROW.

(4) Approximately 1 mile of existing ROW shared with MP's 83L and 20 Line 20L ROW east to the interconnection with the Blackberry Substation.

The new alignment segments would require a ROW with a minimum width of approximately 92 feet; however, Excelsior intends to acquire 100-foot ROWs (150-foot where natural gas pipeline and HVTL would share routes), which would result in a total permanent ROW of approximately 134 acres. Existing HVTL ROWs would not require widening of corridors. Approximately 66 residences would be located within a half mile of the centerline of the preferred alignment, of which 17 would be located within a quarter mile of the alignment. One residence would be located within 300 feet of the alignment and three others would be located within 500 feet.

Plan A – Excelsior's Alternative Route (WRA-1A)

Because route WRA-1 would require acquisition of about 6 miles of new ROW between the Greenway Substation and the point of intersection with MP's 83L and 20L HVTLs, Excelsior is required by Minnesota Rules 4400.1150 Subpart 2.C to consider an alternative route.

The alternative route (WRA-1A) would follow alignment HVTL-1A and include the following four segments:

(1) Same as first segment of WRA-1 (1.6 miles, existing ROW).

(2) Same as second segment of WRA-1 (1.7 miles, new ROW).

(3) Approximately 4.1 miles of new ROW from the point near Twin Lakes southeast then south to the point of intersection with MP's 62L (115-kV) HVTL ROW.

(4) Approximately 0.9 miles of existing ROW shared with MP's 62L (115-kV) HVTL ROW south to the interconnection with the Blackberry Substation.

The new alignment segments would require a ROW with a minimum width of approximately 92 feet. However, Excelsior intends to acquire 100-foot ROWs (150-foot where natural gas pipeline and HVTL would share routes), which would result in a total permanent ROW of approximately 121 acres. Existing HVTL ROWs would not require widening of corridors. Approximately 62 residences would be located within a half mile of the centerline of the preferred alignment, of which 21 would be located within a quarter mile of the alignment. Two residences would be located within 300 feet of the alignment and five others would be located within 500 feet.

Plan B

If MISO determines that the 345-kV transmission infrastructure is incompatible with regional transmission planning initiatives, or if the timetable for building 345-kV transmission in the region would not be acceptable, Excelsior would implement a 230-kV transmission contingency plan. Plan B would begin by interconnecting the generating station to the POI with two 230-kV HVTL circuits mounted on a single steel pole structure, which would accommodate the full **600**-MWe output of Phase I and meet the single failure criterion. Although the double-circuit 230-kV HVTLs could accommodate the entire **1,200-**MWe output of the combined Phases I and II, they would not meet the single failure criterion. Therefore, Plan B would provide for an additional HVTL with the construction of Phase II. The routes considered under Plan B are discussed in the four subsections below and shown in Figure 2.3-4.

Plan B, Phase I – Excelsior's Preferred Route (WRB-1)

The preferred route for the double-circuit 230-kV HVTLs for Phase I of Plan B (WRB-1) would follow alignment HVTL-1, the same as the preferred route WRA-1 of Plan A. However, the single-pole HVTL structures required for 230-kV HVTLs would be shorter, ranging in height from 107 to 143 feet. Approximately 10 structures would be 125 feet or taller. The new alignment segments would require a ROW with a minimum width of approximately 73 feet. Existing HVTL ROWs would not require widening of corridors.

Plan B, Phase I – Excelsior's Alternative Route (WRB-1A)

The alternative route for the double-circuit 230-kV HVTLs for Phase I of Plan B (WRB-1A) would follow alignment HVTL-1A, the same as the alternative route WRA-1A of Plan A.

Plan B, Phase II – Excelsior's Preferred Route (WRB-2)

The preferred route for Phase II of Plan B would be the route not selected for the double-circuit 230-kV HVTL in Phase I of Plan B. That is, if Excelsior's route WRB-1 (alignment HVTL-1) were approved for Phase I, route WRB-1A (alignment HVTL-1A) would be the preferred route for the single circuit 230-kV HVTL for Phase II. Conversely, if WRB-1 were not approved as the preferred route for Phase I of Plan B, it would be proposed as the preferred route for Phase II of Plan B.

The structures and new ROW requirements for the separate alignments would be comparable to those described for WRB-1; however, the single-circuit 230-kV alignment would enable the use of shorter poles (by approximately 20 feet). In the segments where the double-circuit 230-kV HVTL alignment would coincide with the single-circuit 230-kV alignment, a minimum permanent ROW width of approximately 138 feet would be required for the parallel pole structures (affecting approximately 1.7 miles of new ROW). The new alignments for Plan B, Phases I and II (including both routes) would require permanent ROWs affecting approximately 255 acres. Existing HVTL ROWs would not require widening of corridors.

Plan B, Phase II – Excelsior's Alternative Route (WRB-2A)

Plan B would require an alternative route for the same reason as Plan A. The alternative route proposed for Phase II of Plan B would combine segments from two existing HVTL corridors, one of which traverses the northern section of the West Range Site. WRB-2A (alignment HVTL Phase 2 in Figure 2.3-4) would follow an alignment including portions of the ROWs for the MP 45L/28L and 62L/63L HVTLs. Because the length of the HVTL for WRB-2A would be about 18 miles, Excelsior proposes to use HVTLs rated at 345-kV on this route to avoid excessive line losses and elaborate switching requirements that would be required for 230-kV. Both of the existing corridors are occupied by 115-kV HVTLs structures owned by MP. Therefore, Excelsior proposes to use delta configuration 345-kV structures with an underbuild feature that would carry the existing 115-kV HVTLs below the arms holding the 345-kV conductors. The delta configuration structures would require a minimum permanent ROW width of approximately 106 feet, which is generally within the parameters of the existing HTVL ROWs. Therefore, the new alignments for Plan B, Phases I and II (including both routes) would require permanent ROWs affecting approximately 134 acres. Approximately 214 residences are located within a half mile of the ROWs that would be used for Alternative Alignment WRB-2A, 98 of which are located within a quarter mile of the ROWs. Eight residences are located within 300 feet of the ROWs and 21 others are located within 500 feet.

2.3.2 East Range Site and Corridors

2.3.2.1 Proposed IGCC Plant Site

The East Range Site, including the power plant footprint and buffer land, is located within the City of Hoyt Lakes in St. Louis County, Minnesota (Figure 2.3-5). The site is generally bounded by CR 666 to the east and a large mine tailings pile to the west. An existing 138-kV HVTL corridor leading to MP's Laskin Substation runs along the western boundary, and a rail line owned by a CN subsidiary runs along the east and south sides of the property. The site encompasses approximately **1,322** acres of undeveloped property owned by CE within the Superior National Forest and is zoned a mining district (MD) to support mining operations that historically took place within the immediate vicinity of the site. The site has direct access to CR 666 and includes a private, unpaved road used by CE to access its water pumping station on Colby Lake. The closest residential properties are located along the southeast shore of Colby Lake, approximately 1.2 miles south of the power plant footprint.

As described in Section 2.2.4.1, off-site staging and lay-down areas would be acquired to provide 85 acres of land supporting construction of Mesaba Phase II. Figure 2.3-5 shows the candidate locations for the East Range Site.

2.3.2.2 Transportation Facilities

Existing Rail Lines in the Vicinity of the East Range Site

One railroad, a subsidiary of CN, serves the area and could be used to transport coal and other materials to the East Range Site. The nearest access to the BNSF Railway is at Hibbing, 40 miles from the East Range Site. Therefore, the CN would be the only feasible near-term rail provider to the East Range Site. The power plant footprint is located approximately 1 mile north and 1 mile west of two CN railroad tracks. The east-west track runs from Eveleth, Minnesota, to Two Harbors, Minnesota. The north-south track connects with the east-west track at Wyman Junction (about 1.7 miles southeast of the East Range Site) and extends north to Embarrass, Minnesota.

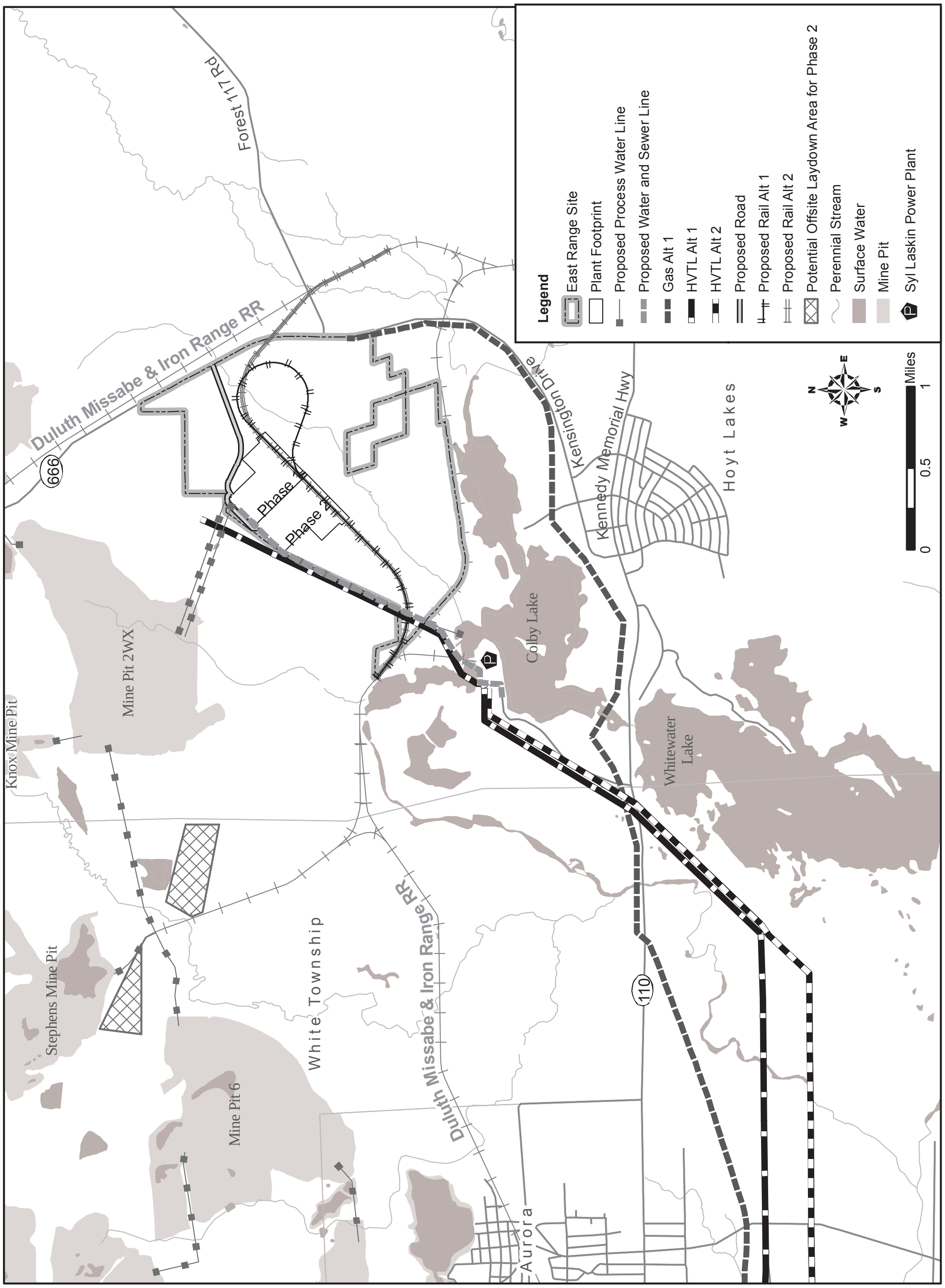

Figure 2.3-5. East Range Plant Site

The CN operates trains daily on the track serving Minnesota Power's Syl Laskin Generating Station. Coal would be delivered by other railroads to the CN at either Superior, Wisconsin, or at a rail yard south of Eveleth, Minnesota. The CN rail line would be used to deliver coal to the site from Eveleth, and empty trains would return by the same route.

Rail Access to the East Range Site

Excelsior considered two alternative rail alignments (Alternative 1 and Alternative 2) to connect the East Range Site to the existing CN rail line. Figure 2.3-6 shows the alternatives, which are described below. Table 2.3-4 summarizes of each alternative. **Following publication of the Draft EIS, USACE, EPA, and other agencies submitted comments expressing their concerns about the extent of wetlands impacted by the rail alternatives.** In particular, **USACE expressed the need** to avoid and minimize impacts to wetlands **in the siting of the Mesaba Energy Project and associated infrastructure. DOE discussed these concerns with USACE in several telephone conferences and meetings during 2008 and conferred with Excelsior to address the need** to **avoid and minimiz**e **impacts to wetlands. The updated DOE Wetland and Floodplains Impact Assessment (Appendix F2) summarizes Excelsior's efforts in coordination with DOE. The Excelsior efforts to address the USACE concerns regarding avoiding and minimizing impacts to wetlands did not result in additional rail alignments for the East Range Site for evaluation in the Final EIS.**

Table 2.3-4. Rail Access Alternatives – East Range Site

Attribute	Alternative 1	Alternative 2
Total length of track (miles)	3.4	3.5
Off-site length of track (miles)	1.25	2.1
Train speed (mph)	10	10
Maximum grade	0.40%	0.40%
Maximum Curvature (loaded coal train)	2 degree 30 minutes	3 degrees
Off-site right-of-way (acres)	15	26
Largest cut (feet)	50	50
Largest fill (feet)	20	20
Approximate cut Qty (cubic yards)	2,390,000	2,180,000
Approximate fill Qty (cubic yards)	**123,000**	**116,000**
Potential wetland impact (acres)	59	18
No. of residences within 1,000 feet	0	0
Closest residence (feet)	Over 1,000 feet	Over 1,000 feet
Alignment Meets Applicable Standards	Yes	Yes

Rail Line Alternative 1

Alternative 1 would provide a traditional coal loop, which could accommodate a unit train that would return in the same direction. The track would originate near MP's Syl Laskin Generating Station rail spur and travel east-northeast to the Mesaba Generating Station. The track would be about 17,800 feet long. No residential dwellings are located near the proposed alignment.

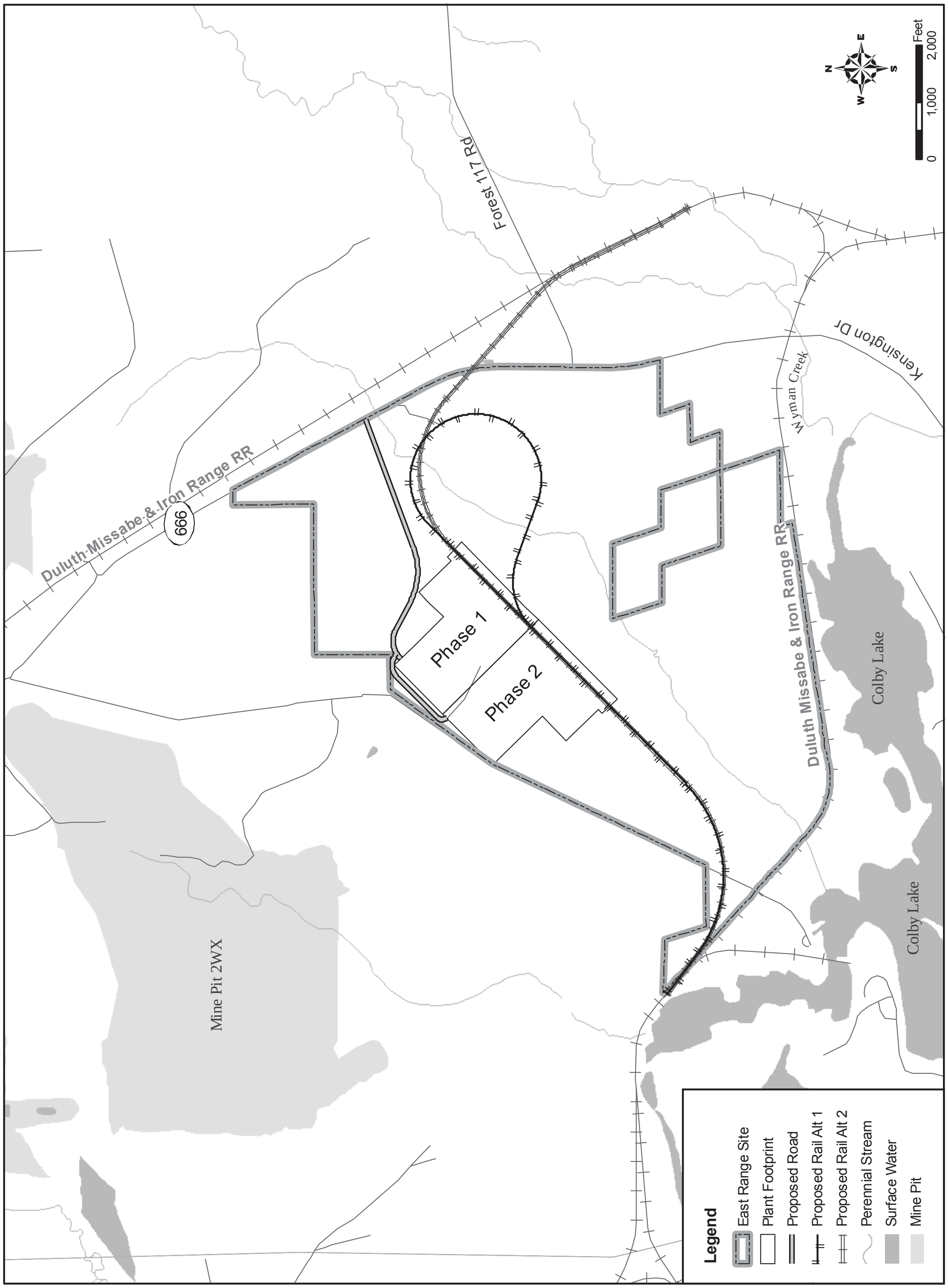

Figure 2.3-6. East Range Rail & Road Alternative

Rail Line Alternative 2

Alternative 2 would accommodate a complete coal train, but it would cross the site (rather than looping within it) and connect to the CN north-south track just north of Wyman Junction. This track would be about 18,500 feet long with the rotary coal dumper near the midpoint. The track would depart the Syl Laskin spur at an elevation of 1,455 feet, climb to an elevation of about 1,465 to 1,470 feet at the coal dumper, and continue to climb to about 1,485 feet at the north-south CN track. To maintain a workable grade, the track would need to cross under CR 666, which would require construction of a roadway bridge.

This alternative may have a lesser impact on wetlands; however, it would limit the choices for locating the rotary coal dumper, and it would cause trains to climb 35 feet in elevation from west to east making the profile grades difficult. The alternative would also affect a wider area than Alternative 1. Based on these factors, Excelsior prefers Alternative 1.

Other Rail Alternatives Considered

The East Range Site could also receive shipments of fuel via water at Taconite Harbor, with transportation to the site via CE's privately owned 70-mile rail line that served the former LTV Mining operations. However, Excelsior does not consider this alternative feasible in the near term.

Roadway Access to the East Range Site

Local Roadways

Roadway transportation in the area of the East Range Site is provided by county roads. The nearest state highway is State Route (SR) 135, approximately 7 miles west of the site. The primary county road is CR 110, which departs from SR 135 in Aurora and passes through Hoyt Lakes. CR 110 is the western terminus of the Superior National Forest Scenic Byway (SR 11). This byway is newly constructed and connects the north shore of Lake Superior with the Mesabi Iron Range. The east-west section of CR 110 in Hoyt Lakes passes approximately 1.6 miles south of the East Range Site. Key local roadways are shown in Figure 2.3-6.

Traffic approaching the East Range Site from the west would travel on CR 110 and turn north onto CR 666 in Hoyt Lakes. This intersection is controlled as a four-way stop. CR 666 extends to the north about 1.6 miles, where it adjoins the eastern boundary of the East Range Site for a distance of about 1.4 miles. It continues beyond the East Range Site for about 2.1 miles north-northwest to the CE administration building. Traffic approaching the East Range Site from the east on CR 110 would turn north onto Hampshire Road in Hoyt Lakes for about 0.3 miles, then turn northeast onto CR 666 toward the site.

Proposed Access Road

After publication of the Draft EIS, Excelsior reconsidered the need for a looped access road based on comments received from USACE regarding potential impacts on wetlands. Therefore, as shown in revised Figure 2.3-6, only the southern portion of the access road described in the following paragraph would be constructed.

CR 666 adjoins the proposed East Range Site and is the most practical choice for public road system access. The proposed access road (Figure 2.3-6) would consist of a looped roadway intersecting CR 666 at two locations to provide gentle curves and good sightlines. Traffic would enter the site from the north access point. During construction and other periods of peak volumes, traffic would exit the site at the south access point. Having two access points from CR 666 would also provide flexibility in accessing the Station during construction and when maintenance or construction work is performed on CR 666.

2.3.2.3 Water Sources and Discharges

Process Water Supply

The water requirements for the East Range Site would be less than required by the West Range Site **as originally proposed** because an enhanced ZLD system as described in Section 2.2.1.4 (required to comply with stringent regulations affecting discharges to Lake Superior Basin surface waters) would be used to recycle water to the maximum extent possible. Water requirements can be reduced by up to **900** gallons per minute per phase through such recycling efforts. **As discussed previously, Excelsior has subsequently committed to enhanced ZLD treatment at the West Range Site, making water requirements equal for both sites.** The enhanced ZLD system would allow for the potential use of wastewaters from other industrial neighbors, but **due to lower source water quality,** the system would require power above that required for a station at the West Range Site making the generating station at the East Range Site less efficient and more costly to operate. The system also would produce large amounts of residual minerals that would require landfilling in a permitted facility.

Process water for the East Range Site would be drawn from numerous mine pits located in the vicinity. The water level in several of these pits is rising, but there is currently no need to control water levels at any of these pits. Therefore, water could be pumped as needed to support the Mesaba Generating Station **without posing public health risks**. Mine Pit 2 West Extension would serve as the primary source (similar to the CMP at the West Range Site). A permanent pumping station would be added to this mine pit, and the pit would receive input from one or more of the pits listed in Table 2.3-5. **In the event that mining occurs in Mine Pit 2 West Extension, other mine pits could serve as alternative reservoirs (e.g., Stephens Mine Pit).** Excelsior proposes to link the various mine pits using water intakes, pump stations, and pipelines as illustrated in Figure 2.3-7. **Note that disused mine pits shown on this and other figures in this EIS have been filling with surface water and groundwater. Therefore, the areas within these pits shown as surface waters based on available geographic information system data may not represent the actual extent of surface waters currently in these pits.** In the event of high inflow rates into Colby Lake during spring runoff or during high precipitation events, water also may be pumped from Colby Lake into Mine Pit 2 West Extension **or other available mine pits. New text was added below which discusses potential conflicts with Mine Pit 2 West Extension and other water sources identified in the Draft EIS. New text in Section 4.5.4.1 discusses new water sources identified since publication of the Draft EIS. Table 2.3-5 has been revised to reflect these updates.**

Table 2.3-5. Process Water Sources – East Range Site

Water Source	Estimated Range of Flow (gpm)	Average Annual Flow (gpm)
Mine Pit 6[1]		1,800 **(Minnesota Mining/Steel Dynamics (SD) is proposing to dewater and mine therein; however, no permit acquired yet for use.)**
Mine Pit 2 West Extension[1]		**0 (Minnesota Mining/SD proposing to dewater and mine therein and has a permit for standby appropriation; thus, assuming no longer available.)**
Mine Pit 2 West[1]		900
Mine Pit 2 East[1]		100
Mine Pit 3[2]	150-450	300
Mine Pit 9 (Donora Mine Pit) [2]	130-380	260
Stephens Mine Pit [2]	190-590	390
Knox Mine Pit[2]	20-70	45
Mine Pit 9S[2]	90-270	180
Mine Pit 1 Effluent (Mesabi Nugget's Outfall SD001)[3]	0-1,000	1,000
PolyMet Mining Dewatering Operations[4]	2,000-8,000	**0 (PolyMet/NorthMet would use for internal processes; thus, assuming no longer available.)**
Mine Pit 5N[5]	**800-850**	
Colby Lake[6]		**5,600* (PolyMet/NorthMet plans variable use of Colby Lake)**
Total Water Available		**11,375**
Average Water Requirements (Phase I/Phases I and II)[6]		**3,500/7,000**
Peak Water Requirements(Phase I/Phases I and II)[6]		5,000/10,000

[1] East Range Hydrology Report, MNDNR, Division of Lands and Minerals, Division of Waters, March 2004.
[2] Range of flow based on the surface drainage area to the pit and average yearly rates of runoff. This should be considered a gross approximation as the actual flow rates are likely much more dependent on groundwater components. The groundwater inflow/outflow component in this area can be highly variable as a result of fractures in the bedrock and/or highly pervious tailings dikes. Due to the complexity associated with the groundwater component, groundwater inflow/outflow has not been evaluated.
[3] Minnesota Pollution Control Agency NPDES Permit Issued to Mesabi Nugget. Mine Pit 1 effluent represents the wastewater discharged from Mesabi Nugget's permitted operation of Mine Pit 1 in accordance with terms of a NPDES Permit.
[4] North Met Mine Environmental Assessment Worksheet.
[5] Excelsior meeting with PolyMet, Hoyt Lakes, MN, July 22, 2008.
[6] Cliffs-Erie **historic use via** Water Appropriation Permit No. 490135; permitted withdrawal is 12,000 gpm daily average over continuous 60-day average; 15,000 gpm peak; and 6,307.2 million gallons per year (Assumes no discharge from the operation of the Mesaba Generating Station). *** Approximate average appropriation rate in CY2000 (2,900 gpm was erroneously presented in the Draft EIS. The total CY2000 appropriation was 2,900 million gallons, which translates to an average appropriation rate of 5,600 gpm.)**
[7] From Table 2.2-3.

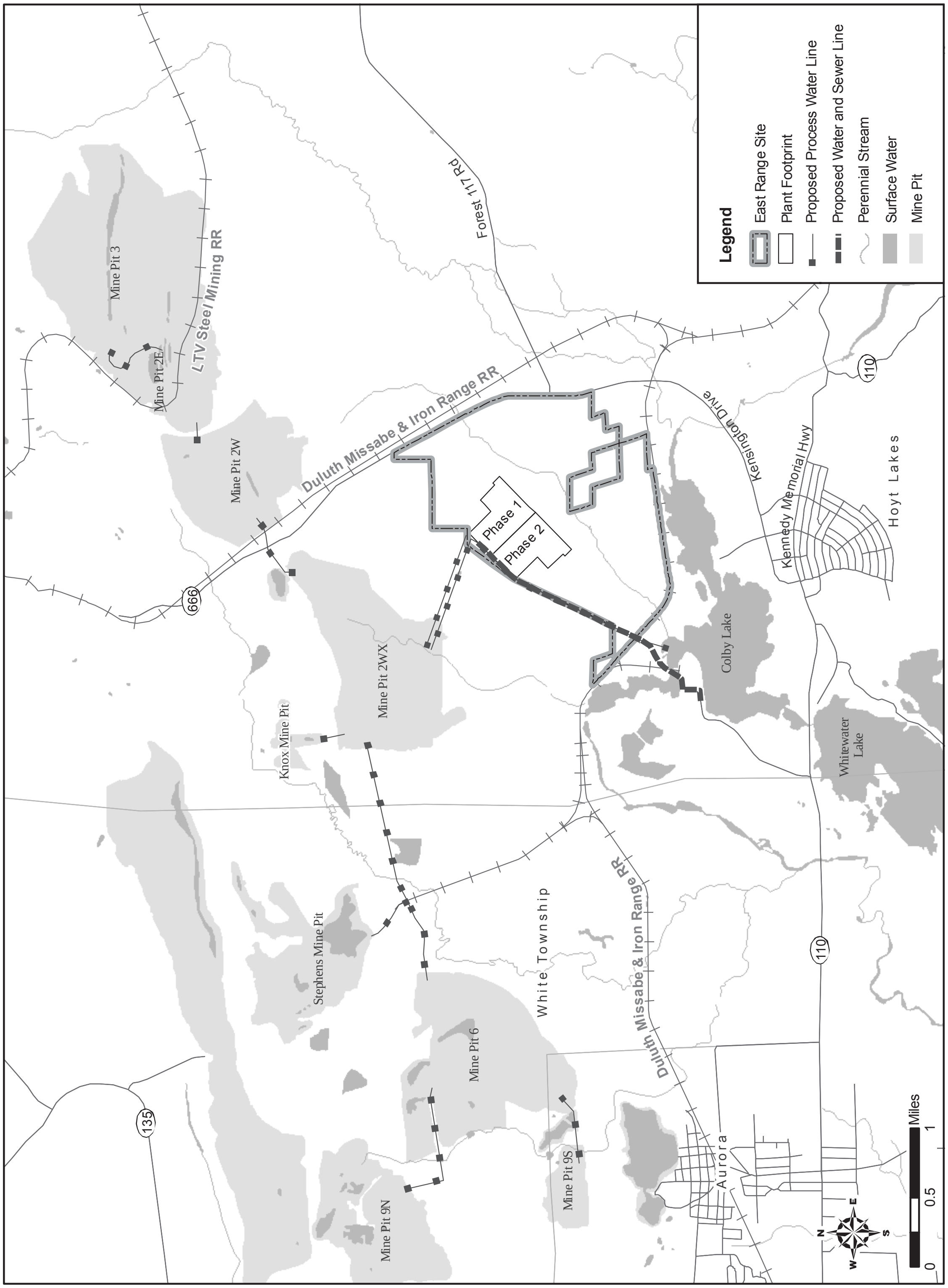

Figure 2.3-7. East Range Water Sources and Pipelines

Process Wastewater Discharges

The East Range Site is located within the Lake Superior Basin watershed, which is regulated for bioaccumulative chemicals of concern (BCCs), such as mercury, in discharges. Water quality criteria applied to waters located within the Lake Superior Basin are defined at Minnesota Rules 7052.0211 Subpart 3 ("Mixing zones for BCCs") states:

> *After March 9, 1998, acute and chronic mixing zones shall not be allowed for new and expanded discharges of bioaccumulative chemicals of concern (BCC) to the Lake Superior Basin.*

The water quality criterion for mercury in all waters within the Lake Superior Basin watershed is 1.3 nanograms per liter. Sampling in two of the pits from which water supplies for the Mesaba Generating Station would be appropriated showed median concentrations of 0.75 nanograms per liter for mercury, meaning that the cycles of concentration at which the cooling towers could operate would be reduced so severely as to preclude the use of these sources. Excelsior concluded that there are no proven technologies to remove mercury at such low concentrations at the high flow rates that would be necessary to operate the Mesaba Generating Station (the peak discharge from Phase I and II would approach 3,500 gallons per minute).

Excelsior's preferred method for dealing with the mercury discharge limitations at the East Range Site would be to totally eliminate the discharge of cooling tower blowdown by expanding the use of ZLD technologies to address all of the generating station's process wastewater streams. The system would evaporate any water that could not be reused in the plant processes leaving only a solid stream of salts for disposal at a licensed treatment/disposal facility. The process would significantly increase the cost of the Mesaba Generating Station but would enable utilization of the East Range Site.

Excelsior considered discharging process wastewater to the Hoyt Lakes POTW as an alternative, but the POTW does not have sufficient existing capacity to manage the daily volumes of cooling tower blowdown. An expansion of the POTW could not be done without a major non-degradation study.

Potable Water Supply

Excelsior considered two alternatives to provide potable water to the Mesaba Generating Station at the East Range Site. Alternative 1 would rely on a connection to the Hoyt Lakes water system; Alternative 2 would provide an on-site water treatment facility. Alternative 1 is Excelsior's preferred alternative based on economic and permitting considerations.

Alternative 1 (Obtain Potable Water from the City of Hoyt Lakes)

The City of Hoyt Lakes 1.5 million gallons per day water treatment plant, which treats surface water from Colby Lake, has adequate capacity to meet the potable water needs of the Mesaba facility. For Excelsior's preferred alternative, a 6-inch diameter pipeline would be constructed approximately 11,000 feet from the East Range Site connecting to a 12-inch water main that serves Minnesota Power (Figure 2.3-7). MP uses an average of 75,000 gallons per day or 100 gallons per minute over a 24-hour period, which would leave adequate capacity in the existing 12-inch water main to supply the additional potable water requirement for Phase I and II of 45,000 gallons per day during construction and 7,500 gallons per day during operations. The proposed 6-inch pipeline would provide the required flow and pressure to the Mesaba Generating Station without the need for a booster station. The City of Hoyt Lakes would own and maintain the pipeline, and Excelsior would enter into an agreement with the city to purchase water.

Alternative 2 (Construct On site Water Treatment System)

Alternative 2 would consist of constructing an on-site treatment facility with the capacity to treat 7,500 gallons per day of potable water for Phases I and II operations. A micro-filtration system similar to that required for the West Range IGCC Power Station would be used to treat a portion of the process water procured for project cooling systems that would be pumped to the East Range Site from nearby mine pits. Chemical treatment of the source water may be required to meet all standards of the Federal Safe Drinking Water Act and the Minnesota Department of Health and would be determined during detailed engineering design of the Mesaba Generating Station. Excelsior would own the water treatment facility and be responsible for its operation and maintenance. **Also, plans and specifications of any new water treatment facility would require MDH approval prior to construction.**

During construction of the Mesaba Generating Station, potable water would not be available until the process water features were completed. Therefore, potable water would be supplied to the site by other means (e.g., tanker trucks) during construction.

Domestic Wastewater Treatment Alternatives

Excelsior considered two alternatives for treating and disposing of domestic wastewaters produced during construction and operation of Phases I and II. Alternative 1 would include the construction of an on-site wastewater treatment plant. Alternative 2, preferred by Excelsior based on economic and permitting considerations, would connect the Mesaba Generating Station to the existing Hoyt Lakes wastewater treatment system. The alternatives are illustrated in Figure 2.3-7.

Alternative 1 (Construct On site Wastewater Treatment Facility)

The on-site WWTF for the East Range Site would be comparable to the facility described for the West Range Site. A 12-inch gravity sewer would be constructed to convey treated effluent to the mine drainage stream running from northeast to southwest through the site and discharging into Colby Lake.

A disadvantage of this alternative is that the treatment facility would be required to have a capacity of 45,000 gallons per day to meet construction demands, but would receive only about 25 percent of this design flow once construction was completed. Thus, part of the facility would have to be closed and other modifications made to the facility after completion of Phase II. Another disadvantage is that effluent from the system would discharge into Colby Lake, which is the source for the Hoyt Lakes drinking water treatment plant. A part-time on-site licensed operator would be required to monitor discharges and ensure that the wastewater treatment facility meets the monitoring and discharge requirements specified in the NPDES permit.

Alternative 2 (Connect to the Hoyt Lakes Wastewater Treatment System)

Excelsior's preferred alternative, Alternative 2, would discharge domestic wastewater to the City of Hoyt Lakes' wastewater collection and treatment system. The City of Hoyt Lakes owns, operates, and maintains a POTW that receives wastewater from the residential, commercial and industrial establishments within the service area and discharges treated effluent to Whitewater Lake. The system has a design capacity of 680,000 gallons per day and receives an average flow of approximately 300,000 gallons per day.

Alternative 2 would consist of constructing approximately 9,500 feet of 12-inch diameter gravity sewer, a pump station, and about 2,500 feet of 4-inch force main. The wastewater piping would parallel the existing HVTL easement along the west side of the proposed property boundary, south to Colby Lake.

A pump station would be located on the north side of Colby Lake. The 12-inch diameter sewer would have ample capacity to convey the estimated wastewater flow of 45,000 gallons per day during construction, and the Hoyt Lakes wastewater treatment facility has adequate capacity to treat the estimated flow from the proposed project. The City of Hoyt Lakes would operate and maintain the sewer line and would be compensated through sewer user fees.

2.3.2.4 Natural Gas Facilities

NNG is the only pipeline company serving the immediate vicinity of the East Range Site. A 10-inch diameter branch of NNG's pipeline from Iron Junction, Minnesota serves the nearby CE plant (the CE branch) and directly abuts the eastern boundary of the East Range Site. However, this branch line lacks adequate capacity to supply the Mesaba Generating Station demand. Therefore, to provide natural gas in the quantity and at the pressure required to supply the Mesaba Generating Station, the following infrastructure would be required:

- Installation of approximately **29** miles of new, 16- to 24-inch pipeline placed within the existing ROW for the 10-inch CE branch line.
- Addition of a new compressor at the existing point where the GLG and NNG pipelines interconnect.
- Installation of an ultrasonic meter facility to serve the Mesaba Generating Station.

The proposed pipeline route is illustrated in Figure 2.3-8. As an interstate pipeline, the East Range natural gas supply pipeline would not be subject to Minnesota Pipeline Route Permit requirements but would be permitted by NNG under the Federal Energy Regulatory Commission (FERC) review process. Approximately 856 residences are located within a half mile of the existing pipeline ROW, 46 of which are located within 300 feet of the ROW.

2.3.2.5 HVTL Corridors

Overview

Excelsior would configure the high voltage switchyard for the East Range Site at 345-kV for both phases of the Mesaba Generating Station. The option to operate the switchyard at 345-kV at the start of Phase I was based on a 5-MWe lower net line loss than would occur if the facilities were operated at 230-kV. Over the project life, the capacity gain associated with the 345-kV option would offset its higher capital cost. The high voltage switchyard required to transmit the entire output from Phase I and Phase II to the point of interconnection with minimum line loss would be installed during construction of Phase I. No further development would be required to accommodate Phase II.

Point of Interconnection

Transmission lines near the East Range Site are part of the MP transmission network known as the "North Shore Loop," which extends from the east end of the Iron Range, along the north shore of Lake Superior, and into Duluth. The 115/138-kV transmission facilities that make up this loop are heavily loaded and currently operate with several special protection schemes involving generation reduction and/or unit tripping to avoid overloading the remaining transmission facilities during critical equipment outages. To minimize the impact on this already constrained local transmission system, Excelsior proposes to construct new HVTLs to the Forbes Substation, approximately 30 miles directly west-southwest of the East Range Site, which would be the POI for the Mesaba Generating Station (Figure 2.3-8). The Forbes Substation is a major electrical hub on the east end of the Iron Range that has 500-kV, 230-kV, and 115-kV buses owned by both MP (115/230-kV) and Xcel Energy (500-kV).

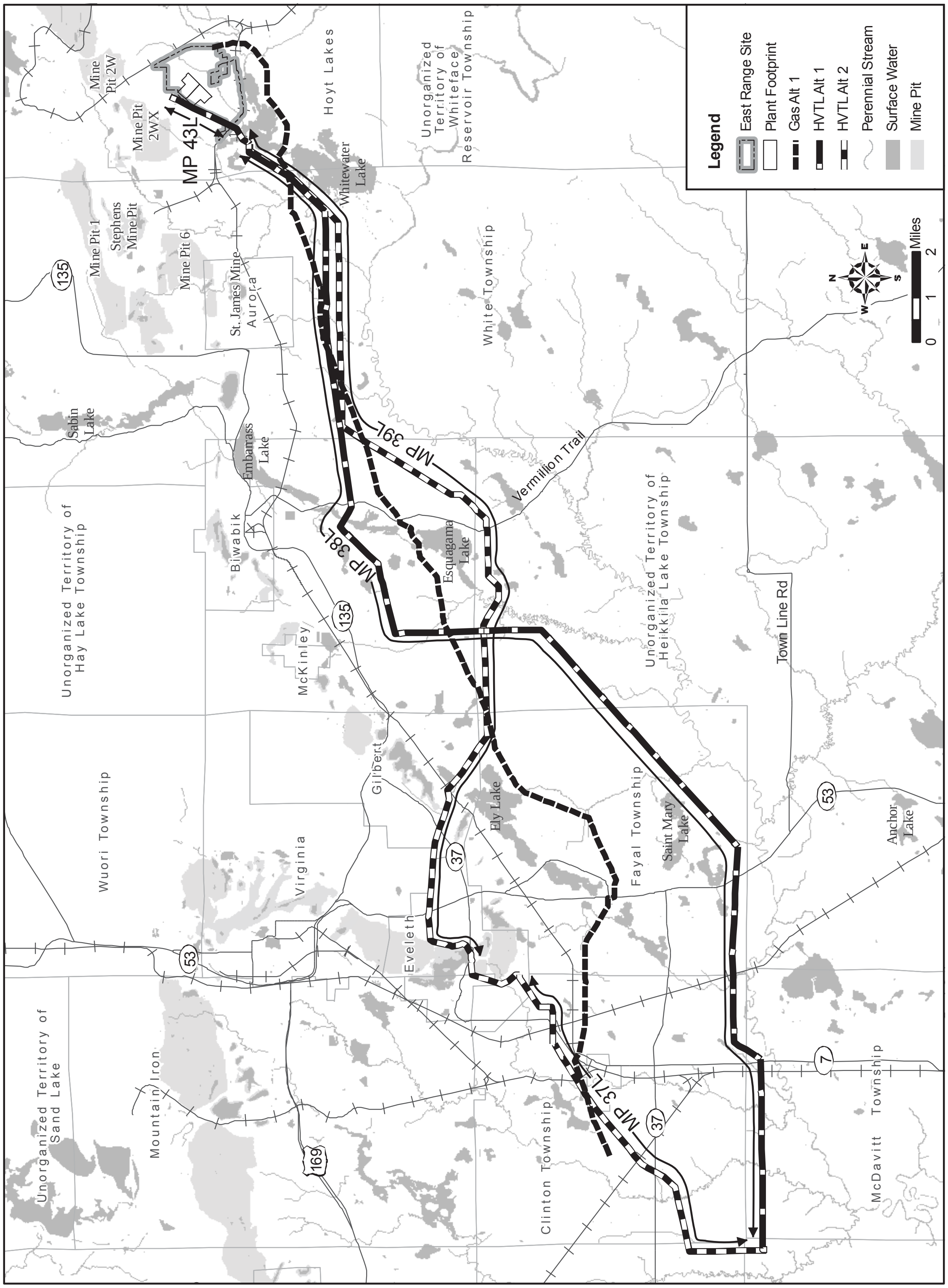

Figure 2.3-8. East Range NG and HVTL Alternatives

Based upon preliminary system studies, interconnecting the Project directly to the Forbes 500/230-kV Substation would result in minimal impact on the underlying MP system, including the already congested "North Shore Loop." The MISO generator interconnection process has been initiated to evaluate Forbes as the POI and to determine what network upgrades are necessary to deliver the output of Phase I to the Xcel Energy control area (Twin Cities).

HVTL Alternative Routes to Support the East Range Site

Excelsior's preferred transmission plan for the East Range Site consists of constructing two new 345-kV HVTLs to link the Mesaba Generating Station with the Forbes Substation. As discussed in Section 2.2.2.4, even though one 345-kV HVTL is sufficient to accommodate the combined full load output of Phases I and II, both new lines must be constructed to address the single-failure criterion concerns. Excelsior proposes to utilize mostly existing ROWs of 115/138-kV HVTL corridors owned by MP that interconnect the Syl Laskin Energy Center with the Forbes Substation and minimize any interruption in electrical service of the existing lines within the corridors selected. Excelsior proposes to use two existing corridors, the 39L/37L corridor and the 38L corridor, as routes for its two 345-kV HVTLs**, both of which would be used beginning with the Phase I plant**. These routes are illustrated in Figure 2.3-8**, which shows the 38L corridor as "HVTL Alt. 1" and the 39L/37L corridor as "HVTL Alt. 2"**. Each corridor spans a length of approximately 33 miles between the East Range Site and the Forbes Substation.

The ROW of a 138-kV line (43L) connecting the Laskin Substation with the CE Substation adjoins the western boundary of the East Range Site. The southern portion of this line could be replaced with double circuit structures to carry the lines from the Mesaba Generating Station and the existing 138-kV HVTL to the Laskin Substation via the existing ROW. However, Excelsior would avoid taking the existing 138-kV HVTL out of service due to the critical role it plays as part of MP's North Shore Loop.

To minimize the impact of the Mesaba Generating Station on the already constrained local transmission system, Excelsior proposes to avoid removing any of the 115/138-kV facilities (the 43L, the Laskin Substation, or the interconnecting HVTLs between the Laskin Substation and the Forbes Substation) from service without providing a replacement HVTL. This can be done in one of two ways. First, the existing 115-kV HVTLs can be handled in "hot" conditions (i.e., HVTLs that are energized) allowing the new HVTL structures to be constructed within the existing ROW and the existing "hot" lines to be transferred to the new structures with no interruption of service. Second, Excelsior could acquire a minimal width of additional ROW along an existing corridor so that new structures can be constructed with less risk.

To avoid the high cost and dangerous conditions associated with "hot" construction methods, Excelsior proposes to acquire an additional 30 feet of ROW along one of the routes between the Laskin and Forbes Substations.

Based on a review of aerial photographs and video taken during overflights of the routes in September 2005, Excelsior identified the 39L/37L corridor as the preferred route along which to acquire the additional 30-foot ROW. For the alternative plan, Excelsior would acquire the additional ROW along the 38L corridor. The preferred and alternative route plans are described in the following subsections.

Either **Excelsior's preferred or alternative** plan would require the acquisition of two new segments of ROW **along with the 30-foot addition described in the preceding paragraph**. One **of the two** new ROW **segments would be** about 2 miles in length **and** would extend alongside the existing MP 43L HVTL corridor **to** connect the Mesaba Generating Station with the initiation point of the 39L and 38L corridors.

The second **new ROW segment would be** about 2 miles **in length and** would be required to link the 39L and 37L corridors near the City of Eveleth.

Excelsior's Preferred Route Plan (Additional Right-of-Way Taken Along 39L/37L Route)

Excelsior considers the best option for widening the 39L corridor to involve acquiring ROW on the south side of the existing ROW from the Laskin Substation to CR 97, then moving to the north side from CR 97 to, and across, the Thunderbird Mine. The 39L has single-family residential conflicts in three potential locations and potentially one industrial site conflict. These narrow sections of ROW would necessitate either hot line construction or construction in short, scheduled outage windows on the existing line in affected ROWs. The 37L could be widened on either side of the ROW since the only conflicts involve existing transmission lines, which may require outage windows for construction.

Approximately 962 residences are located within a half mile of the centerline of the existing ROWs of the 39L and 37L, of which 369 are located within a quarter mile of the alignment **(many of these residences are located within the City of Eveleth)**. Approximately 16 residences are located within 300 feet of the ROWs and 33 others are located within 500 feet.

Excelsior's Alternative Route Plan (Additional Right-of-Way Taken Along 38L Route)

The alternative route plan would involve the same alignments as the preferred route plan. However, for the alternative plan, Excelsior would acquire the additional 30 feet of ROW along the 38L corridor. Excelsior determined that the best option for widening the ROW for the 38L corridor would involve acquiring ROW on the north side of the existing structures. This route conflicts with three to four short sections of existing 38L ROW where single family residences are located on the north side of the existing 115-kV ROW. The ROW in these locations is too narrow for a 30-foot expansion. Therefore, Excelsior would propose constructing these sections during short, scheduled line outages, or under hot line construction, on the existing 38L 115-kV centerline.

Approximately 271 residences are located within a half mile of the centerline of the existing ROWs of the 38L, of which 116 are located within a quarter mile of the alignment. Approximately 11 residences are located within 300 feet of the ROWs and 11 others are located within 500 feet.

2.4 SUMMARY COMPARISON OF ALTERNATIVES AND IMPACTS

Table 2.4-1 summarizes the potential impacts for the No Action Alternative in comparison to the Proposed Action at either of Excelsior's alternative sites. The baseline conditions that are relevant to the No Action Alternative are described in Chapter 3 for each resource area. The impacts for each environmental resource are based on the detailed analyses of impacts in Chapter 4.

Table 2.4-1. Summary Comparison of Impacts (Phases I & II)

No Action	West Range	East Range
Aesthetics		
No change in existing conditions; no change in viewsheds or aesthetic resources.	**Power Plant Site:** Change in viewshed for properties within sightline of power plant location. Security lighting and aircraft warning lights for power plant may be visible to closest residences (~50 within 1 mi). Three public lands are located within 20 mi, where vapor plumes may be visible at times (Hill Annex Mine State Park, Forest History Center, and Chippewa National Forest). See also: Noise. **Mesaba Generating Station (Phases I and II) would be twice the size of Phase I only and have 8 emission stacks instead of 4.** **No substantial differences in utility and transportation corridors for 2-phased plant compared to Phase I only.** **Transportation Facilities:** Aesthetic impacts from rail and road construction and operation for closest residences. See also: Noise. • Rail alt. 1A within 0.5 mi of 16 residences (closest within **470** ft). • Rail alt. 1B **eliminated based on Draft EIS.** • **Rail alt. 3B within 0.5 mi of 16 residences (closest within 470 ft).** • **Access Roads 1 and 2 eliminated after Draft EIS (CR 7 realignment deferred by Itasca County).** • **Access Road 3 within 0.5 mi of 2 residences (both within 1,250 ft).** **Water Sources and Discharges:** Temporary aesthetic impacts during construction. • Process water pipelines within 0.5 mi of 104 residences (4 within 500 ft). • Cooling water effluent pipelines **avoided using enhanced ZLD system.** • Potable/sanitary pipelines within 0.5 mi of 114 residences (4 within 500 ft). **Natural Gas Facilities:** Temporary aesthetic impacts during construction. Permanently cleared ROW (low-growing vegetation) • Alt. 1 within 0.5 mi of 153 residences (3 within 300 ft). • Alt. 2 within 0.5 mi of 339 residences (5 within 300 ft). • Alt. 3 within 0.5 mi of 935 residences (29 within 300 ft).	**Power Plant Site:** Change in viewshed for properties within sightline of power plant location. Security lighting and aircraft warning lights for power plant may be visible to closest residences (none within 1 mi). Site is on private land within Superior National Forest boundary, and two other public lands are located within 20 mi, where vapor plumes may be visible. See also: Noise. **Mesaba Generating Station (Phases I and II) would be twice the size of Phase I only and have 8 emission stacks instead of 4.** **No substantial differences in utility and transportation corridors for 2-phased plant compared to Phase I only.** **Transportation Facilities:** Aesthetic impacts from rail and road construction and operation for closest residences. See also: Noise. No residences within 0.5 mi of either rail alignment alternative (closest, ~1 mi). No residences within 0.5 mi of site access road (closest, >1 mi). **Water Sources and Discharges:** • No residences within 0.5 mi of process water pipeline segments (closest residence >0.75 mi). • No cooling water effluent pipeline (enhanced ZLD system). • No residences within 0.5 mi of potable/sanitary pipelines (closest >0.75 mi). **Natural Gas Facilities:** Temporary aesthetic impacts during construction. Proposed natural gas pipeline on existing pipeline ROW within 0.5 mi of 856 residences (46 within 300 ft).

Table 2.4-1. Summary Comparison of Impacts (Phases I & II)

No Action	West Range	East Range
	HVTL Corridors: Change in viewshed for properties within sightline of new HVTLs (permanently cleared ROW with low-growing vegetation). Increased height and visibility of power poles in existing HVTL ROWs. • **HVTL Alt 1 (WRA-1 or WRB-1)** within 0.5 mi of 66 residences (4 within 500 ft). • **HVTL Alt 1A (WRA-1A or WRB-1A)** within 0.5 mi of 62 residences (7 within 500 ft). • **HVTL Phase 2 Plan B (WRB-2A)** existing HVTL ROW within 0.5 mi of 214 residences (29 within 500 ft).	**HVTL Corridors:** HVTLs on existing HVTL ROWs (<4 mi of new ROW); widening of one corridor required (permanently cleared ROW with low-growing vegetation). Increased height and visibility of power poles for properties within sightline of HVTLs. **Note that taller poles would be required for all HVTLs, but ROW widening would only occur on one of the two alignments.** • **HVTL Alt 1 (widen 38L ROW)** within 0.5 mi of 271 residences (22 within 500 ft). • **HVTL Alt 2 (widen 39L/37L ROW)** within 0.5 mi of 962 residences (49 within 500 ft).
Air Quality		
No change in existing conditions; no new emissions affecting air quality.	**Power Plant Site:** The facility would be a major source of SO_2, NO_X, CO, PM_{10}, and VOCs (for both Phase I-only and combined Phases I and II) under the PSD regulations (Table 4.3-7). Annual emissions of criteria pollutants **for combined Phases I and II** would include **(emissions for Phase I-only would be halved in comparison to the levels that would occur during the combined phase):** • 1,390 tons of SO_2, • 2,872 tons of NO_X, • 2,539 tons of CO, • 0.03 tons of Pb, • **532** tons of PM_{10}, and • 197 tons of VOCs; Predicted concentrations for each pollutant would be below allowable levels under NAAQS and MAAQS. The plant would potentially emit 0.026 tons per year (tpy) of mercury (below the HAP threshold of 25 tpy)**. EPA recently decided to develop emissions standards for power plants consistent with the D.C. Circuit's 2008 ruling to vacate CAMR. Although the final MACT is unknown at this time, the Mesaba Energy Project would implement mercury control technology, which would meet or exceed any anticipated regulatory requirement as activated carbon beds to treat pre-combustion syngas would be state-of-the art technology.**	**Power Plant Site: Similar to the West Range Site, the facility at the East Range Site would be a major source of SO_2, NO_X, CO, PM_{10}, and VOCs (for both Phase I-only and combined Phases I and II) under the PSD regulations (Table 4.3-7). Annual emissions of criteria pollutants for the East Range Site would be the same as the West Range Site, except for PM_{10}, which would be 709 tons.** Because of the source water quality at the East Range Site, emissions of PM_{10} would be higher than at the West Range Site. Similar to the West Range Site, predicted concentrations for each pollutant would be below allowable levels under NAAQS and MAAQS. The plant would potentially emit 0.026 tpy of mercury (below the HAP threshold of 25 tpy). **EPA recently decided to develop emissions standards for power plants consistent with the D.C. Circuit's 2008 ruling to vacate CAMR. Although the final MACT is unknown at this time, the Mesaba Energy Project would implement mercury control technology, which would meet or exceed any anticipated regulatory requirement as activated carbon beds to treat pre-combustion syngas would be state-of-the art technology.**

Table 2.4-1. Summary Comparison of Impacts (Phases I & II)

No Action	West Range	East Range
	Class II PSD increment analysis: Because the highest predicted impacts were significant (i.e., above PSD Significant Impact Levels [SILs]), increment and NAAQS compliance modeling was necessary for SO_2, PM_{10}, and NO_X (Table 4.3-9). Class II PSD increment analysis indicates that the project would comply with all state and Federal Class II increment limits **(for both the single and combined phases)**. **Results of Class II PSD increment analysis for Phases I and II combined (emissions for Phase I-only would be halved in comparison to the levels that would occur during the combined phase) are as follows:** • **SO_2 - 118.2 µg/m^3 for 1-hr averaging time; 71.2 µg/m^3 for 3-hr averaging time; 21.0 µg/m^3 for 24-hr averaging time; and 4.2 µg/m^3 for annual averaging time** • **PM_{10} – 24.8 µg/m^3 for 24-hr averaging time; and 1.7 µg/m^3 for annual averaging time** • **NO_2 – 7.6 µg/m^3 for annual averaging time** **NAAQS/MAAQS evaluation calculated the maximum impact of the Mesaba Generating Station, combined with all other regional sources and background concentrations. For Phase I-only and Phases I and II combined, the following predicted concentrations are below allowable levels, and the results demonstrate compliance with all MAAQS and NAAQS (Tables 4.3-10 and 4.3-11):** • **SO_2 – 521.9 µg/m^3 for 1-hr averaging time; 237.6 µg/m^3 for 3-hr averaging time; 73.3 µg/m^3 for 24-hr averaging time; and 8.6 µg/m^3 for annual averaging time** • **PM_{10} – 126.1 µg/m^3 for 24-hr averaging time; and 37.9 µg/m^3 for annual averaging time** • **$PM_{2.5}$ – 31.7 µg/m^3 for 24-hr averaging time; and 8.1 µg/m^3 for annual averaging time** • **NO_2 – 17.0 µg/m^3 for annual averaging time** • **CO – 8,959 µg/m^3 for 1-hr averaging time**	**Class II PSD increment analysis: Because the highest predicted impacts were significant (i.e., above PSD Significant Impact Levels [SILs]), increment and NAAQS compliance modeling was necessary for SO_2, PM_{10}, and NO_X (similar to West Range Site) (Table 4.3-9). Class II PSD increment analysis indicates that the project would comply with all state and Federal Class II increment limits for both the single and combined phases. Results of Class II PSD increment analysis for Phases I and II combined (emissions for Phase I-only would be halved in comparison to the levels that would occur during the combined phase) are as follows:** • **SO_2 – 294.3 µg/m^3 for 1-hr averaging time; 200.4 µg/m^3 for 3-hr averaging time; 52.5 µg/m^3 for 24-hr averaging time; and 2.9 µg/m^3 for annual averaging time** • **PM_{10} – 26.3 µg/m^3 for 24-hr averaging time; and 0.7 µg/m^3 for annual averaging time** • **NO_2 – 8.1 µg/m^3 for annual averaging time** **NAAQS/MAAQS evaluation calculated the maximum impact of the Mesaba Generating Station, combined with all other regional sources and background concentrations. Similar to West Range Site, for Phase I-only and Phases I and II combined, the following predicted concentrations are below allowable levels, and the results demonstrate compliance with all MAAQS and NAAQS (Tables 4.3-10 and 4.3-11):** • **SO_2 – 565.1 µg/m^3 for 1-hr averaging time; 360.4 µg/m^3 for 3-hr averaging time; 166.5 µg/m^3 for 24-hr averaging time; and 30.8 µg/m^3 for annual averaging time** • **PM_{10} – 112.2 µg/m^3 for 24-hr averaging time; and 32.9 µg/m^3 for annual averaging time** • **$PM_{2.5}$ – 30.1 µg/m^3 for 24-hr averaging time; and 7.5 µg/m^3 for annual averaging time** • **NO_2 – 32.5 µg/m^3 for annual averaging time** • **CO – 11,565 µg/m^3 for 1-hr averaging time**

Table 2.4-1. Summary Comparison of Impacts (Phases I & II)

No Action	West Range	East Range
	Class I PSD increment analysis: Class I PSD increment modeling for West Range Site was based on Phase I and Phase II both operating at the "proposed" emission rates. Class I area impacts analysis indicates that the project impacts would be below allowable increments for all pollutants in Class I areas (i.e., BWCAW, VNP, and RLW) for both the Phase I-only emissions and Phases I and II combined emissions (Table 4.3-13). Long-term impacts are also below the SILs, indicating that impacts would not be significant, with no further analysis necessary. However, impacts are indicated to exceed the SILs for short-term SO_2 and PM_{10} at both BWCAW and VNP; therefore, a cumulative impact analysis (includes other regional SO_2 and PM_{10} increment sources, as well as reasonably foreseeable sources) was conducted to quantify total PSD increment consumption at both sites. The cumulative air impacts analysis indicates that there would be no exceedance of state/Federal standards (including applicable SIL) in any Class I area. Additionally, the cumulative impacts analyses demonstrate that there would be minor differences in cumulative impacts between the West Range Site versus East Range Site (Section 5.2.2.2; Table 5.2.2.-2).	Class I PSD increment analysis: Because the East Range Site is in closer proximity to the Class I areas, the Class I PSD increment modeling for the East Range Site was based on Phase I operating at the "proposed" emission rates and Phase II was operating at the "enhanced" emission rates. Similar to the West Range Site, Class I area impacts analysis indicates that the project impacts would be below allowable increments for all pollutants in Class I areas (i.e., BWCAW, VNP, RLW, and IRNP – note, IRNP was analyzed for East Range Site due to proximity) for both the Phase I-only emissions and Phases I and II combined emissions (Table 4.3-14). Long-term impacts are also below the SILs, indicating that impacts would not be significant, with no further analysis necessary. However, impacts are indicated to exceed the SILs for short-term SO_2 and PM_{10} at BWCAW and short-term SO_2 at VNP; therefore, a cumulative impact analysis (includes other regional SO_2 and PM_{10} increment sources, as well as reasonably foreseeable sources) was conducted to quantify total PSD increment consumption at both sites. Similar to the West Range Site, the cumulative air impacts analysis indicates that there would be no exceedance of state/Federal standards (including applicable SIL) in any Class I area. Additionally, the cumulative impacts analyses demonstrate that there would be minor differences in cumulative impacts between the West Range Site versus East Range Site (Section 5.2.2.2; Table 5.2.2-2).
	Class I Visibility/Regional Haze Analysis: Visibility/regional haze analysis in Class I areas using Method 2 predict that there would be days with ≥5% change in light extinction or ≥10% change in light extinction (Table 4.3-15). Results based on Method 8, indicate that emissions associated with Phases I and II would have the potential to produce impacts above the 5% limit at BWCAW and VNP (Table 4.3-15). The following summarizes the visibility impacts analysis results for both Method 2 and Method 8: BWCAW • Method 2 (in a given year): 1 to 21 days of ≥5% light extinction and 0 to 6 days of ≥10% light extinction, depending on operating scenario.	Class I Visibility/Regional Haze Analysis: The visibility modeling analysis results for the East Range Site reflect the influence of the site's closer proximity to BWCAW by the commensurate higher predicted number of days with a change in light extinction above 5% and 10% for the same operating scenarios (Table 4.3-16). The following summarizes the visibility impacts analysis results for both Method 2 and Method 8: BWCAW • Method 2 (in a given year): 10 to 86 days of ≥5% light extinction and 0 to 29 days of ≥10% light extinction, depending on operating scenario. • Method 2 (2002-2004): 71 to 193 days of ≥5% light

Table 2.4-1. Summary Comparison of Impacts (Phases I & II)

No Action	West Range	East Range
	• Method 2 (2002-2004): 5 to 54 days of ≥5% light extinction and 0 to 13 days of ≥10% light extinction, depending on operating scenario. • Method 8 (annual): 8th highest values would exceed the 5% limit for "proposed" / "proposed" (highest value, 5.13%). • Method 8 (20%): 8th highest values would exceed the 5% limit for "proposed" / "proposed" (highest value, 7.4%) and "proposed" / "enhanced" (highest value, 5.75%). **VNP** • Method 2 (in a given year): 1 to 22 days of ≥5% light extinction and 0 to 7 days of ≥10% light extinction. • Method 2 (2002-2004): 9 to 51 days of ≥5% light extinction and 1 to 12 days of ≥10% light extinction, depending on operating scenario. • Method 8 (annual): 8th highest values would exceed the 5% limit for "proposed" / "proposed" (highest value, 5.95%). • Method 8 (20%): 8th highest values would exceed the 5% limit for "proposed" / "proposed" (highest value, 8.57%) and "proposed" / "enhanced" (highest value, 6.64%).	extinction and 7 to 43 days of ≥10% light extinction, depending on operating scenario. • Method 8 (annual): 8th highest values would exceed the 5% limit for all operating scenarios modeled (highest value, 10.28%). • Method 8 (20%): 8th highest values would exceed the 5% limit for all operating scenarios modeled (highest value, 14.69%). **VNP** • Method 2 (in a given year): 1 to 7 days of ≥5% light extinction and 0 to 2 days of ≥10% light extinction. • Method 2 (2002-2004): 4 to 14 days of ≥5% light extinction and 0 to 3 days of ≥10% light extinction, depending on operating scenario. • Method 8 (annual): 8th highest values would exceed the 5% limit for none of the operating scenarios modeled. • Method 8 (20%): 8th highest values would exceed the 5% limit for "proposed" / "proposed" (highest value, 5.49%). **IRNP** • Method 2 (in a given year): 0 to 2 days of ≥5% light extinction and 0 to 1 days of ≥10% light extinction. • Method 2 (2002-2004): 1 to 2 days of ≥5% light extinction and 0 to 1 days of ≥10% light extinction, depending on operating scenario. • Method 8 (annual): 8th highest values would exceed the 5% limit for none of the operating scenarios modeled. • Method 8 (20%): 8th highest values would exceed the 5% limit for none of the operating scenarios modeled.

Table 2.4-1. Summary Comparison of Impacts (Phases I & II)

No Action	West Range	East Range
	<u>Odors</u> from H_2S and NH_3 would be negligible, because associated processes would be enclosed. <u>Sulfur and Nitrogen Deposition:</u> The National Park Service (NPS) has established a Deposition Analysis Threshold (DAT) of 0.01 kg/hectare/yr for both sulfur (S) and nitrogen (N) deposition in Class I areas, which is the level below which adverse impacts are not anticipated. **No exceedances of the DAT for nitrogen would occur under any of the operating scenarios (Table 4.3-20). No exceedances of the DAT for sulfur would occur under the Phase I-only scenario; exceedances of the DAT for sulfur would occur at BWCAW for the "proposed"/"proposed" scenario and at VNP for the "proposed"/"proposed" and "proposed"/ "enhanced" scenarios.**	<u>Odors</u> from H_2S and NH_3 would be negligible, because associated processes would be enclosed. <u>Sulfur and Nitrogen Deposition:</u> The DAT of 0.01 kg/hectare/yr established by NPS for both S and N deposition in Class I areas would apply to the East Range Site. **DAT exceedances for nitrogen would occur at the BWCAW for all operating scenarios (Table 4.3-20). DAT exceedances for sulfur would occur at BWCAW for all operating scenarios and at VNP for the "proposed"/ "proposed" scenario. Further cumulative analysis on nitrogen and sulfur deposition impacts are discussed in Section 5.2.2.**
	<u>Modeled mercury concentration</u> over lakes and watershed (from AERMOD modeling) = 1.3 x 10^{-5} µg/m^3. The deposition rate for mercury would be **1.3 x 10^{-9} µg/m^2 per** sec over lakes and **6.5 x 10^{-9} µg/m^2 per** sec over the rest of the watershed. Big Diamond Lake would be within the release plume of future facility emissions; therefore, the concentration and rate of deposition was used to determine the incremental contribution of mercury in fish tissues caught from Big Diamond Lake (see Section 4.17, Health and Safety). Mercury emissions and subsequent deposition would be reduced by the high efficiency IGCC technology combined with the design-added mercury removal carbon absorption beds to ensure that mercury emissions from the facility would be less than 10 percent of the mercury in the feedstock. **Maximum predicted concentration of elemental mercury concentration in Class I areas due to operation of Phase I and Phase II is 1.6 x 10^{-6} µg/m^3 at VNP (0.11% of background concentration of elemental mercury). See Table 5.2.2-5. Phase I impacts would be roughly halved.** **Transportation Facilities:** Fugitive dust emissions during construction and operations from vehicle traffic, transportation of materials, and material handling. The impacts would be localized and would decrease with distance from site and alignments. **Relative to plant-wide emissions and considering sources are mobile, transportation-related emissions are considered negligible for both the single and combined phases; estimated transportation-related emissions are as follows (Phase I-only**	**<u>Modeled mercury concentration</u> over lakes and watershed (from AERMOD modeling) = 1.3 x 10^{-5} µg/m^3. The deposition rate for** would be **1.3 x 10^{-9} µg/m^2 per** sec over lakes and **6.5 x 10^{-9} µg/m^2 per** sec over the rest of the watershed. Colby Lake would be within the release plume of future facility emissions; therefore, the concentration and rate of deposition was used to determine the incremental contribution of mercury in fish tissues caught from Colby Lake based on the analytical results for Big Diamond Lake (see Section 4.17, Health and Safety). Mercury emissions and subsequent deposition would be reduced by the high efficiency IGCC technology combined with the design-added mercury removal carbon absorption beds to ensure that mercury emissions from the facility would be less than 10 percent of the mercury in the feedstock. **Maximum predicted concentration of elemental mercury concentration in Class I areas due to operation of Phase I and Phase II is 4.1 x 10^{-6} µg/m^3 at BWCA (0.28% of background concentration of elemental mercury). See Table 5.2.2-6. Phase I impacts would be roughly halved.** **Transportation Facilities:** Fugitive dust emissions during construction and operations from vehicle traffic, transportation of materials, and material handling. The impacts would be localized and would decrease with distance from site and alignments. **Relative to plant-wide emissions and considering sources are mobile, transportation-related emissions are considered negligible for both the single and combined phases; estimated transportation-related emissions are as follows (Phase I-only**

Table 2.4-1. Summary Comparison of Impacts (Phases I & II)

No Action	West Range	East Range
	emissions would be half of levels occurring under the combined phase): • **Emissions from personally owned vehicles (POVs): During peak construction activities, the following daily emission rates (lb/day) would occur: 0.8 NO_x; 11 CO; 0.48 NMOC (non-methane organic compounds); and 0.2 PM. Peak traffic counts from project (during Phase I and II construction overlap) would still be minor fraction of existing AADT threshold and, therefore, impacts are considered negligible.** • **Emissions from rail deliveries: During operation, the following annual emissions would occur (tpy): 150,000 CO_2; 1.5 SO_2; 2,300 NO_x; 80 PM; and 410 CO.** • **Emissions from truck deliveries: During operation, the following annual emissions would occur (tpy): 7,700 CO_2; 0.1 SO_2; 60 NO_x; 0.8 PM; and 7 CO.** **Water Sources and Discharges, Natural Gas Facilities, and HVTL Corridors:** Fugitive dust emissions during construction related to the respective lengths of potential alignments.	**emissions would be half of levels occurring under the combined phase):** • **Emissions from POVs: During peak construction activities, the daily emission rates and impacts would be similar to those of West Range Site.** • **Emissions from rail deliveries: During operation, the following annual emissions would occur (tpy): 170,000 CO_2; 1.7 SO_2; 2,600 NOx; 90 PM; and 460 CO.** • **Emissions from truck deliveries: During operation, the following annual emissions would occur (tpy): 8,100 CO_2; 0.1 SO_2; 61 NOx; 0.8 PM; and 7 CO.** **Water Sources and Discharges, Natural Gas Facilities, and HVTL Corridors:** Fugitive dust emissions during construction related to the respective lengths of potential alignments.
Geology and Soils		
No change in existing conditions; no new land disturbance.	**Power Plant Site:** The plant footprint (Phases I & II) would occupy approximately **202** ac. Site grading and preparation for the plant footprint would require approximately **3,100,000** yd^3 of cut land and approximately **2,350,000** yd^3 of fill land. **The Phase II footprint would be cleared to serve as a laydown area for Phase I construction. Therefore, the amount of disturbed soil on site would not dramatically change between Phase I and Phase II construction. Offsite laydown areas for Phase II construction would be established on 85 ac of lands at 4 potential sites that have been disturbed from prior mining activities.** **All utilities and transportation infrastructure would be developed for operation of Phase I (no difference in impacts for Phase I-only outcome).** Although the site is situated on **152** ac of soils classified as prime farmland or prime farmland if drained, no agriculture uses currently occur on the property. The Minnesota Prime Farmland Exclusion Rule does not apply to the site which is within 2 mi of a statutory city **(Taconite)**.	**Power Plant Site:** The plant footprint (Phases I & II) would occupy approximately **182** ac. Based on site topography, grading and preparation for the plant footprint would require **approximately 3,349,000 yd^3 of cut volume and less fill than the West Range Site**. **The Phase II footprint would be cleared to serve as a laydown area for Phase I construction. Therefore the amount of disturbed soil on site would not dramatically change between Phase I and Phase II construction. Offsite laydown areas for Phase II construction would be established on 85 ac of lands at 2 potential sites that have been disturbed from prior mining activities.** **All utilities and transportation infrastructure would be developed for operation of Phase I (no difference in impacts for Phase I-only outcome).** There are no areas designated as prime farmland within the East Range Site boundary and no agriculture uses currently occur on the property. The Minnesota Prime Farmland Exclusion Rule does not apply to the site which is within 2 mi of a statutory city.

Table 2.4-1. Summary Comparison of Impacts (Phases I & II)

No Action	West Range	East Range
	Transportation Facilities: Construction impacts from rail and road alignments. No long-term operational impacts. • Rail alt. 1A would disturb **118** ac, require approximately **3,725,000** yd^3 of cut land and **610,000** yd^3 of fill land, and **affect** approximately **50** ac of prime farmland soils. • Rail alt. 1B **eliminated based on Draft EIS.** • **Rail alt. 3B would disturb 107 ac, require approximately 2,620,000 yd^3 of cut land and 620,000 yd^3 of fill land, and affect approximately 66 ac of prime farmland soils.** • **Access Roads 1 and 2 eliminated after Draft EIS (CR 7 realignment deferred by Itasca County).** • **Access Road 3 would disturb 20 ac, all of which are prime farmland soils.**	**Transportation Facilities:** Construction impacts from rail and road alignments. No long-term operational impacts. • Rail alt. 1 would disturb **53** ac and require approximately **2,390,000** yd^3 of cut land and less fill than at West Range. • Rail alt. 2 would disturb **58** ac and require approximately **2,180,000** yd^3 of cut land and less fill than at West Range. • Access road construction **(single segment)** would disturb **26** ac. Impacts on prime farmland could not be determined from data available, because the soil survey for St. Louis County has not been completed. **However, the Minnesota Prime Farmland Exclusion Rule does not apply to the alignment which is in or within 2 mi of a statutory city (Hoyt Lakes).**
	Water Sources and Discharges: Construction of process water supply pipelines would disturb **134** ac and occupy **55** ac of prime farmland soils. Cooling water effluent pipelines **avoided using enhanced ZLD system**. Potable/sanitary pipelines would disturb **9** ac and occupy **<1** ac of prime farmland. **Natural Gas Facilities:** Construction impacts of alignments. • Alternative 1 would disturb **135** ac. • Alternative 2 would disturb **84** ac. • Alternative 3 would disturb **99** ac.	**Water Sources and Discharges:** Construction of process water supply pipelines would disturb approximately 109 ac. No cooling water effluent pipelines required (due to the use of an enhanced ZLD system). Potable/sanitary pipelines would disturb 25 ac. Impacts on prime farmland could not be determined (soil survey for St. Louis County not complete). **Natural Gas Facilities:** Pipeline would be constructed within an existing gas pipeline ROW requiring disturbance of **259** ac.
	HVTL Corridors: Impacts of alignments. • **HVTL Alt 1 (WRA-1 or WRB-1)** would disturb 134 ac and occupy <1 ac of prime farmland soils. • **HVTL Alt 1A (WRA-1A or WRB-1A)** would disturb **136** ac and occupy <1 ac of prime farmland soils. • **HVTL Phase 2 Plan B** (WRB-2A) would disturb land on an existing HVTL ROW.	**HVTL Corridors:** HVTLs constructed on existing HVTL ROWs with new towers (<4 mi of new ROW); widening of one or the other corridor required. • **HVTL Alt 1 (widen 38L ROW)** would disturb **about** 457 ac. • **HVTL Alt 2 (widen 39L/37L ROW)** would disturb **about** 455 ac.

Table 2.4-1. Summary Comparison of Impacts (Phases I & II)

No Action	West Range	East Range
Water Resources		
No changes to water resources in the project area. **At West Range Site, potential to aid the state in maintaining mine pits that are currently being pumped (HAMP) or may overflow (CMP) would not occur. No benefits to water quality of Swan River as a result of funded I/I studies and planned improvements at CBT WWTF. At East Range Site, potential to aid other industrial users (e.g., PolyMet) in the treatment of their wastewaters would not occur.**	**Power Plant Site:** Disturbance of land areas during plant construction, as summarized for Geology and Soils, would create potential for erosion and sedimentation. Impacts on surface waters would be minimized through the implementation of an erosion and sediment control (ESC) plan required for a National Pollutant Discharge Elimination System (NPDES) General Construction Permit. Potential impacts during operation would be minimized through the implementation of a stormwater pollution prevention plan (SWPPP) based on state requirements. **All stormwater discharges (within a 24-hour, 100-year storm event) would be eliminated, as stormwater would be treated and reused within the plant, primarily for cooling water**. No impacts on groundwater from the construction or operation of the plant are expected. **Transportation Facilities:** Disturbance of land areas during road and railway construction, as described for Geology and Soils. Impacts on surface waters would be minimized through the implementation of a SEC plan required for a NPDES General Construction Permit. No impacts on surface waters or groundwater from the operation of the road and railway expected. **Water Sources and Discharges: No direct discharge of any process wastewaters to surface waters would occur due to the enhanced ZLD system. During Phase I, annual process water demand** from CMP and interconnected mine pits would not adversely affect water sources. Lowering of water level in CMP would reduce potential for overflow impacts on Coleraine and Bovey. **At the end of the 30-year project life, concentration of phosphorous in the CMP would increase from 0.0037 mg/L to 0.0057 mg/L; however, this predicted concentration is below the state's standard of 1 mg/L and is expected to have minimal impact on biota in the CMP. During Phase II, water demand would lower water levels in HAMP Complex and may cause exposure of land bridges. Use of HAMP would require consultation with MNDNR to determine agency's operating priorities and to ensure minimal impacts to water resources. Elimination of LMP's discharge to the Prairie River represents 1.3 percent of river's average annual flow during normal operating conditions for Phase II. During dry seasons, Prairie**	**Power Plant Site:** Disturbance of land areas during plant construction, as summarized for Geology and Soils, would create potential for erosion and sedimentation. Impacts on surface waters would be minimized through the implementation of an ESC plan required for a NPDES General Construction Permit. Potential impacts during operation would be minimized through the implementation of a SWPPP based on state requirements. **All stormwater discharges (within a 24-hour, 100-year storm event) would be eliminated, as stormwater would be treated and reused within the plant, primarily for cooling water**. No impacts on groundwater from the construction or operation of the plant are expected. **Transportation Facilities:** Disturbance of land areas during road and railway construction, as described for Geology and Soils. Impacts on surface waters would be minimized through the implementation of a SEC plan required for a NPDES General Construction Permit. No impacts on surface waters or groundwater from the operation of the road and railway expected. **Water Sources and Discharges: No direct discharge of any process wastewaters to surface waters would occur due to the enhanced ZLD system. During Phase I, annual process water demand of 3,500 gpm (average) and 5,000 gpm (peak) from interconnected mine pits would not adversely affect water sources. During Phase II, water demand would cause fluctuations of water levels in Colby Lake, which is expected to result in minor impacts to fish populations, boat access and property values; greater fluctuation may occur in Whitewater Reservoir, which may cause similar impacts, but to a greater extent, depending on level of fluctuation. Excelsior would conduct further hydrologic modeling and investigations into limiting losses of water from Whitewater Reservoir as part of the water appropriation permit process. Any credit ultimately ascribed to recovering waters leaking from Whitewater Reservoir would be required to be supported by in-depth studies conducted in conjunction with input from the MNDNR. There are potential water quality benefits to the**

Table 2.4-1. Summary Comparison of Impacts (Phases I & II)

No Action	West Range	East Range
	River's normal low flow could be reduced by approximately 18 percent. If necessary, to protect river flows during such events, Excelsior would curtail direct appropriations from the river and instead withdraw from stored capacity in other mine pits. **I/I studies and planned improvements at the CBT WWTF would improve water quality of Swan River watershed.** Potable water use of 7,500 gpd during operation would not adversely affect Taconite water system, however, the existing water system does not have sufficient capacity to provide the 45,000 gpd during construction. Planned improvements to the system would be necessary to handle this demand, or Excelsior would provide potable water via truck during construction. Domestic wastewater discharges would be within the effective treatment capacity of the regional facility.	**Lake Superior Basin watershed from providing treatment to industrial users' wastewaters.** Potable water use of 45,000 gpd during construction and 7,500 gpd during operation would not adversely affect the Hoyt Lakes water system. Domestic wastewater discharges would be within the effective treatment capacity of the municipal facility.
	Natural Gas Facilities: Best management practices (BMPs) would be implemented to minimize impacts from erosion and sedimentation during construction.	**Natural Gas Facilities:** BMPs would be implemented to minimize impacts from erosion and sedimentation during construction.
	HVTL Corridors: BMPs would be implemented to minimize impacts from erosion and sedimentation during construction.	**HVTL Corridors:** BMPs would be implemented to minimize impacts from erosion and sedimentation during construction.
Floodplains		
No change in existing conditions; no impact on floodplains.	**Power Plant Site:** No impact. The site is approximately one mile from the nearest 100-year floodplain, along the Prairie River. **None of the candidate sites for Phase II staging and laydown activities is located within or would otherwise affect a 100-year floodplain.** **Transportation Facilities:** No impact. Proposed rail and access road alignments would be located outside of the 100-year floodplain. **Water Sources and Discharges:** No impact. Construction of pipelines would occur outside of the 100-year floodplain. **Natural Gas Facilities:** Temporary impacts may occur during construction of natural gas pipeline alt. 1, 2, or 3 as a result of trenching, stockpiling of soil, and storage of equipment where pipelines would cross the 100-year floodplain of Swan River or Prairie River However, impacts would be mitigated through the use of construction BMPs, and floodplain contours would be restored	**Power Plant Site:** No impact. The site is approximately one mile from the nearest 100-year floodplain, along the Partridge River. **None of the candidate sites for Phase II staging and laydown activities is located within or would otherwise affect a 100-year floodplain.** **Transportation Facilities:** No impact. Proposed rail and access road alignments would be located outside of the 100-year floodplain. **Water Sources and Discharges:** No impact. Construction of pipelines would occur outside of the 100-year floodplain. **Natural Gas Facilities:** Temporary impacts may occur during construction of the natural gas pipeline as a result of trenching, stockpiling of soil, and storage of equipment where the pipeline would cross the 100-year floodplain of the Partridge River. However, impacts would be mitigated through the use of construction BMPs, and floodplain contours would be restored

Table 2.4-1. Summary Comparison of Impacts (Phases I & II)

No Action	West Range	East Range
	following construction. No permanent impacts on flood elevations would occur, because the pipelines would be located below the land surface. **HVTL Corridors:** No impact. Construction of HVTLs would occur outside of the 100-year floodplain.	following construction. No permanent impacts on flood elevations would occur, because the pipelines would be located below the land surface. **HVTL Corridors:** Temporary impacts may occur during widening of HVTL corridors (38L or 39L/37L) where the HVTLs would cross the 100-year floodplain of the Partridge, Embarrass, or East Two River. No permanent impact on flood elevations would occur, because permanent structures would be limited to HVTL towers that have small footprints.
Wetlands		
No change in existing conditions; wetlands would remain in their current status.	**Power Plant Site:** Wetland **fill for** the plant footprint (Phases I & II) would be approximately 31 ac **(13 ac for Phase I and 18 ac for Phase II)**. **No wetlands would be disturbed for use of offsite laydown areas to support Phase II construction.** **All utilities and transportation infrastructure would be developed for operation of Phase I (no difference in wetland impacts for Phase I-only outcome).** **Transportation Facilities:** Construction of rail and road access would result in **filling of wetlands and potential isolation of wetlands in rail loops:** • Rail alt. 1A would **fill 18 ac of wetlands and isolate 58 ac of additional wetlands in the rail loop**. • Rail alt. 1B **eliminated based on Draft EIS**. • **Rail alt. 3B would fill <6 ac of wetlands.** • **Access Roads 1 and 2 eliminated after Draft EIS (CR 7 realignment deferred by Itasca County).** • **Access Road 3 would fill <0.2 ac of wetlands.** **Water Sources and Discharges:** Construction of pipelines: • Process water supply pipelines would **permanently convert <5 ac and temporarily affect <3 ac of wetlands.** • Cooling water effluent pipelines **avoided using enhanced ZLD system**. • Potable/sanitary pipelines would **be installed in ROW developed for other plant infrastructure; no additional impacts**. **Natural Gas Facilities:** Construction of pipelines:	**Power Plant Site:** Wetland **fill for** the plant footprint (Phases I & II) would be approximately **17** ac **(13 ac for Phase I and <4 ac for Phase II)**. **No wetlands would be disturbed for use of offsite laydown areas to support Phase II construction.** **All utilities and transportation infrastructure would be developed for operation of Phase I (no difference in wetland impacts for Phase I-only outcome).** **Transportation Facilities:** Construction of rail and road access would result in **filling of wetlands and potential isolation of wetlands in rail loops:**: • Rail alt. 1 would **fill 13 ac of wetlands and isolate 51 ac of additional wetlands in the rail loop**. • Rail alt. 2 would **fill 18 ac of wetlands** (no center loop). • Access road construction **(single road segment)** would **fill <0.5 ac of wetlands**. **Water Sources and Discharges:** Construction of pipelines: • Process water supply pipelines would **permanently convert <2 ac and temporarily affect <1 ac of wetlands**. • No cooling water effluent pipelines required (due to the enhanced ZLD system). • No wetlands are located in the alignments for potable/sanitary pipelines **(would affect 1.1 ac segment of Colby Lake)**. **Natural Gas Facilities:** Construction of the natural gas pipeline would **permanently convert <0.5 ac and temporarily affect 24 ac of wetlands**.

Table 2.4-1. Summary Comparison of Impacts (Phases I & II)

No Action	West Range	East Range
	• Alt. 1 would **permanently convert 16 ac and temporarily affect <5 ac of wetlands**. • Alt. 2 would **permanently convert 11 ac and temporarily affect <2 ac of wetlands**. • Alt. 3 would **permanently convert 4 ac and temporarily affect 8 ac of wetlands**. **HVTL Corridors:** Construction of HVTLs. • **HVTL Alt 1 (WRA-1 or WRB-1) would fill 0.01 ac, permanently convert 36 ac and temporarily affect 2 ac of wetlands**. • **HVTL Alt 1A (WRA-1A or WRB-1A) would fill 0.01 ac, permanently convert 25 ac and temporarily affect 4 ac of wetlands.** • **HVTL Phase 2 Plan B (WRB-2A) would fill 0.03 ac of wetland (construction in existing ROWs; no additional impacts).**	**HVTL Corridors:** HVTLs would be constructed on existing HVTL ROWs with new towers (<4 mi of new ROW); widening of one or the other corridor would be required. • **HVTL Alt 1 (widen 38L ROW) would fill 0.09 ac, permanently convert 62 ac and temporarily affect negligible ac of wetlands**. • **HVTL Alt 2 (widen 39L/37L ROW) would fill 0.09 ac, permanently convert 60 ac and temporarily affect 0.2 ac of wetlands**.
Biological Resources		
No change in existing conditions; biological resources would remain in current status.	**Power Plant Site:** Approximately **202** ac of vegetation **and habitat** would be lost or destroyed from construction for **the plant footprint in both phases (111 ac** for Phase I and **92 ac** for Phase II). **DOE determined, based on a Biological Assessment (see Appendix E), that the project may affect, but would not likely adversely affect, the Canada lynx or gray wolf; the USFWS has concurred with DOE's determination for the West Range Site. USFWS has also concurred with DOE's determination that the project is not likely to adversely affect the bald eagle.** Eight state-listed plant species (17 occurrences) in general area of site, but no occurrences within the site boundary. Possible, but unlikely, that these species could be affected. **85 ac of land on 4 potential sites would be cleared for offsite laydown areas to support Phase II construction. All 4 sites have been disturbed during prior mining activities.** **All utilities and transportation infrastructure would be developed for operation of Phase I (no difference in impacts for Phase I-only outcome).**	**Power Plant Site:** Approximately **183** ac of vegetation **and habitat** would be lost or destroyed from construction for **the plant footprint in both phases (98 ac** for Phase I and **85 ac** for Phase II. **DOE determined, based on a Biological Assessment (see Appendix E), that the project may affect, but would not likely adversely affect, the Canada lynx or gray wolf at the East Range Site; however, the USFWS stated that agency policy precludes consultation on more than one site and that it would only concur on the DOE determination for one of the two sites. DOE agreed that in the event that the East Range Site would be selected by the MPUC in the site permitting process, DOE would re-initiate consultation for the East Range Site. USFWS has concurred with DOE's determination that the project is not likely to adversely affect the bald eagle.** No known occurrences of state-listed species within 1 mi of site. **85 ac of land on 2 potential sites would be cleared for offsite laydown areas to support Phase II construction. Both sites have been disturbed during prior mining activities.** **All utilities and transportation infrastructure would be developed for operation of Phase I (no difference in impacts for Phase I-only outcome).**

Table 2.4-1. Summary Comparison of Impacts (Phases I & II)

No Action	West Range	East Range
	Transportation Facilities: Construction of rail and road access: • Rail alt. 1A: **92** ac of vegetation **and habitat would be** lost or destroyed **(80 ac additional habitat in rail loop may be affected without Excelsior's assurances to the contrary)**. No known occurrences of state-listed species within 1 mi. • Rail alt. 1B: **Eliminated based on Draft EIS**. • **Rail alt. 3B: 94 ac of vegetation and habitat would be lost (212 ac additional habitat in rail loop may be affected). No known occurrences of state-listed species within 1 mi.** • **Access Roads 1 and 2 eliminated after Draft EIS (CR 7 realignment deferred by Itasca County).** • **Access Road 3: 12 ac of vegetation and habitat would be lost; 8 ac would additionally be cleared for construction. No known occurrences of state-listed species within 1 mi.**	**Transportation Facilities:** Construction of rail and road access: • Rail alt. 1**: 53 ac of vegetation and habitat would be lost (105 ac additional habitat in rail loop may be affected without Excelsior's assurances to the contrary).** Two stream crossings could cause direct mortality to aquatic biota, habitat fragmentation/conversion, increased water temperature, and increased sedimentation (causing loss in macroinvertebrate communities). No known occurrences of state-listed species within 1 mi. • Rail alt. 2**: 58 ac of vegetation and habitat would be lost (no rail loop).** One stream crossing could cause direct mortality to aquatic biota, habitat fragmentation/conversion, increased water temperature, and increased sedimentation (causing loss in macroinvertebrate communities). No known occurrences of state-listed species within 1 mi. • Access road **(single road segment)** would result in the loss of **16** ac of **habitat; 10 ac would additionally be cleared for construction**. No known occurrences of state-listed species within 1 mi.
	Water Sources and Discharges: Construction of pipelines: • Process water supply pipelines would result in **conversion of 47 ac of wooded habitat to grassland habitat as well as clearing 46 ac of additional habitat during construction**. Five known occurrences of five state-listed plant species within 1 mi of proposed pipeline. Possible, but unlikely, that these species could be affected by construction (usually found in different habitat types). • Cooling water effluent pipelines **avoided using enhanced ZLD system.** • Potable/sanitary pipelines would cause the **conversion of 1 ac of wooded habitat to grassland habitat as well as clearing 6 ac of additional habitat during construction.**	**Water Sources and Discharges:** Construction of pipelines: • Process water supply pipelines would result in the **conversion of 21 ac of wooded habitat to grassland habitat as well as clearing 38 ac of additional habitat during construction**. No known occurrences of state-listed species within 1 mi. • No cooling water effluent pipelines (due to the use of an enhanced ZLD system). • Potable/sanitary pipelines would cause the **conversion of 2 ac of wooded habitat to grassland habitat as well as clearing 12 ac of additional habitat during construction**. No known occurrences of state-listed species within 1 mi of potable/sanitary pipelines.
	Natural Gas Facilities: • Alt 1 would cause the **conversion of 76 ac of wooded habitat to grassland habitat as well as clearing 32 ac of additional habitat during construction.** Nine known occurrences of seven state-listed plant species within 1 mi of proposed pipeline. Possible, but unlikely, that these species could be affected by construction (usually found in different habitat types).	**Natural Gas Facilities:** Proposed alignment would cause the **conversion of 24 ac of wooded habitat to grassland habitat as well as clearing <2 ac of additional habitat during construction**. Five occurrences of three state-listed plant species and seven occurrences of two state-listed animal species within 1 mi of proposed pipeline. Possible that construction could affect these species.

Table 2.4-1. Summary Comparison of Impacts (Phases I & II)

No Action	West Range	East Range
	• Alt 2 would cause the **conversion of 36 ac of wooded habitat to grassland habitat as well as clearing 6 ac of additional habitat during construction.** Three known occurrences of one state-listed plant species within 1 mi of proposed pipeline. Possible, but unlikely, that these species could be affected by construction (usually found in different habitat types). • Alt. 3 would cause the **conversion of 30 ac of wooded habitat to grassland habitat as well as clearing 20 ac of additional habitat during construction**. No known occurrences of state-listed species within 1 mi.	
	HVTL Corridors: • **HVTL Alt 1 (WRA-1 or WRB-1)** would cause the **conversion of 70 ac of wooded habitat to field/meadow habitat as well as clearing 22 ac of additional habitat during construction**. Seven occurrences of five state-listed plant species within 1 mi of proposed HVTL, which could be affected during construction and operation. • **HVTL Alt 1A (WRA-1A or WRB-1A)** would cause the **conversion of 70 ac of wooded habitat to field/meadow habitat as well as clearing 29 ac of additional habitat during construction**. Seven occurrences of five state-listed plant species within 1 mi of proposed HVTL, which could be affected during construction and operation. • **HVTL Phase 2 Plan B (WRB-2A)** would not have a permanent impact on vegetation because it would be located within an existing HVTL corridor. Eleven occurrences of eight state-listed plant species and one occurrence of a state-listed animal species within 1 mi of proposed HVTL, which could be affected during construction and operation.	**HVTL Corridors: With the exception of two 2-mi segments, all HVTLs would be constructed on existing HVTL ROWs with new towers; widening of one or the other corridor would be required.** • **HVTL Alt 1 (widen 38L ROW)** would cause the **conversion of 219 ac of wooded habitat to field/meadow habitat; additional construction would be limited to existing ROW**. Eight occurrences of five state-listed plant species and eight occurrences of two state-listed animal species within 1 mi of proposed HVTL, which could be affected during construction and operation. • **HVTL Alt 2 (widen 39L/37L ROW)** would cause the **conversion of 219 ac of wooded habitat to field/meadow habitat; additional construction would be limited to existing ROW**. Two occurrences of two state-listed plant species and 16 occurrences of three state-listed animal species within 1 mi of proposed HVTL, which could be affected during construction and operation.

Table 2.4-1. Summary Comparison of Impacts (Phases I & II)

No Action	West Range	East Range
Cultural Resources		
No new structures built, no archaeological or Native American sites disturbed.	**Power Plant Site:** Located within Western Mesabi Iron Range Early Mining Landscape District. MN State Historic Preservation Office (SHPO) has 11 historic properties recorded within the area of potential effect for the West Range Site and corridors. Coordination with SHPO required during construction to avoid or minimize potential impacts to the historic character of the District. No known archaeological resources or Native American cultural resources known to exist within 1 mi of site. The potential for the occurrence of archaeological resources is high within 55 ac (1%) and moderate on 108 ac (2%) of the site **(1,344 acres)**. Consistent with the recommendations of the SHPO, a Phase I archaeological survey of locations with high and medium potential was conducted in 2007. Although not yet final, the survey did not uncover any previously unknown resources within the site boundaries. **The Phase II footprint would be cleared to serve as a laydown area for Phase I construction. Therefore, the amount of disturbed land on site would not dramatically change between Phase I and Phase II construction. Offsite laydown areas for Phase II construction would be established on 85 ac of lands at 4 potential sites that have been disturbed from prior mining activities.** **All utilities and transportation infrastructure would be developed for operation of Phase I (no difference in impacts for Phase I-only outcome).** **Transportation Facilities, Water Sources and Discharges, Natural Gas Facilities, HVTL Corridors:** Located within Western Mesabi Iron Range Early Mining Landscape District. SHPO has 11 historic properties recorded within the area of potential effect for site and corridors. Coordination with SHPO required during construction to avoid or minimize potential impacts to the historic character of the District. No known archaeological resources or Native American cultural resources exist within the transportation or utility corridors. A total of 330 ac (5%) of high potential for archaeological resources and 580 ac (12%) of moderate potential for archaeological	**Power Plant Site:** No known archaeological sites or Native American cultural resources identified within 1 mi of the site. The study area (30,471 ac) included the site and associated transportation and utility corridors. A total of 4,862 ac (16%) of the study area has a high potential for archaeological resources and 457 ac (1.5%) has a moderate potential for archaeological resources. Phase I surveys are complete and the SHPO has agreed that no further study is needed, provided that there would be no terrain disturbance at the Longyear historic site. **The Phase II footprint would be cleared to serve as a laydown area for Phase I construction. Therefore, the amount of disturbed land on site would not dramatically change between Phase I and Phase II construction. Offsite laydown areas for Phase II construction would be established on 85 ac of lands at 2 potential sites that have been disturbed from prior mining activities.** **All utilities and transportation infrastructure would be developed for operation of Phase I (no difference in impacts for Phase I-only outcome).** **Transportation Facilities:** Included in the discussion for Power Plant Site above. **Water Sources and Discharges:** The water pipeline corridors would be located within previously disturbed areas; therefore, these corridors would not be expected to contain archaeological or historical resources. **Natural Gas Facilities:** The natural gas pipeline corridor would follow an existing ROW; therefore, no archaeological or historical resources are anticipated. **HVTL Corridors:** The proposed HVTLs would follow existing HVTL corridors, which would minimize potential for impacts.

Table 2.4-1. Summary Comparison of Impacts (Phases I & II)

No Action	West Range	East Range
	resources exists along the HVTLs, rail line, and pipeline corridors (combined for all transportation and utility corridors - **4,988 acres**). Archaeological surveys would be conducted only in those corridors to be permitted by the PUC if the West Range Site were selected for permitting. Although surveys would necessarily be completed after the DOE Record of Decision, the Record of Decision would be conditional upon implementing the provisions of an agreement between DOE, SHPO, and appropriate parties for the identification and protection of resources. **DOE is developing a Programmatic Agreement with the SHPO, ACHP, and Native American tribes for the appropriate protection of cultural resources during construction for the Mesaba Energy Project.** **DOE is also negotiating a separate Memorandum of Agreement with regional Native American tribes for the appropriate consideration of interests not addressed by the PA.**	There are two known archaeological sites located within 0.25 mi of the 39L/37L corridors; however, they are outside of the construction ROW. One National Register of Historic Places (NRHP)-listed building and one potentially eligible building are within the town of Eveleth in the vicinity of the 39L/37L route. One eligible site within the HVTL visual area of potential effect would be crossed by the HVTL corridor south of the plant site. Archaeological surveys would be conducted only in those corridors to be permitted by the PUC if the East Range Site were selected for permitting. Although surveys would necessarily be completed after the DOE Record of Decision, the Record of Decision would be conditional upon implementing the provisions of an agreement between DOE, SHPO, and appropriate parties for the identification and protection of resources **DOE is developing a Programmatic Agreement with the SHPO, ACHP, and Native American tribes for the appropriate protection of cultural resources during construction for the Mesaba Energy Project.** **DOE is also negotiating a separate Memorandum of Agreement with regional Native American tribes for the appropriate consideration of interests not addressed by the PA.**
Land Use		
No change in land use; sites and corridors would remain in current status.	**Power Plant Site:** Generating station on **1,708**-ac site, currently undeveloped and zoned for industrial use. ~50 residential properties within 1 mi of footprint (closest, 0.71 mi); buffered by ~0.5 mi of dense woodlands. No conflict with local or regional zoning ordinances or land use plans. **The** use of eminent domain, **as allowed by MN Statutes 216B.1694**, **may be** needed to acquire **parcels of land within** the site footprint and its surrounding buffer land. The use of eminent domain also may be necessary to acquire some public and private lands or easements if agreements to purchase such lands or easements (for **HVTLs,** associated facilities, utilities, or transportation infrastructure; or to interconnect the project with such features and available water resources) cannot be negotiated with property owners. **All utilities and transportation infrastructure would be developed for operation of Phase I (no difference in impacts for Phase I-only outcome).**	**Power Plant Site:** Generating station on **1,322**-ac site, currently undeveloped and zoned for mining use. No residential properties within 1 mi of footprint (closest, 1.28 mi); buffered by ~0.5 mi of dense woodlands. No conflict with local or regional zoning ordinances or land use plans. No use of eminent domain is needed to acquire the site footprint and its surrounding buffer land. The use of eminent domain as allowed by MN Statutes 216B.1694 may be necessary to acquire some public and private lands or easements if agreements to purchase such lands or easements (for **HVTLs,** associated facilities, utilities, or transportation infrastructure; or to interconnect the project with such features and available water resources) cannot be negotiated with property owners. **All utilities and transportation infrastructure would be developed for operation of Phase I (no difference in impacts for Phase I only outcome).**

Table 2.4-1. Summary Comparison of Impacts (Phases I & II)

No Action	West Range	East Range
	Transportation Facilities: Rail alignment alternatives: • Alt. 1A within 0.5 mi of 16 residences (closest **within 470** ft). • Alt. 1B **eliminated based on Draft EIS.** • **Alt 3B within 0.5 mi of 16 residences (closest within 470 ft).** **Access Roads:** • **Access Roads 1 and 2 eliminated after Draft EIS (CR 7 realignment deferred by Itasca County).** • **Access Road 3 within 1,250 ft of 2 residences.** **Water Sources and Discharges:** • Process water pipelines within 0.5 mi of 104 residences (4 within 500 ft). • Cooling water effluent pipelines **avoided using enhanced ZLD system**. • Potable/sanitary pipelines within 0.5 mi of 114 residences (4 within 500 ft). **Natural Gas Facilities:** Natural gas pipelines: • Alt. 1 within 0.5 mi of 153 residences (3 within 300 ft). • Alt. 2 within 0.5 mi of 339 residences (5 within 300 ft). • Alt. 3 within 0.5 mi of 935 residences (29 within 300 ft). **HVTL Corridors:** HVTL routes: • **HVTL Alt 1** within 0.5 mi of 66 residences (4 within 500 ft). • **HVTL Alt 1A** within 0.5 mi of 62 residences (7 within 500 ft). • **HVTL Phase 2 Plan B** within 0.5 mi of 214 residences (29 within 500 ft).	**Transportation Facilities:** Rail and road alignments: No residences within 0.5 mi of either rail alignment alternative (closest ~1 mi). No residences within 0.5 mi of site access road (closest >1 mi). **Water Sources and Discharges:** • No residences within 0.5 mi of process water pipeline segments (closest >0.75 mi). • No cooling water effluent pipeline (enhanced ZLD system). • No residences within 0.5 mi of potable/sanitary pipelines (closest >0.75 mi). **Natural Gas Facilities:** Natural gas pipeline on existing ROW within 0.5 mi of 856 residences (46 within 300 ft). **HVTL Corridors:** HVTL routes on existing ROWs (<4 mi of new ROW); widening of one or the other corridor would be required. • **HVTL Alt 1 (widen 38L ROW)** within 0.5 mi of 271 residences (22 within 500 ft). • **HVTL Alt 2 (widen 39L/37L ROW)** within 0.5 mi of 962 residences (49 within 500 ft).
Socioeconomics		
No change in existing socioeconomic conditions; no potential for economic stimulus from proposed project.	**General:** Project spending and creation of new construction and operation jobs would provide **total output economic** benefits to regional economy. **For both phases, the project would generate** $3.1 billion **in total output benefits** over 6 years during construction **($2 billion for Phase I and $1.1 billion for Phase II). The Project would generate total output economic benefits of** $1.1 billion/yr during operation of both phases **($535 million/yr for Phase I operation alone)**; the power plant would be expected to operate commercially for 20 years or more). **Power Plant Site:** No displacement of population, housing, businesses, or jobs. Ten or more residential properties closest to	**General:** Project spending and creation of new construction and operation jobs would provide **total output economic** benefits to regional economy. **For both phases, the project would generate** $3.1 billion **in total output benefits** over 6 years during construction **($2 billion for Phase I and $1.1 billion for Phase II). The Project would generate total output economic benefits of** $1.1 billion/yr during operation of both phases **($535 million/yr for Phase I operation alone)**; the power plant would be expected to operate commercially for 20 years or more). **Power Plant Site:** No displacement of population, housing, businesses, or jobs. No impact on property values anticipated

Table 2.4-1. Summary Comparison of Impacts (Phases I & II)

No Action	West Range	East Range
	the plant footprint could experience impacts on property values based on proximity to facility and resulting aesthetic and noise impacts. Potential temporary adverse impacts on housing demand related to influx of workers during peak construction (>1,500/yr in **2011-13**); less than 3,000 housing units in Census Tract 9810, of which 513 were vacant (non-seasonal) or rental units in 2000. **Note: The Minnesota Steel[1] Final EIS concluded that there would be no significant cumulative socioeconomic impacts even with consideration of the Mesaba Energy Project.**	based on distances to nearest residences. Potential temporary adverse impacts on housing demand related to influx of workers during peak construction (>1,500/yr in **2011-13**); less than 1,000 housing units in Hoyt Lakes (Census Tract 140), of which 143 were vacant (non-seasonal) or rental units in 2000.
	Transportation Facilities: No displacement of population, housing, businesses, or jobs. Three residences within 1,000 ft of Rail Alignment Alternatives **3B and** 1A could experience impacts on property values due to proximity and resulting aesthetic and noise impacts. Realignment of CR 7 (connected action) **could** influence local housing development in vicinity**, but project was deferred by Itasca County after Mesaba Draft EIS publication**.	**Transportation Facilities:** No displacement of population, housing, businesses, or jobs. No impact on property values anticipated based on distances to nearest residences.
	Water Sources and Discharges: No displacement of population, housing, businesses, or jobs. No impact on property values anticipated. **Natural Gas Facilities:** No displacement of population, housing, businesses, or jobs. No impact on property values anticipated. **Excelsior proposes to negotiate with Nashwauk PUC for the purchase of natural gas from its permitted pipeline, which would follow the same alignment as Excelsior's preferred alternative.** **HVTL Corridors:** No displacement of population, housing, businesses, or jobs. **A small number of the closest residences may experience adverse effects on property values depending upon the visibility of HVTL structures**.	**Water Sources and Discharges:** No displacement of population, housing, businesses, or jobs. No impact on property values anticipated. **Natural Gas Facilities:** No displacement of population, housing, businesses, or jobs. No impact on property values anticipated. **HVTL Corridors:** No displacement of population, housing, businesses, or jobs. **Although HVTLs would be constructed in existing HVTL ROWs except for two 2-mi segments, the addition of 30 feet of ROW on one of the corridors would place HVTLs closer to more residences, which may adversely affect property values depending upon the visibility of the taller towers**.
Environmental Justice		
No change in existing conditions relative to minority and low-income populations; no potential for economic benefits from proposed project.	**Power Plant Site:** Minority and low-income populations in the region of influence for the power plant do not exceed 50% of the population and are not meaningfully greater than the percentages in the general population. Therefore, the plant site would not have a disproportionately high and adverse impact on minority or low-income populations. The closest concentrations of American-Indian populations are located approximately 20 mi from the site. Local tribes expressed concern regarding health risks associated with project pollutants	**Power Plant Site:** Minority and low-income populations in the region of influence for the power plant do not exceed 50% of the population and are not meaningfully greater than the percentages in the general population. Therefore, the plant site would not have a disproportionately high and adverse impact on minority or low-income populations. The closest concentrations of American-Indian populations are located approximately **20** mi from the site. Local tribes expressed concern regarding health risks associated with project pollutants

Table 2.4-1. Summary Comparison of Impacts (Phases I & II)

No Action	West Range	East Range
	and their impact on traditional food sources. However, the increment of mercury (less than 0.5 percent increase) and other pollutants from the project would be very low and human health impacts from fish consumption would be negligible even within 2 mi from the power plant site. **Transportation Facilities, Water Sources and Discharges, Natural Gas Facilities, HVTL Corridors:** No disproportionately high and adverse impacts on minority or low-income populations are indicated.	and their impact on traditional food sources. However, the increment of mercury (less than 0.5 percent increase) and other pollutants from the project would be very low and human health impacts from fish consumption would be negligible even within 2 mi from the power plant site. **Transportation Facilities, Water Sources and Discharges, Natural Gas Facilities, HVTL Corridors:** No disproportionately high and adverse impacts on minority or low-income populations are indicated.
Community Services		
No change in existing conditions relative to community services.	**Power Plant Site:** Demands by the generating station may require staff at local fire and emergency response agencies to increase by 30 to 50%. Large numbers of construction workers (>1,500 during 3 years of peak construction) may affect capacities of local law enforcement agencies. Security requirements for the generating station may affect capacities of local law enforcement agencies. **OSHA Standard 1910.120 requires the Mesaba Generating Station to provide and train first responders and first aid specialists to respond until local emergency personnel arrive.** **Transportation Facilities:** Potential for delays to emergency response vehicles at 17 rail grade crossings between Grand Rapids and Taconite (8 in Grand Rapids). Approximately 2.5% daily probability of delay at a crossing caused by train serving Mesaba plant; 4% probability of delay from combined rail traffic. **Water Sources and Discharges:** Security requirements for process water intake facilities may **affect public access for recreation in the Canisteo Mine Pit depending upon MNDNR**. **Natural Gas Facilities:** No displacement of providers or change in demand on community services. **HVTL Corridors:** No displacement of providers or change in demand on community services.	**Power Plant Site:** Demands by the generating station may require staff at local fire and emergency response agencies to increase by 20% or less. Large numbers of construction workers (>1,500 during 3 years of peak construction) may affect capacities of local law enforcement agencies. Security requirements for the generating station may affect capacities of local law enforcement agencies. **OSHA Standard 1910.120 requires the Mesaba Generating Station to provide and train first responders and first aid specialists to respond until local emergency personnel arrive.** **Transportation Facilities:** Potential for delays to emergency response vehicles at 8 rail grade crossings between Clinton Township and Hoyt Lakes. Approximately 2.5% daily probability of delay at a crossing caused by train serving Mesaba plant; 5.5% probability of delay from combined rail traffic. **Water Sources and Discharges:** No displacement of providers or change in demand on community services. **Natural Gas Facilities:** No displacement of providers or change in demand on community services. **HVTL Corridors:** No displacement of providers or change in demand on community services.

Table 2.4-1. Summary Comparison of Impacts (Phases I & II)

No Action	West Range	East Range
	Utility Systems	
No change in existing conditions relating to utilities; the region would not benefit from the additional source of power from the Mesaba Energy Project.	**Power Plant Site:** The project would tie into the existing grid without service interruptions and would ensure necessary upgrades to substations and other infrastructure would be installed to prevent system failures. The project would provide another source of power for the region that could reduce outages and help meet future demand. **Transportation Facilities:** No expected impacts. **Proposed road and rail alignments would be the same for Phase I-only and combined Phases I and II.** **Water Sources and Discharges:** The Mesaba Energy Project would not adversely affect sanitary wastewater treatment capacity. The wastewater collection system in Taconite currently overflows during heavy rain and high water table events, which may be worsened by new flow from the West Range Site. This collection system would need to be redesigned or repaired regardless of the outcome of this project. During the construction phase of the project, potable water requirements would exceed the capacity of the existing Taconite water supply system; however, planned improvements and studies to the system would provide sufficient supplies **and improve water quality**. Otherwise, potable water supplies would be brought to the project site by truck**. Proposed sanitary wastewater and potable water pipelines would be the same for Phase I-only and combined Phases I and II. Proposed process water pipelines required for Phase I include pipelines to supply water from CMP and GMMP. Additional pipelines for Phase II would be required and include pipelines for LMP and Prairie River**. **Natural Gas Facilities:** No impacts on service providers or capacity expected**. Proposed natural gas pipeline route would be the same for Phase I-only and combined Phases I and II. Depending on status of Nashwauk Public Utilities Commission to construct the pipeline, Excelsior would operate a 16- or 24-inch diameter pipeline**. **HVTL Corridors:** The project's proposed utility lines would be constructed in accordance with all Federal and state regulations, and would pose no adverse impact on other resources**. No network upgrades required for Phase I. Specific network upgrades for Phase II unknown at this time; however, DOE considers the possible network upgrades that may be**	**Power Plant Site:** The project would tie into the existing grid without service interruptions and would ensure necessary upgrades to substations and other infrastructure would be installed to prevent system failures. The project would provide another source of power for the region that could reduce outages and help meet future demand. **Transportation Facilities:** No expected impacts**. Proposed road and rail alignments would be the same for Phase I-only and combined Phases I and II**. **Water Sources and Discharges:** The Mesaba Energy Project would not adversely impact existing potable and sanitary sewer systems, as both have capacity to serve the project**. Proposed sanitary wastewater and potable water pipelines would be the same for Phase I-only and combined Phases I and II. Proposed process water pipelines for Phase I include Mine Pit 2WX, Mine Pit 6, and Stephens Mine Pit (other mine pit sources may be used depending on other industrial users and consultation with MNDNR). Phase II would require additional process water pipelines from Colby Lake**. **Natural Gas Facilities:** No impacts on service providers or capacity expected**. Proposed natural gas pipeline route would be the same for Phase I-only and combined Phases I and II**. **HVTL Corridors:** The project's proposed utility lines would be constructed in accordance with all Federal and state regulations, and would pose no adverse impact on other resources**. No network upgrades required for Phase I. Specific network upgrades for Phase II unknown at this time; however, DOE considers the possible network upgrades that may be**

Table 2.4-1. Summary Comparison of Impacts (Phases I & II)

No Action	West Range	East Range
	required for Mesaba Phase II to be unavailable information that is not essential for a reasoned choice among alternatives available to DOE (see 40 CFR 1502.22). Furthermore, if network upgrades or new HVTL's were to be required for Mesaba Phase II, the potential environmental impacts would be evaluated and disclosed to the public through the MDOC environmental review process. **Plan A: Same two 345-kV HVTLs would be utilized for both Phase I (operated at 230-kV) and combined Phases I and II (upgraded to operate at 345-kV).** **Plan B: Two 230-kV HVTLs would be utilized for Phase I. An additional 230-kV HVTL would be required for Phase II**.	**required for Mesaba Phase II to be unavailable information that is not essential for a reasoned choice among alternatives available to DOE (see 40 CFR 1502.22). Furthermore, if network upgrades or new HVTL's were to be required for Mesaba Phase II, the potential environmental impacts would be evaluated and disclosed to the public through the MDOC environmental review process. Same two HVTL corridors would be required for Phase I operation as well as Phase II. Installation of high voltage switchyard would occur at Phase I construction and no further development required for Phase II**.
Traffic and Transportation		
No change in existing vehicular traffic; Level of Service (LOS) conditions would remain the same.	**Power Plant Site:** During construction: temporary level of service (LOS) degradation of **CR 7 – from an LOS of A to B.** During operation: **For Mesaba Energy Project (Phase I) number of vehicle trips generated by personnel and from truck deliveries would be 165 and 30, respectively. LOS would remain the same and in stable operating conditions on nearby roadways. Up to one roundtrip train per day would be required. Combined Phases I and II would add 115 employee-generated vehicle trips and 30 truck trips. Except for CR 7 south of project site, no substantial differences in LOS for combined-phase plant compared to Phase I-only. CR 7 would degrade from an LOS of A to B. Up to two roundtrip trains per day would be required.** **Transportation Facilities:** Rail use during construction and operations is expected to have minimal adverse impacts to baseline rail traffic conditions. Access Roads: Access Roads 1 **and 2 eliminated after Draft EIS (CR 7 realignment deferred by Itasca County)**. • Access Road **3** would not impact LOS. **Water Sources and Discharges:** Temporary and localized traffic congestion during construction. **Natural Gas Facilities:** Temporary and localized traffic congestion during construction. **HVTL Corridors:** Temporary and localized traffic congestion during construction.	**Power Plant Site:** During construction: temporary LOS degradation of most of nearby roads; however, lowest LOS would be B. Reconstruction of Hampshire Drive expected to minimize potential congestion at intersection of CR 666 and CR 110. During operation: **For Mesaba Energy Project (Phase I) number of vehicle trips generated by personnel and from truck deliveries would be 165 and 30, respectively. Combined Phases I and II would add 115 employee-generated vehicle trips and 30 truck trips.** LOS would remain the same on nearby roadways, except for CR 666 (north of CR 110), which would degrade from A to B. **Up to one roundtrip train per day would be required for Phase I. Up to two roundtrip trains per day would be required for Phase II.** **Transportation Facilities:** Rail use during construction and operations is expected to have minimal adverse impacts to baseline rail traffic conditions. Access Roads: Access Road 1 **(single segment)** would provide access from CR 666 and would not affect LOS. **Water Sources and Discharges:** Temporary and localized traffic congestion during construction. **Natural Gas Facilities:** Temporary and localized traffic congestion during construction. **HVTL Corridors:** Temporary and localized traffic congestion during construction.

Table 2.4-1. Summary Comparison of Impacts (Phases I & II)

No Action	West Range	East Range
Materials and Waste Management		
No change in existing conditions; no increase in the risk of a hazardous waste release.	**Power Plant Site:** Proper handling and storage of materials and wastes would be conducted to minimize potential for release of a hazardous waste or material to the environment. In-state or out-of-state solid waste collection services and landfills would have the capability and capacity to accept solid wastes generated. Additional market analysis would be required to secure a market and avoid disposal of slag (1000-1600 tons per day generated for both phases); however, sufficient capacity is available if disposal of the slag is necessary. Commercially available treatment, stabilization, or disposal for waste streams generated. The Mesaba Generating Station would be regulated as a large quantity generator of hazardous waste (sulfuric acid, spent activated carbon and potentially the ZLD filter cake, as well as smaller quantities of other hazardous wastes). No substantial increase in risk of a hazardous waste release to the environment. Proper handling and storage of wastes in accordance with Resource Conservation and Recovery Act (RCRA) would be adhered to. **The Mesaba Generating Station (Phases I and II) would use the same materials and generate the same wastes as a Phase I-only plant, although the quantities would be approximately double.** **Transportation Facilities:** Proper handling and storage of materials and wastes would be conducted to minimize potential for a release of a hazardous waste or material to the environment. **Water Sources and Discharges:** Proper handling and storage of materials and wastes would be conducted to minimize potential for a release of a hazardous waste or material to the environment. **Natural Gas Facilities:** Proper handling and storage of materials and wastes would be conducted to minimize potential for a release of a hazardous waste or material to the environment. **HVTL Corridors:** Proper handling and storage of materials and wastes would be conducted to minimize potential for a release of a hazardous waste or material to the environment.	**Power Plant Site:** Proper handling and storage of materials and wastes would be conducted to minimize potential for a release of a hazardous waste or material to the environment. In-state or out-of-state solid waste collection services and landfills would have the capability and capacity to accept solid wastes generated. Additional market analysis would be required to secure a market and avoid disposal of slag (1000-1600 tons per day generated for both phases); however, sufficient capacity is available if disposal of the slag is necessary. Commercially available treatment, stabilization, or disposal for waste streams generated. The Mesaba Generating Station would be regulated as a large quantity generator of hazardous waste (sulfuric acid, spent activated carbon and potentially the ZLD filter cake, as well as smaller quantities of other hazardous wastes). No substantial increase in risk of a hazardous waste release to the environment. Proper handling and storage of wastes in accordance with RCRA would be adhered to. **The Mesaba Generating Station (Phases I and II) would use the same materials and generate the same wastes as a Phase I-only plant, although the quantities would be approximately double.** **Transportation Facilities:** Proper handling and storage of materials and wastes would be conducted to minimize potential for a release of a hazardous waste or material to the environment. **Water Sources and Discharges:** Proper handling and storage of materials and wastes would be conducted to minimize potential for a release of a hazardous waste or material to the environment. **Natural Gas Facilities:** Proper handling and storage of materials and wastes would be conducted to minimize potential for a release of a hazardous waste or material to the environment. **HVTL Corridors:** Proper handling and storage of materials and wastes would be conducted to minimize potential for a release of a hazardous waste or material to the environment.

Table 2.4-1. Summary Comparison of Impacts (Phases I & II)

No Action	West Range	East Range
Safety and Health		
No added health and safety risk, and no increase in the probability of construction or operational health and safety risks.	**Power Plant Site:** Construction workers would follow a safety plan and standard safety practices to reduce the potential for construction-related impacts. During the 5-year construction period, statistically less than 1 worker fatality (0.4) would occur. During the operation of the plant, statistically less than 1 operations-related worker fatality (0.01) would occur. **The potential for worker fatalities during Phase I construction and operation would be marginally lower than for both phases.** Based on air emission modeling results, cancer or morbidity hazards to workers or to the public would be small and would not exceed EPA standards. Specifically, the **highest cumulative** non-cancer **(morbidity)** hazard indices would be **0.081 and 0.082**, respectively **for adult and child,** compared to a threshold index of 1, and the **highest cumulative** projected cancer risks would be **$2.5x10^{-6}$ and $4.6x10^{-7}$**, **respectively for adult and child,** compared to a threshold of $1x10^{-5}$. **Risks from exposure to dioxins, furans, chromium, and $PM_{2.5}$ would be below established thresholds. These results, based on the emissions from both phases, indicate that the health risks associated with Phase I-only would also be below established thresholds.** Potential major operating accidents or intentional destructive acts, although not anticipated, could result in fires and localized airborne releases of substances **that are toxic in high concentrations**, such as CO, H_2S, and SO_2. In such cases, plant workers would be the most at-risk of injury or death, although the nearest residents, located 0.6 to 0.8 mi from the plant, would also be at-risk from a large release. **The probability of an accident or intentional destructive act occurring in Phase I-only or during the operation of both phases would be comparable and the potential for injury would be similar.** **All utilities and transportation infrastructure would be developed for operation of Phase I (no difference in impacts for Phase I-only outcome).** **Transportation Facilities:** During construction and operation, it is estimated, respectively, that approximately 1.2 and 0.53 fatalities could occur due to the movement of workers and material via trucks and personal vehicles. Because of the relatively low incremental	**Power Plant Site:** Construction workers would follow a safety plan and standard safety practices to reduce the potential for construction-related impacts. During the 5-year construction period, statistically less than 1 worker fatality (0.4) would occur. During the operation of the plant, statistically less than 1 operations-related worker fatality (0.01) would occur. **The potential for worker fatalities during Phase I construction and operation would be marginally lower than for both phases.** Based on air emission modeling results, cancer or morbidity hazards to workers or to the public would be small and would not exceed EPA standards. Specifically, the **highest cumulative** non-cancer **(morbidity)** hazard indices would be **0.081 and 0.082**, respectively **for adult and child**, compared to a threshold index of 1, and the **highest cumulative** projected cancer risks would be **$2.5x10^{-6}$ and $4.6x10^{-7}$**, **respectively for adult and child,** compared to a threshold of $1x10^{-5}$. **Risks from exposure to dioxins, furans, chromium, and $PM_{2.5}$ would be below established thresholds. These results, based on the emissions from both phases, indicate that the health risks associated with Phase I only would also be below established thresholds.** Potential major operating accidents or intentional destructive acts, although not anticipated, could result in fires and localized airborne releases of substances **that are toxic in high concentrations,** such as CO, H_2S, and SO_2. In such cases, plant workers would be the most at-risk of injury or death, although the nearest residents, located 1 mi from the plant, would also be at-risk from a large release. **The probability of an accident or intentional destructive act occurring in Phase I-only or during the operation of both phases would be comparable and the potential for injury would be similar.** **All utilities and transportation infrastructure would be developed for operation of Phase I (no difference in impacts for Phase I-only outcome).** **Transportation Facilities:** During construction and operation, it is estimated, respectively, that approximately 1.2 and 0.53 fatalities could occur due to the movement of workers and material via trucks and personal vehicles. Because of the relatively low incremental addition of project-related train trips (up to one and

Table 2.4-1. Summary Comparison of Impacts (Phases I & II)

No Action	West Range	East Range
	addition of project-related train trips (up to one and two roundtrips per day during Phase I and II, respectively), it is expected that increases to safety hazards at at-grade crossings would be low because baseline vehicular traffic numbers within the region of influence are considered low. **Water Sources and Discharges:** No impacts would be expected. **Natural Gas Facilities:** No impacts would be expected. **HVTL Corridors:** Research regarding the potential for public health risks from the inhalation of pollutant particles charged by HVTLs (i.e., the Henshaw Effect) is currently inconclusive. Therefore, these risks are considered comparable to the risks imposed by tens of thousands of mi of HVTLs already in use throughout the U.S. EMF exposure from utility lines would fall **within the 8-kV/m MN standard inside the ROW; short segments of the 345-kV single-circuit delta configuration would be slightly above 2-kV/m at the edge of the ROW.** There would be no permanent residents located in areas exceeding 2-kV/m.	two roundtrips per day during Phase I and II, respectively), it is expected that increases to safety hazards at at-grade crossings would be low because baseline vehicular traffic numbers within the region of influence are considered low. **Water Sources and Discharges:** No impacts would be expected. **Natural Gas Facilities:** No impacts would be expected. **HVTL Corridors:** Research regarding the potential for public health risks from the inhalation of pollutant particles charged by HVTLs (i.e., the Henshaw Effect) is currently inconclusive. Therefore, these risks are considered comparable to the risks imposed by tens of thousands of mi of HVTLs already in use throughout the U.S. EMF exposure from utility lines would fall **within the 8-kV/m MN standard inside the ROW. One residence within 50-100 feet of the centerline of the 38L route and 2 residences within 50-100 feet of the centerline of the 39L/37L route could fall within areas where the electric fields exceed 2-kV/m.**
Noise		
No change in noise emissions. There would be no new violations or exceedances of noise standards.	**Power Plant Site:** <u>During construction</u>: Aggregate noise levels at receptors not expected to exceed MPCA thresholds **and would range from 27 to 56 dBA** (Table 4.18-7)**.** Steam blows would be an unavoidable adverse impact. A series of short steam blows, lasting two or three minutes each, would be performed several times daily over a period of two or three weeks during the final weeks of construction. Resultant levels at nearby receptors would range from **86 to 100** dBA (Table 4.18-8); however, steam piping would be equipped with silencers that would reduce noise levels by 20 dBA to 30 dBA at each receptor location. <u>During operation</u>: Daytime – MPCA noise thresholds would not be exceeded (Table 4.18-11). Nighttime (10:00 p.m. to 7:00 a.m.) – During Phase I-only (without mitigation), R3 and R4 would remain over state thresholds (note, existing noise levels at these receptors exceed state limits because of proximity to CR 7) (Table 4.18-11); however, no perceptible change in noise levels would occur at any of the receptors. During combined Phases I and II (without mitigation), the nighttime noise levels would exceed the L_{50} threshold at R3 and R4 by **3.5 and 3.4 dBA**, respectively; however, no perceptible noise increase would occur at any receptor.	**Power Plant Site:** <u>During construction</u>: Aggregate noise levels at receptors not expected to exceed MPCA thresholds and would range from **31 to 65 dBA** (Table 4.18-9). Steam blows would be an unavoidable adverse impact. A series of short steam blows, lasting two or three minutes each, would be performed several times daily over a period of two or three weeks during the final weeks of construction. Resultant sound levels at nearby receptors would range from 88 to **104** dBA (Table 4.18-10); however, steam piping would be equipped with silencers that would reduce noise levels by 20 dBA to 30 dBA at each receptor location. <u>During operation</u>: During Phase I-only and combined Phases I and II (and without mitigation), noise levels would not exceed daytime or nighttime MPCA noise thresholds (Table 4.18-11). During Phase I and combined Phases I and II (and without mitigation), predicted daytime and nighttime noise level increases would be greatest at R1 (**8.6-dBA** increase during combined Phase I and II); however, this is an isolated industrial area. No other perceptible changes in noise levels would occur at any of the receptor locations for each phase.

Table 2.4-1. Summary Comparison of Impacts (Phases I & II)

No Action	West Range	East Range
	Transportation Facilities: Train operations: Freight train noise levels would range from **36 to 56** dBA (Table 4.18-13) at the modeled receptor locations during a train pass-by - noise from freight train operations could be noticeable to residences represented by receptors R2, R5, **and AAC-7** and may be considered an impact based on the FRA noise criteria, but would be short-term and relatively infrequent. Maximum noise levels generated by freight train operations would be below the ATPA guideline of 70 dBA at each receptor location and would not be considered significant. Train horns, as required under FRA regulations, would be adverse unavoidable impacts for receptors near at-grade crossings. Access Roads: **No perceptible noise increases would occur at any receptor during operation of proposed Access Road 3. MINNOISE modeling results indicate that noise levels at modeled receptors would range from 32.4 to 53.9 dBA during day-time hours and 32.6 to 55.1 dBA during nighttime hours (Table 4.18-15). Note that incremental noise levels related to transportation activities would be similar under the single and combined phases; however, Phase I-only would generally experience half the occurrences of noise increases that would occur under the combined phase (comparable to rail and vehicle traffic volumes analyzed).** **Water Sources and Discharges:** Temporary and localized increases in noise levels during construction of water pipelines. **Natural Gas Facilities:** Temporary and localized increases in noise levels during construction of natural gas pipelines. **HVTL Corridors:** Temporary and localized increases in noise levels during construction of HVTLs.	**Transportation Facilities:** Train operations: Freight train noise levels would range from **39 to 50** dBA (Table 4.18-14) at the modeled receptor locations during a train pass-by - noise from freight train operations could be noticeable to residences represented by receptor R1. Maximum noise levels generated by freight train operations would be below the ATPA guideline of 70 dBA at each receptor location and would not be considered significant. Train horns, as required under FRA regulations, would be adverse unavoidable impacts for receptors near at-grade crossings. Access Roads: There are no residences or sensitive noise receptors in proximity to the proposed access road intersecting CR 666. **Note that incremental noise levels related to transportation activities would be similar under the single and combined phases; however, Phase I-only would generally experience half the occurrences of noise increases that would occur under the combined phase (comparable to rail and vehicle traffic volumes analyzed).** **Water Sources and Discharges:** Temporary and localized increases in noise levels during construction of water pipelines. **Natural Gas Facilities:** Temporary and localized increases in noise levels during construction of natural gas pipelines. **HVTL Corridors:** Temporary and localized increases in noise levels during construction of HVTLs.

[1] **The Minnesota Steel project is now known as "Essar Steel Minnesota"; however it is identified throughout this EIS as "Minnesota Steel", Minnesota Steel Industries", or "MSI based on the name of the project in the Final EIS published for it.**

Acronyms: ac – acre(s); alt. – alternative; APTA – American Public Transportation Association; BMPs – best management practices; BWCAW – Boundary Waters Canoe Area Wilderness; CAMR – Clean Air Mercury Rule; CMP – Canisteo Mine Pit; CO – carbon monoxide; CO_2 – carbon dioxide; CR – County Road; DAT – deposition analysis threshold; dBA – A-weighted decibels; EMF – electromagnetic field; FRA – Federal Railroad Administration; ft – feet; gpd – gallons per day; gpm – gallons per minute; H_2S – hydrogen sulfide; HAP – hazardous air pollutant; HVTL – high voltage transmission line; IGCC – integrated gasification combined cycle; **IRNP – Isle Royale National Park;** kg – kilogram; kV – kilovolt; LOS – level of service; m – meter; M – million; MAAQS – Minnesota Ambient Air Quality Standards; mi – mile(s); MPCA – Minnesota Pollution Control Agency; N – nitrogen; NAAQS – National Ambient Air Quality Standards; NH_3 – ammonia; NO_x – nitrogen oxides; NPDES – National Pollutant Discharge Elimination System; NPS – National Park Service; NRHP – National Register of Historic Places; Pb – lead; PM_{10} – particulate matter (aerodynamic diameter <10 μm); PSD – prevention of significant deterioration; RCRA – Resource Conservation and Recovery Act; **RLW – Rainbow Lakes Wilderness Area;** ROW – right-of-way; S – sulfur; ESC – erosion and sediment control; SHPO – State Historic Preservation Office; SO_2 – sulfur dioxide; SWPPP – Stormwater Pollution Prevention Plan; tpy – tons per year; VNP – Voyageurs National Park; VOCs – volatile organic compounds; yd – yard; yr – year; ZLD – zero liquid discharge

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3. AFFECTED ENVIRONMENT

3.1 CHAPTER OVERVIEW

This chapter describes the environmental setting as it relates to the Proposed Action and alternatives. The chapter has been prepared to address the required elements of an EIS in accordance with NEPA (40 CFR 1502.15) and the Minnesota Power Plant Siting Act, and it includes information on relevant environmental resource areas identified through the scoping process in the following sections:

3.2 Aesthetics

3.3 Air Quality and Climate

3.4 Geology and Soils

3.5 Water Resources

3.6 Floodplains

3.7 Wetlands

3.8 Biological Resources

3.9 Cultural Resources

3.10 Land Use

3.11 Socioeconomics

3.12 Environmental Justice

3.13 Community Services

3.14 Utility Systems

3.15 Traffic and Transportation

3.16 Materials and Waste Management

3.17 Safety and Health

3.18 Noise

The extent of information provided in each section of this chapter is commensurate with the baseline data necessary to support the impacts analysis presented in Chapter 4.

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3.2 AESTHETICS

This section describes the existing aesthetic attributes that may be affected by implementation of the Proposed Action. Aesthetic resources include scenic areas, such as public lands (e.g., national parks or forests), nature preserves, viewsheds, and other visual resources preserved and managed by the Federal, state, and local governments.

3.2.1 Background and Definitions

3.2.1.1 Aesthetic Definitions and Principles

Aesthetic resources addressed in this section consist of two aspects: viewsheds and scenic resources. Other aesthetic aspects, such as noise and visual haze (air quality), are addressed in other sections of this chapter. For this EIS, scenic resources are considered to be lands that are managed by Federal, state, and local governments for preservation purposes. These areas generally have inherent natural or manmade aesthetic properties that give a landscape its character and value as an environmental factor. Viewsheds are generally non-managed areas with aesthetic value. While the government does not typically protect viewshed locations, the community may still value these aesthetic qualities.

The framework for characterizing the existing conditions is derived from the Bureau of Land Management's (BLM) resource inventory system, which was designed to categorize and describe viewscapes for management and NEPA purposes (BLM, 1980). The resource inventory system is comprised of three elements, scenic quality, visual sensitivity, and visual distance:

- "Scenic quality" measures the visual appeal of the land area, and includes factors such as landform shape, vegetation, water, color, adjacent scenery, and additional cultural modifications. In essence, it describes the purity, or "pristineness," of a given viewscape;
- "Visual sensitivity" gauges the public's concern for the scenic quality. Wilderness areas with virgin forests are considered to have higher visual sensitivity than an industrial park. Publicly held lands, parks, and scenic routes would also be expected to have high visual sensitivity; and
- "Visual distance" describes the depth perspective of the view. Objects found in the foreground tend to be more predominant than ones in the distance are. However, a deeper perspective provides depth and can add to the scenic quality. Therefore, elevation, tree height, and visual distance all contribute to a viewscape's visual distance.

The above criteria are used to qualitatively describe current aesthetics resources of the region. Public lands, industrial mining areas, lookout points, and lakes will be described here to provide context for the impacts analysis in Section 4.2.

3.2.1.2 Regional Setting

The Minnesotan north woods is a scenic area with rolling hills, many lakes of varying size, and large swaths of forests. The area is rural, with small towns, and a mixture of recreation cabins among permanent residences. Four-season outdoor activities are a main source of recreation and area income. Major activities in the area include fishing, water recreation, biking, operating all-terrain vehicles and snowmobiles, hiking, and skiing. There are numerous trails and unpaved roads within the area, which connect local villages to the deep woods. Forest views are extremely restricted during the growing seasons but extend further with the absence of leaves during the fall, winter, and early spring. Vegetation is thick and high, with an average tree height between 60 and 80 feet.

There are numerous industrial traces in the Mesabi Iron Range area, resulting from historic and active iron ore mining. An abandoned mine area consists of the mine pit and an adjacent tailings pile. Groundwater infiltrates the mining pits and generates manmade lakes and ponds. Separate mines may also be connected by water, generating long, linear lakes. Where the mine pit edge is above the water, the slopes are very steep from the extensive local cuts. Adjacent to the mine pits are large waste rock piles from the mining activities. The tops of these tailings piles can extend up to 200 feet above the surrounding topography. They have steep slopes and sparse vegetation, and are very prominent in the landscape. Trees have begun to revegetate the top and slopes of some tailings piles; however, the shape and red rock are still visible from a distance. Figure 3.2-1 shows the Canisteo mine pit and a tailings pile near the West Range Site in late October 2005. The branch in the foreground is the top of a dead tree drowned by the increasing pit water height.

Figure 3.2-1. View of the Canisteo Mine Pit and Tailings Pile Looking North

3.2.2 Viewsheds

A viewshed is the land, water, and other environmental elements that are visible from a fixed vantage point. Since much of northern Minnesota is forested, most of the views are foreground to medium depth. Tall trees often adjoin roadways and population centers, restricting long-distance views. Breaks in the trees, from wetlands, lakes, or cleared areas generate the medium-range views in the area. The local topography is relatively flat, with a typical elevation variation of 200 feet. The best long-range views are from the summits of man-made tailings piles and on the ridges along the Messabe Mountain range. These areas have few trees and generally provide the height needed to see for many miles (Figure 3.2-2).

Figure 3.2-2. View from the Lind Mine Pit Tailings Pile Looking East

3.2.2.1 West Range Site and Corridors

West Range Site

The West Range Site is currently forested with shorter vegetation occurring in wetlands and along existing HVTL corridors that cross the property (Figure 3.2-3). Sections 3.10, Land Use; and 3.8, Biological Resources; describe the land use and local vegetation in more detail. The topography varies from 1,300 to 1,520 feet above sea level. There are several natural lakes that provide viewsheds within the vicinity of the West Range Site as shown in Figure 2.3-3 in Section 2.3.1.3, including Dunning Lake Holman Lake, Big Diamond Lake, and Little Diamond Lake. Many of the lakes in the area have water access through private cabins along the lakefront. The largest natural lakes in the West Range area are Trout Lake, Swan Lake, and Twin Lakes. Further discussion of the lakes is provided in Section 3.5, Water Resources.

Figure 3.2-3. View of West Range Site Looking North along HVTL (45L)

There are also numerous water-filled mine pits near the West Range Site. The CMP consists of a sequence of flooded mines extending from east to west. To the east, the Arcturus Mine, Hill Trumbull Mine and Hill-Annex Mine form the Gross-Marble Mine Pit (GMMP). When the pits were mined, large swaths of glacial overburden were removed, and the iron ore extracted. These cuts are still visible along the mine wall, with sheer drops of tens of feet occurring in places. Current access to the water occurs along old mining access roads and allows recreational boating to occur.

CR 7 extends north from US 169 around the west side of the West Range Site (Figure 3.2-4). This highway is screened on either side by trees and by wetlands to the west near US 169. From US 169, CR 7 extends north for approximately 25 miles and ends at Big Fork. Near Big Fork, CR 7 crosses portions of the George Washington State Forest. CR 7 is not a state or National Scenic Byway, and the designation "Scenic Highway" is considered a local reference.

West Range Corridors

HVTL corridors for the West Range Site are described in Section 2.3.1.5 and shown in Figure 2.3-4. Where possible, HVTLs would follow existing utility corridors. In general, the existing corridors are characterized by areas of cleared/maintained low-lying vegetation bordered by forested areas (Figure 3.2-3). Surrounding forests typically screen the existing utility corridors with the exception of where they intersect roads or terminate at mine pits (Figure 3.2-4).

Figure 3.2-4. View of CR 7 Near West Range Site Looking North

The proposed rail alignments would cross Diamond Lake Road (Figure 3.2-5) and a minor unpaved road **with a rail bridge crossing** as illustrated in Figure 2.3-2. These corridors are generally comprised of undeveloped, vegetated lands except at road crossings or along areas disturbed by prior mining activities. Figures 3.2-6 and 3.2-7 show the residential receptors near the West Range Site and associated utility and rail corridors.

Figure 3.2-5. View of Diamond Lake Road Near Potential Rail Crossing

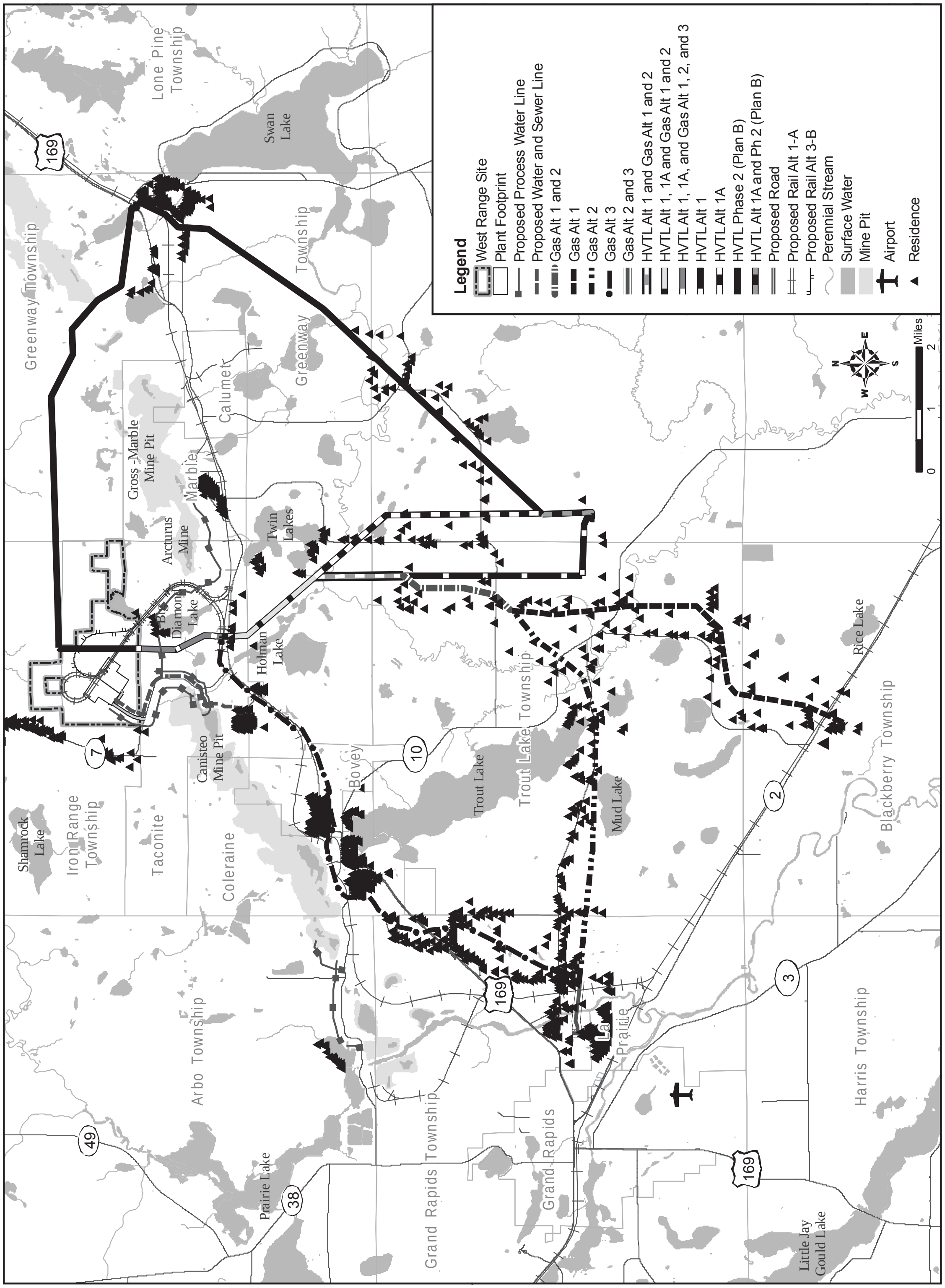

Figure 3.2-6. Receptors along the West Range Corridor

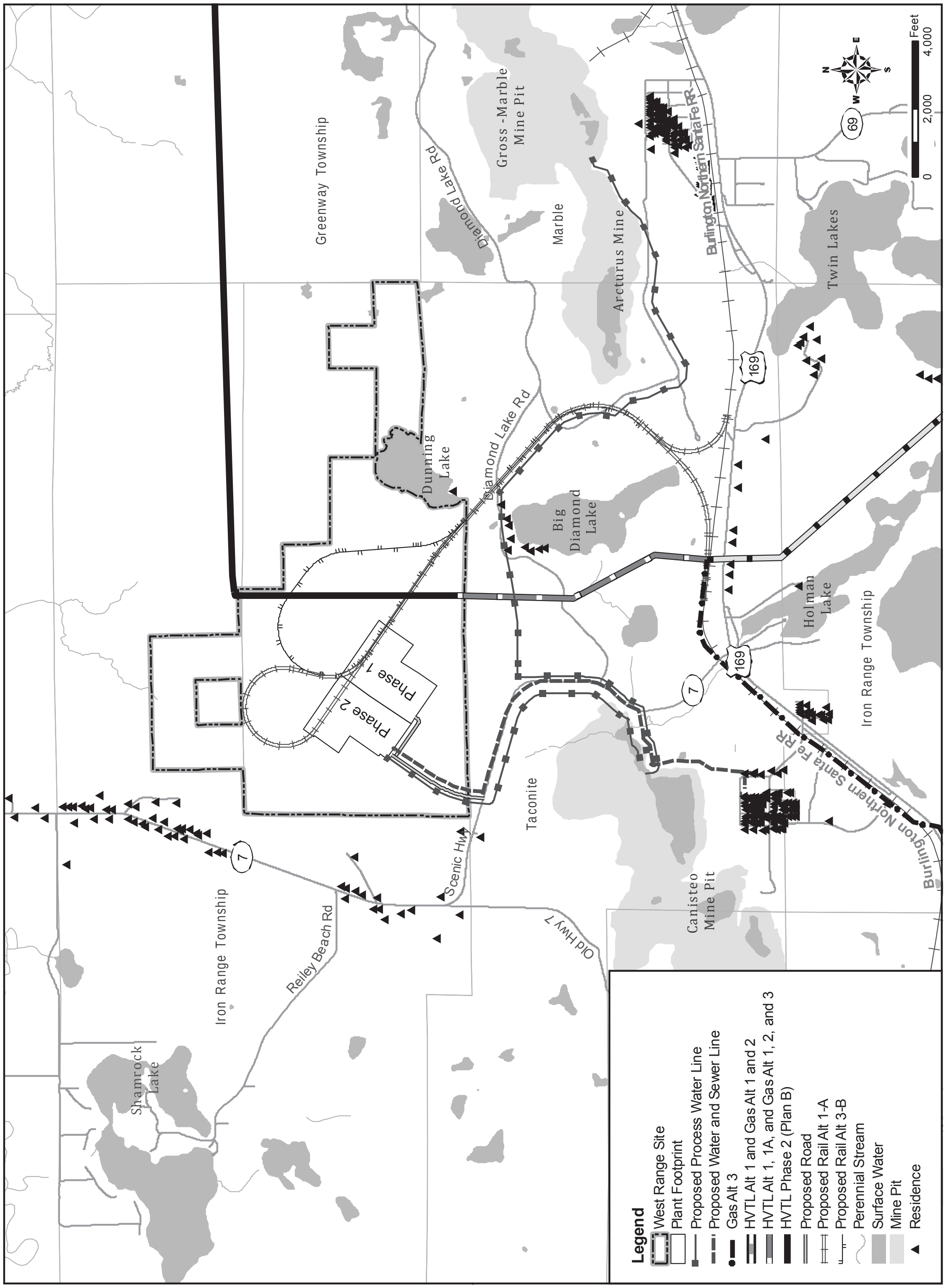

Figure 3.2-7 Receptors near the West Range Power Plant

3.2.2.2 East Range Site and Corridors

East Range Site

The East Range Site is located in an area characterized by active mining operations and undeveloped forest (Figure 3.2-8). The immediate area around the East Range Site slopes to the southeast towards wetlands and the northern border of Colby Lake. Sections 3.10, Land Use; and 3.8, Biological Resources; describe the land use and local vegetation in more detail. Area elevations range from 1,450 to 1,500 feet above sea level. Mine tailings piles exist in two locations near the proposed site. The closest is approximately 300 feet west of the East Range Site. The other is approximately one mile northeast of CR 666. Minnesota Power's Syl Laskin Energy Center, a coal-fired power plant, is located approximately 2 miles south of the East Range Site. The Syl Laskin exhaust stack is currently visible to the Hoyt Lakes population.

Two lakes are located within the vicinity of the proposed East Range Site. Colby Lake and Whitewater Lake are located directly south of the East Range Site. Numerous four-season residences are located on the shores of the lakes. There are no residences immediately north of the East Range Site due to active mining operations by CE.

Elongated bedrock mountains are located to the north-northwest of the eastern portion of the Mesabi Iron Range (including the towns of Biwabik, Aurora, and Hoyt Lakes). Embarrass Mountain is located approximately 4 miles to the northwest of the East Range Site, rising 1,940 feet above sea level. There are several lookout towers and a commercial skiing resort located on these mountains. The Giants Ridge Ski Area (1,844 feet above sea level) is located directly west of Embarrass Mountain.

Figure 3.2-8. View of East Range Site from Tailings Pile Looking East

East Range Corridors

The Mesabi Iron Range stretches north of the HVTL corridors and has topographic heights extending 500 feet above the surrounding area. The Messabe Mountain near Gilbert reaches an elevation of 1,840 feet above mean sea level. Farther north, Pike Mountain and Lookout Mountain have summit elevations of approximately 1,930 and 1,860 feet above mean sea level, respectively. Lookout stations on the summits provide views of the surrounding area. Alternative rail alignments and access roads would enter the East Range Site from the south through an area of forested land. Figures 3.2-9 and 3.2-10 show the residential receptors near the East Range Site and associated utility and rail corridors.

3.2.3 Scenic Resources

There are many types of public land in northern Minnesota. Federal lands include National Parks, Forests, and Indian Reservation Lands. The Minnesota Department of Natural Resources (MNDNR) manages 90 percent of the state-owned lands, which include state parks and forests, wildlife management areas, scientific and natural areas, and state recreation areas (Minnesota State Legislature, 2006). These areas are used for a variety of purposes, including silviculture, recreation, and scientific study. Figure 3.2-11 shows the State Parks and other public lands in northern Minnesota. Certain state forests, such as Bowstring and Blackduck, are part of national forests (e.g., Chippewa National Forest). Public lands around the West and East Range locations are discussed in respective sections below. The Mesabi Trail, owned by the St. Louis and Lake Counties Regional Railroad Authority, extends 130 miles from Grand Rapids east to Winton along US 169 and SR 135, offering a wooded path for hiking, biking, skating, skiing, snow-shoeing, and limited snow-mobiling.

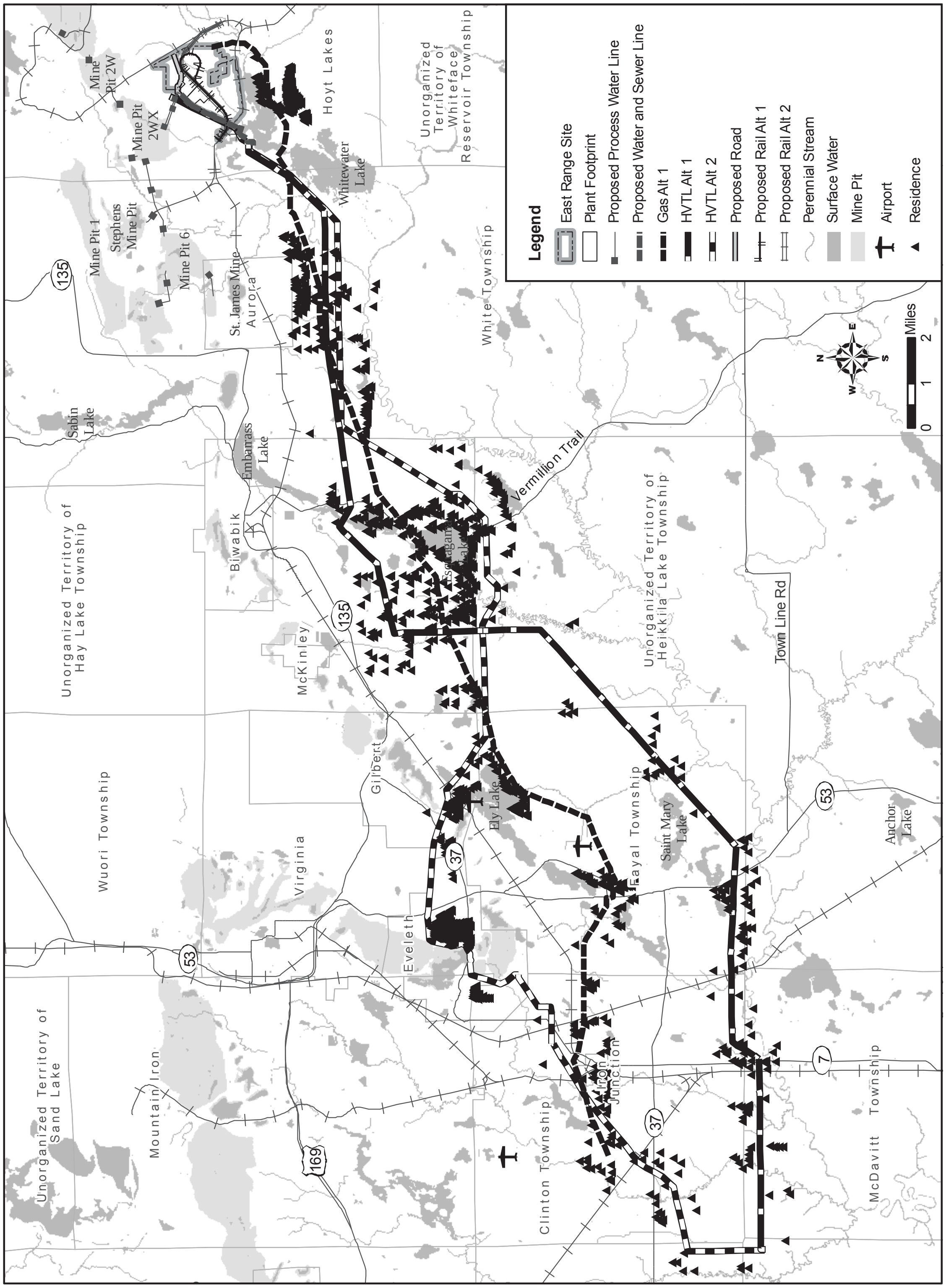

Figure 3.2-9. Receptors along the East Range Corridor

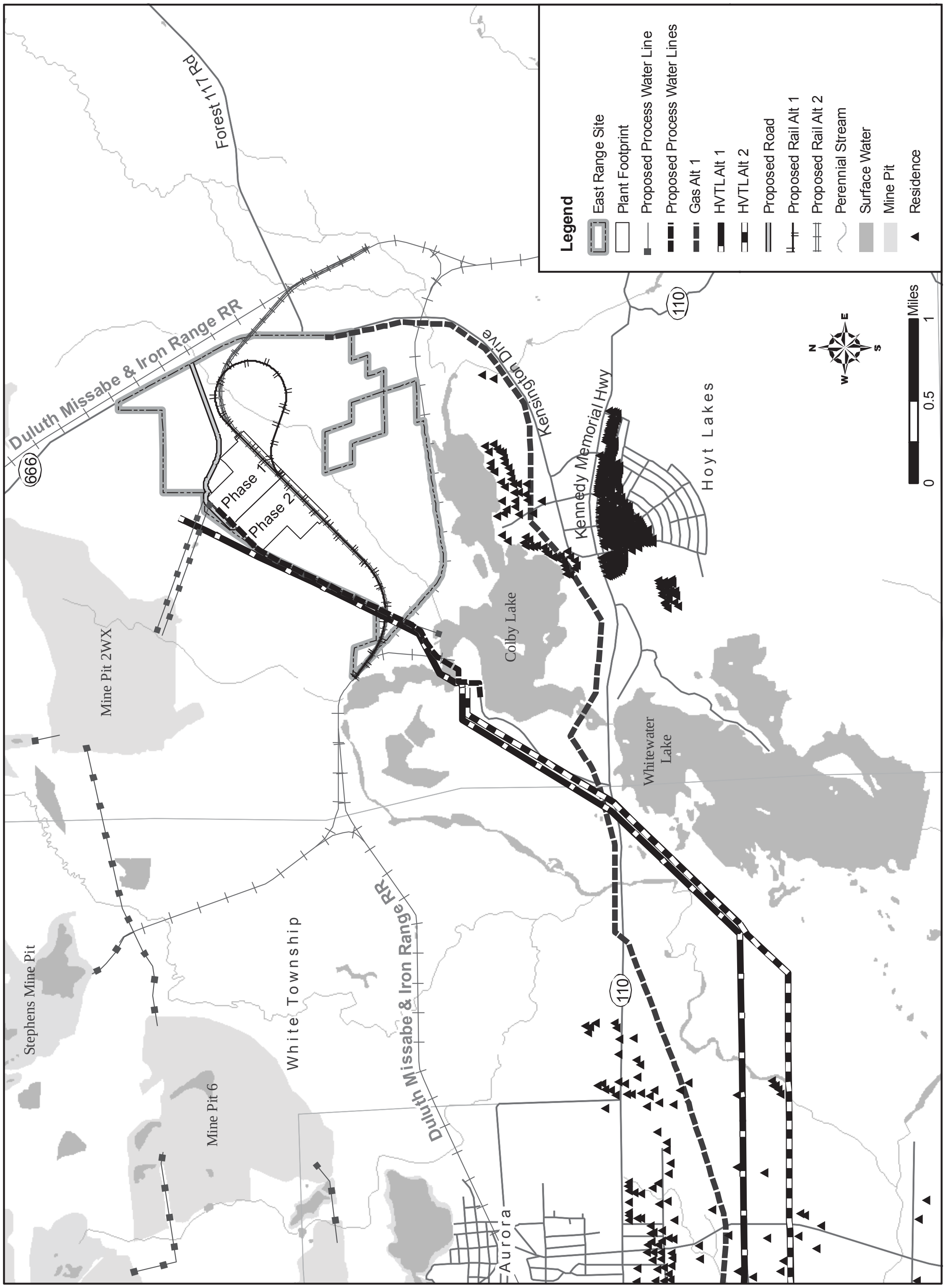

Figure 3.2-10. Receptors near the East Range Power Plant

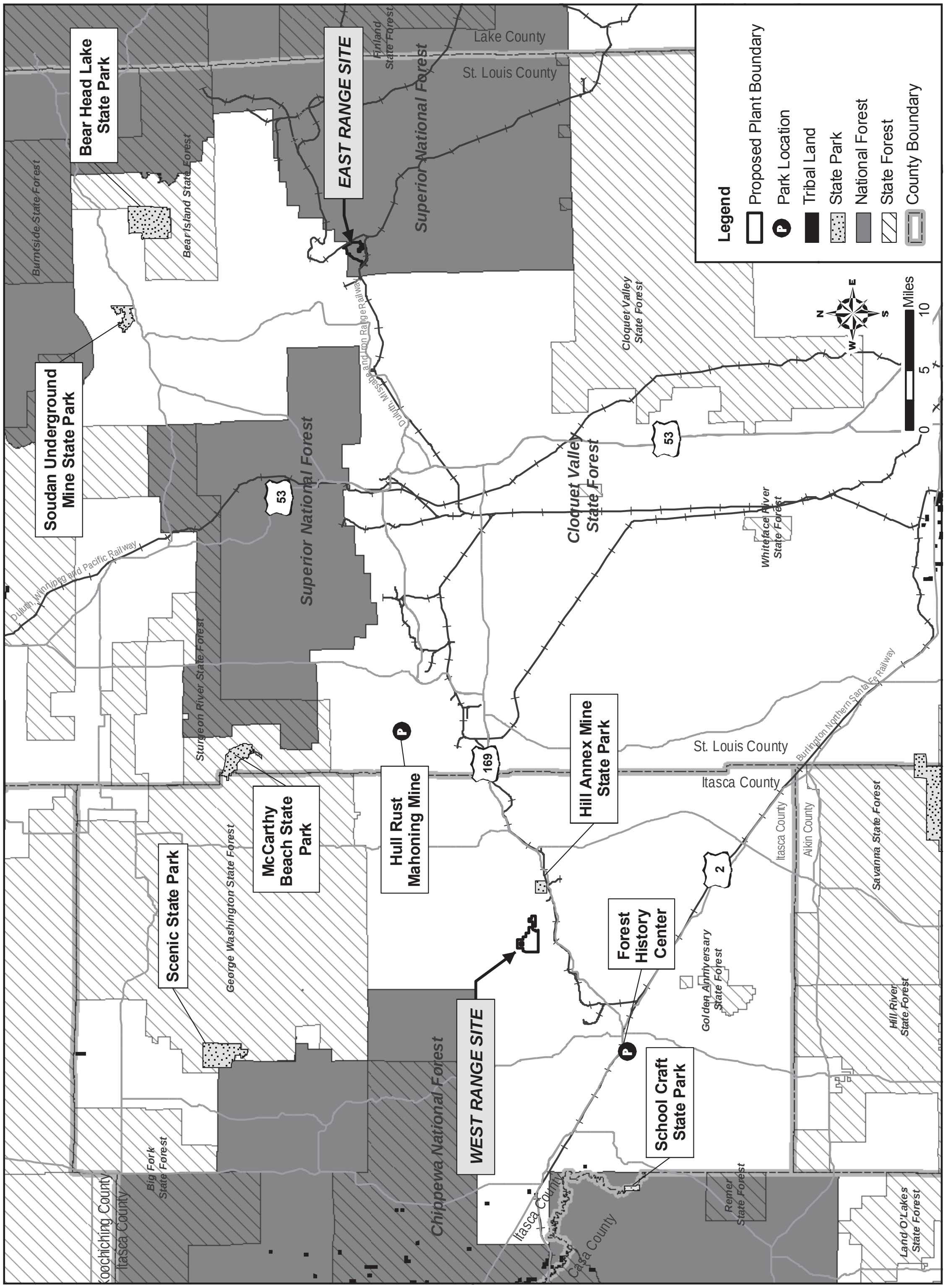

Figure 3.2-11. State Parks and Other Public Lands

3.2.3.1 West Range Site and Corridors

West of Grand Rapids, large portions of land are part of the Chippewa National Forest. The Chippewa National Forest also includes the Leech Lake Indian Reservation. The Hill Annex Mine State Park is located to the east of the West Range Site. This state park features the mining history of the area, demonstrates mining equipment and operations, and provides views of flooded mine pits and surrounding lands from the top of the tailings piles. The Forest History Center features the north woods foresting and silviculture history. The center includes a 100-foot fire tower and a living history museum. Other state parks and forests are located 20 to 30 miles away from the West Range Site and potential corridors. Locally, Holman Lake provides a public recreation and swimming area within 2 miles south of the site. Table 3.2-1 lists some of the public lands and reservations in relation to the West Range Site. Section 3.10 also describes the publicly owned lands in the area.

Table 3.2-1. Public Lands Near the West Range

Name	Approximate Distance from the Site (miles)[1]	Location in relation to the Site
Hill Annex Mine State Park	5	Southeast
Forest History Center	15	Southeast
Chippewa National Forest	Closest edge is 20 miles	West-Northwest
Leech Lake Reservation	20	West
Golden Anniversary Sate Forest	20	Southwest
School Craft State Park	22	Southwest
George Washington State Forest	27	Northwest
Scenic State Park	26	Northwest

[1]These sites are located outside of the 2-mile region of influence.

3.2.3.2 East Range Site and Corridors

The East Range Site is located adjacent to an active iron ore mining operation. The Syl Laskin Energy Center is also located south of the proposed East Range Site. A public landing and picnic spot, known as Birch Cove, is located on the southern border of Colby Lake overlooking the Syl Laskin plant (Figure 3.2-12).

Figure 3.2-12. View of Syl Laskin Energy Center from Birch Cove Park Looking North

Portions of the Superior National Forest are adjacent to Hoyt Lakes and a portion extends in to the city limits, and extends further north, south, and east. As an extension of the Superior National Forest, the Superior National Forest Scenic Byway extends from Aurora, through Hoyt Lakes, and along State Route 16 to Silver Bay at Lake Superior's north shore. The scenic byway is considered a scenic, rural passage through pine forests and the Mesabi iron mining towns (Explore Minnesota, 2006). Aside from the Superior National Forest, two other state parks are located within 30 miles of the East Range Site, as shown in Table 3.2-2. Section 3.10 describes the publicly owned land surrounding the East Range Site and corridors.

Table 3.2-2. Public Lands Near the East Range

Name	Approximate Distance from the Site (miles)	Location in relation to the Site
Superior National Forest	<1	East
Bear Head Lake State Park	16	North
Soudan Underground Mine State Park	20	Northwest

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3.3 AIR QUALITY AND CLIMATE

This section describes the overall air quality within the region. Air quality is determined by the type and amount of pollutants emitted into the atmosphere, the size and topography of the air basin, and the prevailing meteorological conditions. The emissions from the Mesaba Generating Station , except for particulate matter, would be independent of the site selected.

3.3.1 Sensitive Air Quality Receptors

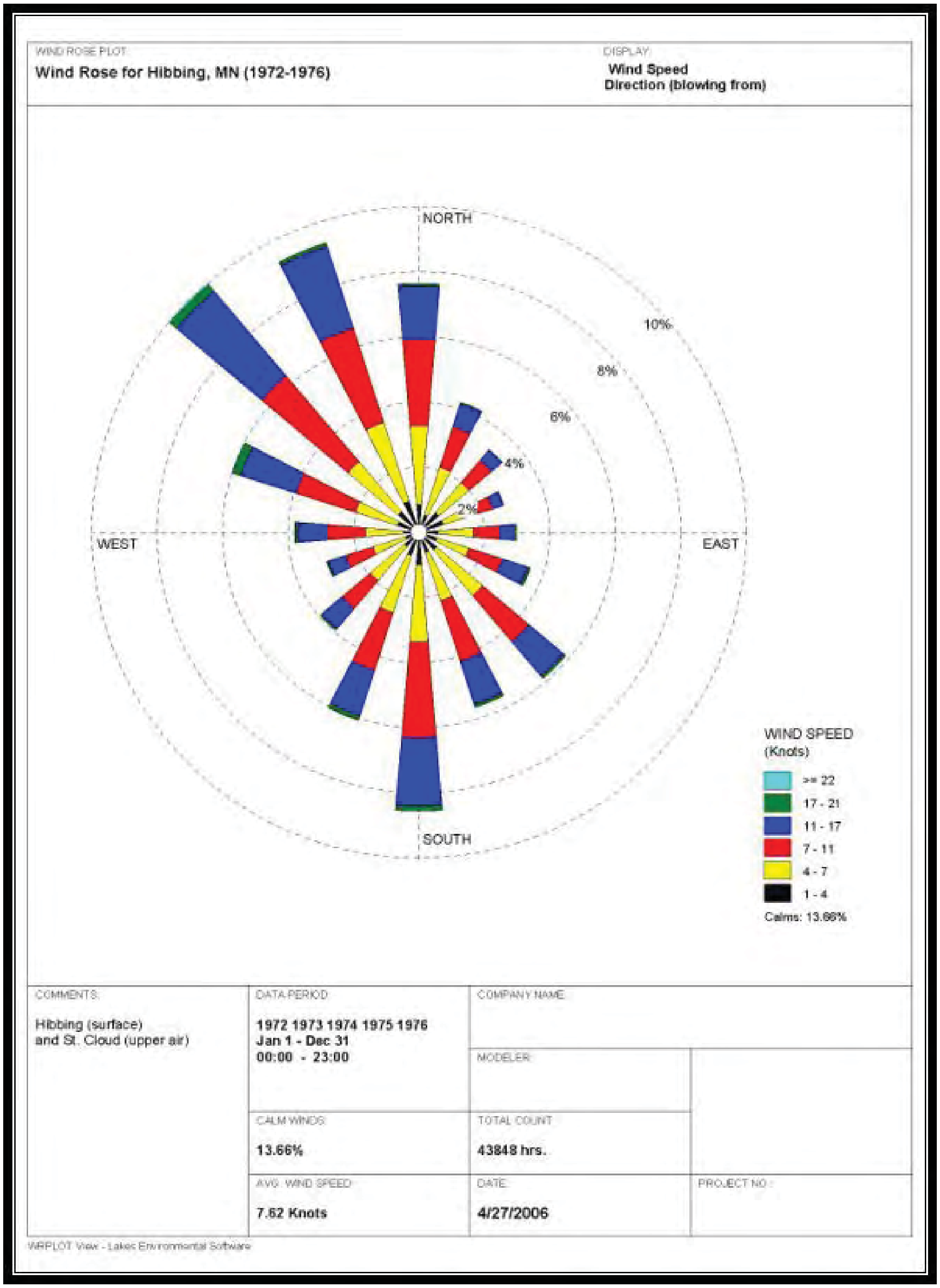
For the purposes of air quality analysis, any area to which the public has access is considered a sensitive receptor, and includes residences, day care centers, educational and health facilities, places of worship, parks, and playgrounds. An Air Emission Risk Assessment (AERA) was conducted to assess whether air emissions from the Mesaba Energy Project could pose an unacceptable health risk to nearby residents (see Section 4.17).

The closest residence to the power plant footprint in the West Range Site is located 1.1 kilometers (0.7 miles) away. A farm is located approximately 1.7 kilometers (1.1 miles) west-southwest of the power plant footprint on the West Range Site. For the East Range Site, the nearest residences are located about one mile directly south of the Mesaba IGCC Power Plant Combustion Turbine Generator/Heat Recovery Steam Generator (CTG/HRSG) stack, in the City of Hoyt Lakes. There are no other significant receptors, such as schools, daycare centers, recreation centers, playgrounds, nursing homes, or hospitals located within this distance. The primary emission point from either site will be the flare and CTG/HRSG stack. The closest residence to the flare and CTG/HRSG stack emission points on the East Range Site is located about 1.9 kilometers (1.2 miles) and 2.6 kilometers (1.4 miles) away, respectively.

3.3.2 Local and Regional Climate

Minnesota has a continental-type climate and is subject to frequent occurrences of continental polar air throughout the year, with occasional Arctic occurrence during the cold season. Occasional periods of prolonged heat occur during summer, particularly in the southern portion when warm air pushes northward from the Gulf of Mexico and the southwestern United States. Pacific Ocean air masses that move across the western United States produce comparatively mild and dry weather at all seasons (MCWG, 2006). Prevailing winds are from the northwest (approximately 10 percent of the observations) and the north-northwest (9 percent of the observations) at between 7 to 17 knots (8 to 20 miles per hour). Southerly winds occur in just over eight percent of the observations. Figure 3.3-1 provides a wind rose based on five years of hourly meteorological data (1972–1976) from Hibbing, Minnesota (surface) (MNDNR, 2006a). This wind rose is applicable to both the West Range and East Range sites.

Temperatures throughout the year are highly variable, with extremes ranging from 114°F to negative 60°F. Average temperatures range from 5.7°F in January to 67.4°F in July. From December through February, the maximum temperature is below 32°F for an average of 24 days per month. During the summer, the maximum temperature exceeds 90°F for an average of five to six days a year. Mean annual precipitation is 34 inches in southeast Minnesota and 19 inches in the northwest portion of the state. The number of days with precipitation per month varies from seven days in February to 13 days in June, with approximately two-thirds of the annual precipitation occurring between August and December.



Source: MNDNR, 2006a

Figure 3.3-1. Wind Rose Data at Hibbing, Minnesota

The area receives an average of approximately 56 inches of snow annually. Snow cover of one inch or more over Minnesota occurs on an average of about 110 days annually, ranging from 85 days in the south to 140 days in the north. Due to the abundance of small lakes in the region, fog is likely to form on and around the lakes during clear, calm conditions in the evening and early morning. Persistent fogging at either the West Range Site or the East Range Site is unlikely (MnDOT, 2006a).

3.3.3 Local and Regional Air Quality

The Clean Air Act (CAA) requires that the EPA establish National Ambient Air Quality Standards (NAAQS). Accordingly, EPA developed primary and secondary ambient air quality standards for six criteria pollutants. These pollutants are sulfur dioxide (SO_2), carbon monoxide (CO), ozone (O_3), nitrogen dioxide (NO_2), lead (Pb), and inhalable particulates, which are also known as respirable particulate matter (PM). The PM_{10} standard covers particles with aerodynamic diameters of 10 micrometers or less and the $PM_{2.5}$ standard covers particulates with aerodynamic diameters of 2.5 micrometers or less. The NAAQS are expressed as concentrations of the criteria pollutants in the ambient air; that is, in the outdoor air to which the public has access [40 CFR 50.1(e)]. Primary standards are set to protect the public health, including the health of sensitive populations such as asthmatics, children, and the elderly. Secondary standards are set to protect public welfare, including protection against decreased visibility, damage to animals, crops, vegetation, and buildings.

The Minnesota Pollution Control Agency (MPCA), which is responsible for monitoring air quality for each of the criteria pollutants and assessing compliance, has promulgated rules governing ambient air quality in the State of Minnesota. These rules, codified in Minnesota Rules 7009.00800, further regulate concentrations of the criteria pollutants and include standards for hydrogen sulfide (H_2S) and total suspended particulate matter (TSP). Table 3.3-1 lists the NAAQS and Minnesota Ambient Air Quality Standards (MAAQS).

Table 3.3-1. National and Minnesota Ambient Air Quality Standards

Pollutant	Averaging Period	Standard Value		Standard Type (1)	Notes
Carbon Monoxide	8-Hour	9 ppm	10 mg/m^3	Primary	Maximum concentration not to be exceeded more than once per year.
	1-Hour	35 ppm	40 mg/m^3	Primary	
	1-Hour (2)	30 ppm	35 mg/m^3	Primary and Secondary	
Nitrogen Dioxide	Annual Arithmetic Mean (2)	0.05 ppm	100 $\mu g/m^3$	Primary and Secondary	Maximum annual arithmetic mean.
Ozone	8-Hour (3) **(2008 standard)**	**0.075 ppm**		Primary and Secondary	Daily maximum 8-hour average.
	8-Hour (4) **(1997 standard)**	0.08 ppm		Primary and Secondary	
Lead	Quarterly Average		1.5 $\mu g/m^3$	Primary and Secondary	Maximum arithmetic mean averaged over a calendar quarter.
	Rolling 3-Month Average (5)		**0.15 $\mu g/m^3$**	**Primary and Secondary**	
Particulate Matter (2)	Annual Geometric Mean		75 $\mu g/m^3$	Primary	Maximum annual geometric mean.
			60 $\mu g/m^3$	Secondary	
	24-Hour		260 $\mu g/m^3$	Primary	Maximum concentration

Table 3.3-1. National and Minnesota Ambient Air Quality Standards

Pollutant	Averaging Period	Standard Value		Standard Type[1]	Notes
			150 µg/m³	Secondary	
Particulate matter – 10 microns (PM_{10})	Annual Arithmetic Mean [6]		50 µg/m³	Primary and Secondary	Maximum annual arithmetic mean; standard is attained when the expected annual arithmetic mean concentration is less than or equal to the value of the standard.
	24-Hour		150 µg/m³	Primary and Secondary	Maximum 24-hour average concentration; standard is attained when the expected number of days per calendar year exceeding the value of the standard is equal to or less than one.
Particulate matter – 2.5 microns ($PM_{2.5}$)	Annual Arithmetic Mean		15 µg/m³	Primary and Secondary	Standard is attained when the annual arithmetic mean concentration is less than or equal to the standard.
	24-Hour		35 µg/m³	Primary and Secondary	Standard is attained when the 98th percentile 24-hour concentration is less than or equal to the standard.
Sulfur Dioxide	Annual Arithmetic Mean	0.03 ppm	80 µg/m³	Primary	Maximum annual arithmetic mean.
		0.02 ppm	60 µg/m³	Secondary [2]	
	24-Hour	0.14 ppm	365 µg/m³	Primary and Secondary	Maximum concentration not to be exceeded more than once per year.
	3-Hour	0.5 ppm	1,300 µg/m³	Primary and Secondary [7]	
	3-Hour [8]	0.35 ppm	915 µg/m³	Secondary[2]	
	1-Hour	0.5 ppm	1,300 µg/m³	Primary[2]	
Hydrogen Sulfide [2]	½-Hour	0.05 ppm	70 µg/m³	Primary	½-Hour average not to be exceeded over 2 times per year.
	½-Hour	0.03 ppm	42 µg/m³	Primary	½-Hour average not to be exceeded over 2 times in any 5 consecutive days.

Table 3.3-1. National and Minnesota Ambient Air Quality Standards

Pollutant	Averaging Period	Standard Value	Standard Type(1)	Notes

(1) Primary standards set limits to protect human health; Secondary standards set limits to protect public welfare (i.e., decreased visibility; damage to animals, vegetation).
(2) Minnesota State Ambient Air Quality Standard only.
(3) To attain this standard, the 3-year average of the fourth-highest daily maximum 8-hour average ozone concentrations measured at each monitor within an area over each year must not exceed 0.075 ppm. (effective May 27, 2008)
(4) (a) To attain this standard, the 3-year average of the fourth-highest daily maximum 8-hour average ozone concentrations measured at each monitor within an area over each year must not exceed 0.08 ppm.
(b) The 1997 standard—and the implementation rules for that standard—will remain in place for implementation purposes as EPA undertakes rulemaking to address the transition from the 1997 ozone standard to the 2008 ozone standard.
(5) Final rule signed October 15, 2008.
(6) Due to a lack of evidence linking health problems to long-term exposure to coarse particle pollution, the EPA revoked the annual PM_{10} standard (effective December 17, 2006). However, it is still reflected in the State of Minnesota's regulations.
(7) Secondary standard for Air Quality Control Regions 128, 131, and 133.
(8) For Air Quality Control Regions 127, 129, 130, and 132.
ppm – parts per million; µg/m3 – micrograms per cubic meter
Source: EPA, 2006a and MPCA, 2006a

3.3.3.1 Air Quality Management Plan

Attainment status for NAAQS is determined primarily by evaluating data from ambient air quality monitoring stations. The MCPA conducts ambient air quality monitoring throughout the state. Currently, there are no nonattainment areas in Minnesota. Attainment means air quality in the county meets the standards. An "unclassified" status means that no data exists that demonstrates non-compliance. The West Range Site and the East Range Site are located in Itasca and St. Louis Counties, respectively. Monitoring results from the closest monitors to Itasca and St. Louis Counties are shown in Table 3.3-2. The two counties are in close proximity of each other and the monitoring sites are within the region of influence for both potential project sites.

The table includes the average ambient air concentrations over a four-year period (2002-2005) for each pollutant and averaging period. Based on the monitored data, Itasca and St. Louis Counties are designated attainment or unclassified for each of the standards.

Table 3.3-2. Monitored Background Concentrations

Pollutant	Averaging Period	Monitored Background Concentration	Standard Value	Standard Type	Monitoring Station
Carbon Monoxide	8-Hour	1.6 ppm	9 ppm	Primary	314 West Superior Street, Duluth
	1-Hour	3.3 ppm	35 ppm 30 ppm(1)	Primary Primary and Secondary	314 West Superior Street, Duluth
Nitrogen Dioxide	Annual	0.004 ppm	0.05 ppm	Primary and Secondary	Carlton County
Ozone	8-Hour **(5)**	0.066 ppm	**0.075** ppm	Primary and Secondary	Voyageurs National Park
Lead	Quarterly	0.01 μg/m3	1.5 μg/m3	Primary and Secondary	Virginia City Hall
Total Suspended Particulate (TSP)(1)	Annual	16 μg/m3	75 μg/m3 60 μg/m3	Primary Secondary	Virginia City Hall
	24-Hour	35.7 μg/m3	260 μg/m3 150 μg/m3	Primary Secondary	Virginia City Hall
Particulate matter – 10 microns (PM_{10})(2)	Annual	16 μg/m3	50 μg/m3	Primary and Secondary	Virginia City Hall
	24-Hour	35.7 μg/m3	150 μg/m3	Primary and Secondary	Virginia City Hall
Particulate matter – 2.5 microns ($PM_{2.5}$)	Annual	6.1 μg/m3	15 μg/m3	Primary and Secondary	Virginia City Hall
	24-Hour	19 μg/m3	35 μg/m3	Primary and Secondary	Virginia City Hall
Sulfur Dioxide	Annual	0.001 ppm	0.03 ppm 0.02 ppm(1)	Primary Secondary	Rosemount, MN
	24-Hour	0.005 ppm	0.14 ppm	Primary and Secondary	Rosemount, MN
	3-Hour	0.010 ppm	0.5 ppm 0.35 ppm	Primary and Secondary(3) Secondary(4)	Rosemount, MN
	1-Hour	0.019 ppm	0.5 ppm(1)	Primary	Rosemount, MN

(1) Minnesota State Ambient Air Quality Standard only.
(2) The EPA revoked the annual PM_{10} standard (effective December 17, 2006). However, it is still reflected in the State of Minnesota's regulations.
(3) Secondary standard for Air Quality Control Regions 128, 131, and 133
(4) For Air Quality Control Regions 127, 129, 130, and 132**; (5) New standard effective May 27, 2008.**
ppm – parts per million; μg/m3 – micrograms per cubic meter
Source: Excelsior, 2006b

3.3.3.2 Class I Areas

Under the Clean Air Act, a **Class I area** is one in which only a small amount of new pollution is allowed. These areas include national parks, wilderness areas, monuments, and other areas of special national and cultural significance. **Class II areas** include all other clean air regions and allow moderate pollution increases.

In addition to the NAAQS, national air quality standards exist for the Prevention of Significant Deterioration (PSD). The PSD requirements provide maximum allowable increases (expressed as increments) in concentrations of pollutants for areas that are already in compliance with the NAAQS. Allowable PSD increments currently exist for three pollutants, SO_2, NO_2, and PM_{10}. One set of allowable increments exists for Class II areas, which covers most of the United States and another set of more stringent allowable increments exists for Class I areas, which include many national parks and monuments, wilderness areas, and other areas as specified in 40 CFR 51.166(e). The allowable PSD increments are shown in Table 3.3-3.

Table 3.3-3. Allowable PSD Increments

Pollutant, averaging period	Allowable Increment ($\mu g/m^3$)	
	Class I Area	Class II Areas
SO_2, 3-Hour	25	512
SO_2, 24-Hour	5	91
SO_2, Annual	2	20
NO_X, Annual	2.5	25
PM_{10}, 24-Hour	8	30
PM_{10}, Annual	4	17

SO_2 – sulfur dioxide; NO_x – nitrogen oxides; PM_{10} – particulate matter-10 microns;
Source: 40 CFR 51.166(e), 2006

In addition to complying with the more stringent allowable PSD increments, proposed projects that are within 100 kilometers (62 miles) of Class I areas must evaluate impacts of the project on air quality related values (AQRVs) such as visibility, flora/fauna, water quality, soils, odor, and any other resources specified by the Federal Land Manager (FLM) (NPS, 2006). The closest Class I areas to the proposed Mesaba Energy Project sites include two areas administered by the USDA-Forest Service (the Boundary Waters Canoe Area Wilderness [BWCAW] in northern Minnesota and Rainbow Lakes Wilderness Area [RLW] in northwestern Wisconsin); and two national parks (Voyageurs National Park [VNP] in northern Minnesota and Isle Royale National Park [IRNP] in Michigan). The distances from the proposed project sites to the Class I areas are provided in Table 3.3-4.

Table 3.3-4. Distances to Class I Areas

Class I Area	Distance from West Range Site kilometers (miles)	Distance from East Range Site kilometers (miles)
BWCAW	100 (62)	40 (25)
VNP	120 (75)	90 (60)
RLW	190 (118)	170 (106)
IRNP	>300 (186)	>200 (124)

The West Range Site and East Range Site are similar regarding air quality; however the East Range Site is considerably closer to the Class I areas than the West Range Site.

3.3.3.3 Visibility and Regional Haze

In 1999, the EPA established the Regional Haze Program to improve visibility and air quality in national parks and wildlife areas. As part of this program, a network of monitors was set up by the Interagency Monitoring of Protected Visual Environments (IMPROVE) program to continuously record visibility and aerosol conditions for the protection of visibility in Class I areas. Specifically, these monitors record concentrations of ammonium sulfate, ammonium nitrate, coarse particulate matter, and variables to determine extinction coefficients and deciviews to measure visibility. The 1999 Regional Haze Program identifies certain older emission sources that have not been regulated under other provisions of the Clean Air Act. Those older sources that could contribute to visibility impairment in Class I areas may be required to install Best Available Retrofit Technology (BART).

Class I areas in northeastern Minnesota, that have monitors under the Regional Haze Program are located in the BWCAW near Ely and at VNP. **A public notice of the opportunity to comment on the Draft Regional Haze State Implementation Plan (SIP) was published on February 25, 2008**. **In July 2009, the MPCA completed a revised Draft Regional Haze SIP (MPCA, 2009a), which will remain open to public comment until September 2009.** The Regional Haze SIP identified sources that cause or contribute to visibility impairment in these areas and included a demonstration of reasonable progress toward reaching the 2018 visibility goal for each of the state's Class I areas. **Additionally, the Regional Haze SIP includes a concept plan, the Northeast Minnesota Plan, which focuses on major sources in northeast Minnesota as one part of its long term strategy for improving visibility. The plan addresses major point sources in the six counties in northeast Minnesota (including Itasca and St. Louis counties) and includes existing sources with actual emissions in 2002 greater than 100 tons per year of either NO_x or SO_2 and for new sources built after 2002 with a potential-to-emit greater than 100 tons per year of either NO_x or SO_2. The plan suggests that reduction goals from 2002 levels include a 20 percent reduction by 2012 and 30 percent reduction by 2018 reduction in region-wide NO_X and SO_2 emissions (MPCA, 2007b).**

Because the Mesaba Generating Station would be a new facility, it would not have to meet the BART requirement. However, to achieve reasonable progress toward state's visibility goals, Minnesota may need to implement control measures on other sources (including new sources) in addition to BART and ensure that they do not hinder attainment of visibility goals. Any future control strategies on newer facilities, that the MPCA implements, would affect the Mesaba Generating Station. Currently, a new source of criteria and air toxics emissions is required to assess impacts to Class I areas visibility under the NEPA and PSD regulations. Section 4.3 addresses the impacts of the Mesaba Energy Project on Class I areas.

3.3.4 Pertinent Air Quality Regulations

Local, state, and Federal air quality regulations were reviewed to determine their applicability to the proposed Mesaba Energy Project. The CAA is the basis for Federal statutes and regulations that govern air pollution. Air quality regulations within the state of Minnesota are codified in the Minnesota Rules for the MPCA, Chapters 7001 to 7023 and 7027. The Minnesota Rules establish permit review procedures for all facilities that emit pollutants to the ambient air. New facilities are required to obtain an air quality permit before construction is initiated. Federal and state regulations established as a result of the CAA and the Minnesota Rules that potentially apply to the Mesaba Energy Project are summarized in Table 3.3-5.

Table 3.3-5. Pertinent Air Quality Regulations

Regulation	Citation	Description
Prevention of Significant Deterioration (PSD)	• 40 CFR 52.21 • Minn. R. 7007.3000.	The PSD is a pre-construction review and permit process for construction and operation of a new or modified major stationary source in attainment areas. A major source is a source for which the amount of any one regulated pollutant emitted equal to or greater than significance thresholds defined by the PSD rule. The required PSD review consists of the following elements: • A case-by-case best available control technology (BACT) demonstration, which takes into account energy, environmental, and economic impacts as well as technical feasibility. • An ambient air quality impact analysis to demonstrate that the allowable emissions from the proposed project will not cause or contribute to a violation of the applicable PSD increments and NAAQS. • An assessment of the direct and indirect effects of the proposed project on general growth, soil, vegetation, and visibility. Additionally, a source that might affect a Class 1 Federal area must undergo additional review. • An ambient air quality monitoring program for up to one year may be required if no other representative data are available and if the project impacts are greater than a monitoring de minimis level. • Public comment, including an opportunity for a public hearing. The Mesaba Energy Project is projected to have emissions above the PSD significance threshold for one or more of the regulated criteria air pollutants (see Section 4.3); therefore, PSD review is required under the regulations. An application for a Part 70/New Source Review Construction Authorization Permit for an air emission facility, which covers the Mesaba Generating Station sources, has been submitted to MPCA for review in accordance with the PSD regulations. The air permit application is filed for the West Range Site.

Table 3.3-5. Pertinent Air Quality Regulations

Regulation	Citation	Description
New Source Performance Standards (NSPS)	40 CFR Part 60	The Federal NSPS are technology-based standards applicable to new and modified stationary sources of regulated air emissions. Where the NAAQS emphasize on air quality in general, the NSPS focus on particular sources of pollutants. The NSPS program sets uniform emission limitations for approximately 70 industrial source categories or sub-categories of sources (e.g., fossil fuel-fired generators, grain elevators, steam generating units) that are designated by size as well as type of process. The standards that apply to the Mesaba Energy Project are as follows: • Subpart A – General Provisions, which provides for general notification, record keeping, and monitoring requirements. • Subpart Da – Standards of Performance for Electric Utility Steam Generating Units For Which Construction is Commenced After September 18, 1978, which applies to any electric utility combined cycle gas turbine that combusts more than 73 MWe (250 MMBtu/hour) heat input of fossil fuel in the steam generator. • Subpart Db – Standards of Performance for Industrial-Commercial-Institutional Steam Generating Units, which covers the natural gas-fired auxiliary boiler because its heat input will be greater than 100 MMBtu/hr. • Subpart Dc – Standards of Performance for Small Industrial-Commercial-Institutional Steam Generating Units, which covers the Tank Vent Boiler because it is a steam-generating unit that is less than 100 MMBtu/hr, but greater than 10 MMBtu/hr. Since this unit will burn syngas, it is considered a coal-fired unit for the purposes of this regulation. • Subpart HHHH – Emission Guidelines and Compliance Times for Coal-Fired Electric Steam Generating Units: Subpart HHHH was included as part of the Clean Air Mercury Rule promulgated on March 15, 2005 (70 FR 28606). • Subpart Y – Standards of Performance for Coal Preparation Plants: Coal handling capacity at the IGCC power station will exceed 200 tons per day, and is therefore subject to this NSPS. These standards were considered as part of the BACT analysis.

Table 3.3-5. Pertinent Air Quality Regulations

Regulation	Citation	Description
Minnesota Standards of Stationary Sources	Minn. R. ch. 7011	The following Minnesota Standards of Performance are also applicable to the Mesaba Energy Project: • Control of Fugitive Particulate Matter (Minn. R. 7011.0150), which applies to bulk material handling operations including coal, petroleum coke, flux and other materials. The rule prohibits the release of "avoidable amounts" of particulate matter and facilities are required to take reasonable precautions to prevent the discharge of visible fugitive emissions beyond the property line. • Standards of Performance for Stationary Internal Combustion Engines (Minn. R. 7011.2300), which applies to the emergency fire water pumps and the emergency generators, limits visible emissions from these units to 20 percent opacity and limits SO_2 emissions to 0.5 lb/MMBTU heat input unless a higher limit has been established through modeling. • Standards of Performance for Post-1969 Industrial Process Equipment (Minn. R. 7011.0715), which applies to the Mesaba Generating Station's coal, petroleum coke, and slag handling equipment that will generate particulate matter emissions. Since the Mesaba Generating Station is located outside of Minneapolis, St. Paul and Duluth, and is located more than one quarter mile from any residence or public roadway, the required control equipment efficiency standard to be applied is 85 percent. These standards were considered as part of the BACT analysis.
National Emission Standards for Hazardous Air Pollutants (NESHAP)	40 CFR Parts 61 and 63	Non-criteria pollutants that can cause serious health and environmental hazards are termed hazardous air pollutants (HAPs) or air toxics. The 1970 CAA Amendments required EPA to promulgate national emissions standards for hazardous air pollutants to protect the public health and welfare with an ample margin of safety. Due to the difficulty in establishing health risks for HAPs, EPA identified and regulated only eight pollutants: asbestos, benzene, beryllium, inorganic arsenic, mercury, radionulides, and vinyl chloride. The 1990 CAA Amendments, section 112, changed the regulatory approach for controlling HAPs, basing it instead on available control technology. Subsequently, a list of 188 compounds to be controlled as HAPS was developed. The 1990 CAA Amendments define two types of NESHAP emissions standards: maximum achievable control technology (MACT) and generally available control technology (GACT). Unlike the health-based standards established under the initial NESHAPs, the MACT standards are technology-based emission limits that take into account available methodologies for controlling emissions of targeted HAPs from each source category. In general, a source is subject to a MACT standard if it is in a source category regulated under 40 CFR 63 and part of a facility that is defined as a major source for HAPs. A source is defined as a major source for HAPs if it emits a single HAP in excess of 10 tons (9.1 metric tons) per year or an aggregate emission rate of over 25 tons (22.7 metric tons) per year of any combination of regulated HAPs. GACTs are less stringent emission standards based on the use of more standard technologies and work practices. HAP emissions for the proposed Mesaba Energy Project would not exceed the associated major source thresholds (see Section 4.3); therefore, MACT standards do not apply to the proposed facility.

Table 3.3-5. Pertinent Air Quality Regulations

Regulation	Citation	Description
Clean Air Interstate Rule (CAIR)	Section 110 of the CAA Amendments	On March 10, 2005, EPA issued the CAIR, a rule that will achieve the largest reduction in air pollution of SO_2 and NO_X. The goal of the rule is to permanently cap emissions of SO_2 and NO_X from electric generating units (EGU) in the eastern United States so as to address $PM_{2.5}$ and ground-level O_3 transport. CAIR would achieve large reductions of SO_2 and/or NO_X emissions across 28 eastern states (including Minnesota) and the District of Columbia. When fully implemented, CAIR is expected to reduce SO_2 emissions in these states by over 70 percent and NO_X emissions by over 60 percent from 2003 levels. CAIR is expected to help sources in Minnesota reduce emissions of SO_2 by 36 percent and NO_X by 59 percent, by 2015. **The MPCA is allowing the CAIR to be implemented in Minnesota without modification.** The MPCA is currently considering changes to the Minnesota Air Rules to address the CAIR. In June 2006, the MPCA published an annotated draft of a new chapter in the state rules that would address issues related to CAIR. As a **new** EGU in the Minnesota, the Mesaba Energy Project would be subjected to the CAIR once promulgated by the MPCA **and would be allow access to allocation under the concept of a new source set aside as discussed in the MPCA's draft**. **On July 11, 2008, the Circuit Court of the District of Columbia vacated the CAIR following a lawsuit by a few parties on various aspects of the regulation but on re-hearing the Court decided simply to remand the rule to EPA. However, the Court decision did not affect state's obligations to eliminate significant contribution to downwind state's ozone and fine particle pollution (EPA, 2008a).**
Clean Air Mercury Rule (CAMR)	Section 111 of the CAA Amendments	In December 2000, EPA announced that it was "appropriate and necessary" to regulate and control emissions of mercury and other air toxics from coal- and oil-fired electric utilities under section 112 of the CAA Amendments (i.e., the MACT requirements). In January 2004, under the CAA, EPA was given the authority to regulate power plant mercury emissions by establishing performance standards or MACT, whichever the agency deems most appropriate. On March 15, 2005, EPA revised and reversed its December 2000 finding and issued the CAMR, which creates performance standards and establishes permanent, declining caps on mercury emissions from coal-fired power plants. The CAMR establishes "standards of performance" limiting mercury emissions from new and existing coal-fired power plants and creates a market-based cap-and-trade program. New coal-fired power plants ("new" means construction starting on or after January 30, 2004) will have to meet stringent new source performance standards in addition to being subject to the caps. As an electric utility steam-generating unit with more than 25 MWe output, the Mesaba Energy Project will be subject to the CAMR. In October 2005 (70 FR 62200), EPA agreed to reconsider certain aspects of its determination that regulation of electric utility steam generating units under section 112 of CAA was neither necessary nor appropriate, and removing coal- and oil-fired utility units from the list of source categories. However, EPA declined to issue a stay, and the CAMR remains in effect. The CAMR is a closely related action to the CAIR, which is discussed above. Together, the CAMR and the CAIR is expected to create a multi-pollutant strategy to reduce emissions throughout the United States **(EPA, 2008b)**.

Table 3.3-5. Pertinent Air Quality Regulations

Regulation	Citation	Description
Acid Rain Program	40 CFR Parts 72 through 78	The EPA established a program to control emissions that contribute to the formation of acid rain. The overall goal of the Acid Rain Program is to achieve significant environmental and public health benefits through reductions in emissions of SO_2 and NO_X, the primary causes of acid rain. The acid rain regulations are applicable to "affected units" as defined in the regulations. As a new utility unit, the Mesaba Generating Station is classified as an affected unit under 40 CFR 72.6(a)(3) because it would utilize fossil fuel-fired combustion to generate over 25 MWe of electricity for sale and is therefore subject to the Acid Rain Program. The objectives of the program are achieved through a system of marketable allowances, which are used by utility units to cover their SO_2 emissions. One allowance means that an affected utility unit may emit up to one ton of SO_2 during a given year. Utilities cannot emit more tons of SO_2 than they hold in allowances. Allowances may be bought, sold, or traded, and any allowances that are not used in a given year may be banked and used in the future. **The use of marketable allowances in the program limits the amount of SO_2 and NO_X that can be produced by any one facility**, **thereby helping to minimize regional effects. The Mesaba Energy Project would be required to hold SO_2 allowances in an amount equal to its actual emissions.** Owners or operators of an affected unit are subject to the following Acid Rain Program requirements: • Acid Rain Permit Application, which must be submitted at least 24 months prior to the date of initial operation of the unit • SO_2 emission allowances, which are to be secured on an annual basis. • NO_X emission limitations. • Acid Rain Compliance Plan. • Continuous emissions monitoring requirements for NO_X, SO_2, CO_2, and opacity. **Depending upon the source of the allowances, requirements under this program could reduce impacts from the IGCC power plant emissions**.
Minnesota Acid Deposition Control	Minn. R. 7021.0050	This regulation applies to existing electrical generating facilities that have a total capacity greater than 1,000 MWe. As Mesaba Energy Project, Phase I and II, will be new generating facilities, they will not be subject to this rule. However, under the Acid Rain Program, Mesaba Energy Project will be required to annually purchase SO_2 allowances in an amount equal to the total IGCC power plant's annual SO_2 emissions. The CAIR will supersede the Acid Rain Program when it becomes effective. Pursuant to Minnesota regulations, the Mesaba Energy Project's compliance with the new CAIR also constitutes compliance with the Minnesota's acid deposition requirements. The IGCC power plant would also be subject to the Reasonable Available Control Technology requirements of Minn. R. 7021.0050, Subpart 5 because the total indirect heating capacity of the CTGs, tank vent boilers, and auxiliary boilers exceed 5,000 MMBTU/hr. However, since emissions from these units are subject to BACT requirements, no additional limitations are necessary to meet reasonable available control technology requirements.

Table 3.3-5. Pertinent Air Quality Regulations

Regulation	Citation	Description
Compliance Assurance Monitoring (CAM) Rule	40 CFR Part 64	The CAM Rule will apply to facilities that have emission units located at major sources subject to Title V air quality permitting and which use control devices to achieve compliance with emission limits. It requires that these facilities monitor the operation and maintenance of their control equipment to evaluate the performance of their control devices and report if they meet established emission standards. If these facilities find that their control equipment is not working properly, the CAM rule requires them to take action to correct any malfunctions and to report such instances to the appropriate enforcement agency (i.e., State and local environmental agencies). Although a major source, the Mesaba Generating Station would not be subject to the CAM Rule because it will not be equipped with add-on air pollution control devices. However, the Mesaba Generating Station would be subject to similar requirements specified under the Acid Rain Provisions and the applicable NSPS.
Minnesota Air Pollution Episodes Rules	Minn. R. 7009.1000 – 7009.1110	Since the Mesaba Generating Station will have allowable emissions of greater than 250 tons per year of any single regulated pollutant, the plant is subject to Minnesota's Air Pollution Episode rules. The rules require preparation of an emergency action plan to be implemented in the event that the Commissioner of the MPCA makes an air pollution episode declaration. Requirements under this rule would be considered mitigation measures to reduce emissions from the Mesaba Generating Station sources.
Regional Haze Rule and the Minnesota Regional Haze Program	40 CFR Part 51, 51.300 – 51.309	In July 1999, EPA published the Regional Haze Rule to address visibility impairment in our nation's largest national parks and wilderness ("Class I") areas. Within its boundary, Minnesota has two Class I areas – the BWCAW and VNP. In addition, emissions from Minnesota may contribute to visibility impairment in other states' Class I areas, such as Michigan's IRNP and Seney Wilderness Area. **In July 2009, the MPCA completed a revised Draft Regional Haze SIP** that identifies sources that cause or contribute to visibility impairment in these areas. **Additionally, the Regional Haze SIP includes the Northeast Minnesota Plan, which includes target reduction (from 2002 levels) goals of 20 percent reduction from both existing and new sources by 2012 and 30 percent by 2018.**The Regional Haze SIP also includes a demonstration of reasonable progress toward reaching the 2018 visibility goal for each of the state's Class I areas. The Regional Haze Rule singles out certain older emission sources **(i.e., in existence on August 1977)** that have not been regulated under other provisions of the CAA. Those older sources that could contribute to visibility impairment in Class I areas may be required to install BART. **Minnesota's Draft Regional Haze SIP relies on implementation of the Federal CAIR to substitute for BART for power plants and in predictions of future emissions. EPA has indicated that it intends to stay the effectiveness of CAIR in Minnesota. However, the MPCA has requested additional information from certain power plants in order to make BART determinations that do not rely on CAIR and will revise and resubmit the Regional Haze SIP (MPCA, 2009a).** Because the Mesaba Generating Station would be a new facility, it would not have to meet the BART requirement. However, under PSD requirements a new source of criteria and air toxics emissions has to analyze its impacts to Class I areas. Section 4.3 addresses the impacts of the Mesaba Energy Project on Class I areas.

Table 3.3-5. Pertinent Air Quality Regulations

Regulation	Citation	Description
Chemical Accident Provisions	40 CFR Part 68 and Section 112(r) of the CAA Amendments	This regulation applies to stationary sources that will have more than a threshold quantity of the specific regulated toxic and flammable chemicals. It is intended to prevent accidental releases to the air and to mitigate the consequences of any such releases by focusing prevention measures on chemicals that pose the greatest risk to the public and the environment. Stationary sources covered by this regulation must develop and implement a risk management program that includes a hazard assessment, a prevention program, and an emergency response program. These elements are to be described in a risk management plan that must be submitted to EPA and state and local emergency planning authorities. The plan must also be made available to the public by the date that a regulated substance is first present in a process above a threshold quantity. The IGCC power plant is not expected to have any chemicals above the threshold amounts; however, detailed calculations would be performed when the system design for the IGCC power plant is finalized. The Mesaba Energy Project is expected to comply with all applicable provisions of the regulation in a timely manner.
Clean Air Act General Conformity Rule	40 CFR Parts 6, 51 and 93	An area that does not meet (or contributes to ambient air quality in a nearby area that does not meet) the primary or secondary NAAQS for a pollutant is referred to as a nonattainment area. The CAA requires states to submit to the EPA a SIP for attainment of the NAAQS. The 1977 and 1990 amendments to the CAA require comprehensive plan revisions for areas where one or more of the standards have yet to be attained. The 1990 Amendments to the CAA, Section 176(c)(1), required Federal actions to show conformance with the SIP. Federal actions are those projects that are funded by Federal agencies and include the review and approval of a proposed action through the NEPA process. Conformance with the SIP means conformity to the approved SIP's purpose of eliminating or reducing the severity and number of violations of the NAAQS, and achieving expeditious attainment of such standards. The need to demonstrate conformity is applicable only to areas that are not in compliance with the NAAQS or areas that were previously in nonattainment for one or more pollutants and are currently designated as maintenance areas. A Federal action will fall under the jurisdiction of either the General Conformity Rule or the Transportation Conformity Rule. The Transportation Conformity Rule covers highway and transit projects. The Mesaba Energy Project is a Federal action under the jurisdiction of the General Conformity Rule.

Table 3.3-5. Pertinent Air Quality Regulations

Regulation	Citation	Description
Federal Actions on Global Climate Change		**On June 2008, the Climate Security Act was debated in Congress. The main purpose of the act was to establish a Federal program that would substantially reduce U.S. greenhouse gas emissions between 2007 and 2050, in large part through a Federal cap-and-trade program (EIA, 2009).** **Over the years, the Federal government actions regarding GHG have focused on research, information, and voluntary programs. EPA has administered a wide array of public-private partnerships and programs to reduce U.S. greenhouse gas intensity. These programs focus on energy efficiency, renewable energy, methane and other non-CO_2 gases, agricultural practices and implementation of technologies to achieve greenhouse gas reductions. In April 2007, the Supreme Court concluded that GHGs meet the CAA definition of an air pollutant. On May 14, 2007, in response to the Supreme Court's decision, the President issued an Executive Order to control GHG emissions from motor vehicles, nonroad vehicles, and nonroad engines. EPA joined a cross-agency effort to develop new regulations that would cut GHG emissions from motor vehicles and their fuels, and EPA began an endangerment determination. However, a decision to regulate GHG emissions for motor vehicles could impact whether other sources of GHG emissions would need to be regulated as well, including establishing permitting requirements for stationary sources of air pollutants.** **In 2008, Congress directed EPA to publish a mandatory greenhouse gas reporting rule (The Consolidated Appropriations Act of 2008) under the CAA. The rule will require mandatory reporting of greenhouse gases "above appropriate thresholds in all sectors of the economy" (EPA, 2009a). Additionally, EPA is required to include in the rule reporting of emissions "resulting from upstream production (such as fossil fuel and chemical producers and importers) and downstream sources (such as large industrial facilities)," to the extent that the Agency deems appropriate. EPA published an advance notice of proposed rulemaking (ANPR) on July 2008, requesting stakeholders' help in evaluating whether there is a regulatory path available through the CAA to control emissions of GHGs and is expected to be finalized by June 2009.** **The EPA will soon be implementing the GHG reporting rules using its flexibility to determine emissions threshold and reporting frequency. The Mesaba Generating Station would be subject to these rules because it is likely that EPA may use exiting reporting requirements under Section 821 of CAA (i.e., Acid Rain Program), which requires electric generating facilities to monitor CO_2 either through continuous emissions monitoring or fuel analysis.**

Table 3.3-5. Pertinent Air Quality Regulations

Regulation	Citation	Description
State and Local Climate Change Policies – Greenhouse Gas Emissions Control	**Minn. Stat. § 216H.02**	**In May 2007, Governor Pawlenty signed the *Next Generation Energy Act* which included strategies to increase renewable energy use, increase energy conservation, and decrease carbon emissions from Minnesota (MHR, 2008). The initiative also established the Minnesota Climate Change Advisory Group (MCCAG), whose purpose is to evaluate and compile a set of aggressively reduced GHG emissions in Minnesota (MPCA, 2008a). On February 2008, the MCCAG developed a preliminary Climate Change Action Plan and made its final recommendations on effective and cost-efficient policies to reduce the emissions of greenhouse gases in Minnesota. Under Minn. Stat. 216H.02, Subd 1, the GHG emissions reduction goal involves the statewide reduction of GHG emissions across all sectors producing those emissions to a level at least 15 percent below 2005 levels by 2015, to a level at least 30 percent below 2005 levels by 2025, and to a level at least 80 percent below 2005 levels by 2050 (MPCA, 2007a). While exempt from the coal moratorium under the *Next Generation Energy Act,* the Mesaba Energy Project would be subject to the *Next Generation Energy Act* because the law requires Minnesota electric utilities to generate at least 25 percent of their electricity from renewable resources by 2025. Additional initiatives that could bring about GHG reduction legislation and affect operations at the Mesaba Generating Station are discussed below (MPCA, 2008b).** • **In November 2007, Midwestern governors and Canadian premiers signed the *Midwestern Greenhouse Gas Reduction Accord*. The Accord focused on energy efficiency, renewable electricity and advanced coal with carbon capture, the bioeconomy and transportation, and designing a regional Cap & Trade system that would place a limit on greenhouse gas emissions into the atmosphere. One of the MCCAG's recommendations for Minnesota to enter into the carbon Cap and Trade market is being addressed as part of the Accord.** • **The Midwest Governor's Association also signed the *Energy Security and Climate Stewardship Platform for the Midwest* (Stewardship Platform), which established goals for energy efficiency improvements, bio-based products and transportation, renewable electricity, and advanced coal and carbon capture and storage. The renewable electricity goal reinforces the Midwest Regional commitment to obtain at least 30 percent of the region's electricity from renewable resources by 2030. Additionally, the advanced goal of carbon capture and storage reinforces that by 2020 all new coal gasification and coal combustion power plants will capture and store CO_2 emissions.**

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3.4 GEOLOGY AND SOILS

3.4.1 Geology

3.4.1.1 Regional Features

Physiography and Topography

The physiography surrounding the West and East Range Sites consists of rolling hills with forests, bogs, and lakes in glacial till over bedrock. The bedrock is a mixture of metamorphic and intrusive igneous rocks, and is considered to be among the oldest within the continent. Both the West Range and East Range Sites are located on the edge of the Giants Range physiographic area of Minnesota, within the Superior Upland of the Canadian Shield province (Wright, 1972). The Giants Range, also known as the Mesabi Iron Range, is a folded ridge of iron-rich rock that was exposed during erosion in the Mesozoic. The topography of the area has also been heavily modified by extensive glaciation events, the last of which occurred roughly 12,000 years ago. The regional physical relief varies from 600 feet above mean sea level (msl) at Lake Superior to an elevation of 2,301 feet above msl at Eagle Mountain. The local landscape is also influenced by a number of 300- to 400-foot deep mine pits, large mine-pit tailing piles and basins, all associated with historical iron ore mining activity.

Climate

Minnesota has a continental climate and is frequently influenced by polar air masses. In Itasca and St. Louis counties, winters are very cold and summers are short and warm. The short freeze-free time limits farmed crops to forage, small grains, and adapted vegetables. Snow covers the ground much of the time from late fall to early spring. The lowest recorded temperature in the area was in Embarrass (near the East Range Site) in 1996 at negative 63ºF. Early freezes, prior to snowfall, extend the frost depth to several feet. However, the frost depth recedes and seldom exceeds a few feet after the snow blanket is established. Frost depths, in the order of 6 feet or more, can occur in areas that are plowed or otherwise kept clear of snow.

Bedrock

The bedrock of northern Minnesota consists of primarily continental craton rocks overlain by metamorphosed sedimentary rocks that are intruded by igneous plutons and dikes. The predominant geological and physiological feature in the area is the Mesabi Iron Range, which is made of silica-rich chert and iron-rich hematite, magnetite and taconite over basal quartz sandstone. Table 3.4-1 describes the bedrock geology in the area in more detail

3.4.1.2 West Range Site and Corridors

The West Range Site is located primarily on granite of the Giants Range batholith, just north of the Mesabi Iron Range bedrock (see Figure 3.4-1). At the project site, the elevations are approximately 1,430 feet above msl to 1,470 feet above msl.

All of the West Range corridors would cross portions of the Biwabik formation, the Virginia formation, and the Giant's Range batholith (at approach to the West Range Site). Between the Biwabik formation and the batholith is the Pokegama Quartzite. The Biwabik formation consists of layers of chert with iron rich minerals (hematite, taconite, and magnetite) and carbonate rocks. South of the Biwabik formation is the Virginia Formation, which is composed of argillite and clay-rich siltstone. The northern edge of the Virginia formation is located approximately 1.5 miles south of the proposed Mesaba Generating Station site. Portions of the Virginia and Biwabik formation are covered by the Coleraine Formation, an irregular sandstone and conglomerate layer deposited during the Cretaceous (Table 3.4-1). The first appearances of the Coleraine Formation occur approximately 1 mile from the power plant site.

Table 3.4-1. Bedrock Geology at the West and East Range Sites

Age	Group	Formations	Description	Member Description[a]	Location[a]
Cretaceous	N/A	Coleraine Formation	Irregular conglomerate composed of iron-formation clasts, and hematite-cemented sandstone; contains marine fossils	N/A	WR
Upper Proterozoic	Duluth Complex	Ultramafic intrusions, Bald Eagle Lake Intrusion; South Kiwishi Intrusion; Partridge River intrusion; Anorthositic series	Troctolite-gabbro, intruded by titaniferous peridodite	Ultra mafic, oxide-rich intrusions medium grained and layered	ER
Proterozoic	Animike Group	Virginia Formation	Interbedded carbonaceous shale, mudstone siltstone	Argillaceous Siltstone/greywacke	WR/ER
		Biwabik Formation	Ferruginous chert	Granular chert, iron silicates, hematite and carbonate rocks	WR/ER
		Pokegama Quartzite	Sedimentary rock assemblages	Upper: quartz arenite Middle: shale/siltsonte Lower: laminated shale	WR
Archean Eon	Wawa subprovince of the Superior province	Giant's Range Batholith/Granite	Tonalite to granite rocks in metavolcanic + metasedimentary host rocks	Sedimentary strata overlying greenstone-granite and diabasic dikes	WR/ER
		Mud Lake Sequence	Volcanic and intrusive rocks overlain by sedimentary rocks	Greywacke, slate and Metagabboric rocks	ER

[a]N/A=Not Applicable, WR=West Range Site, ER=East Range Site
Source: Jirsa et al., 2005

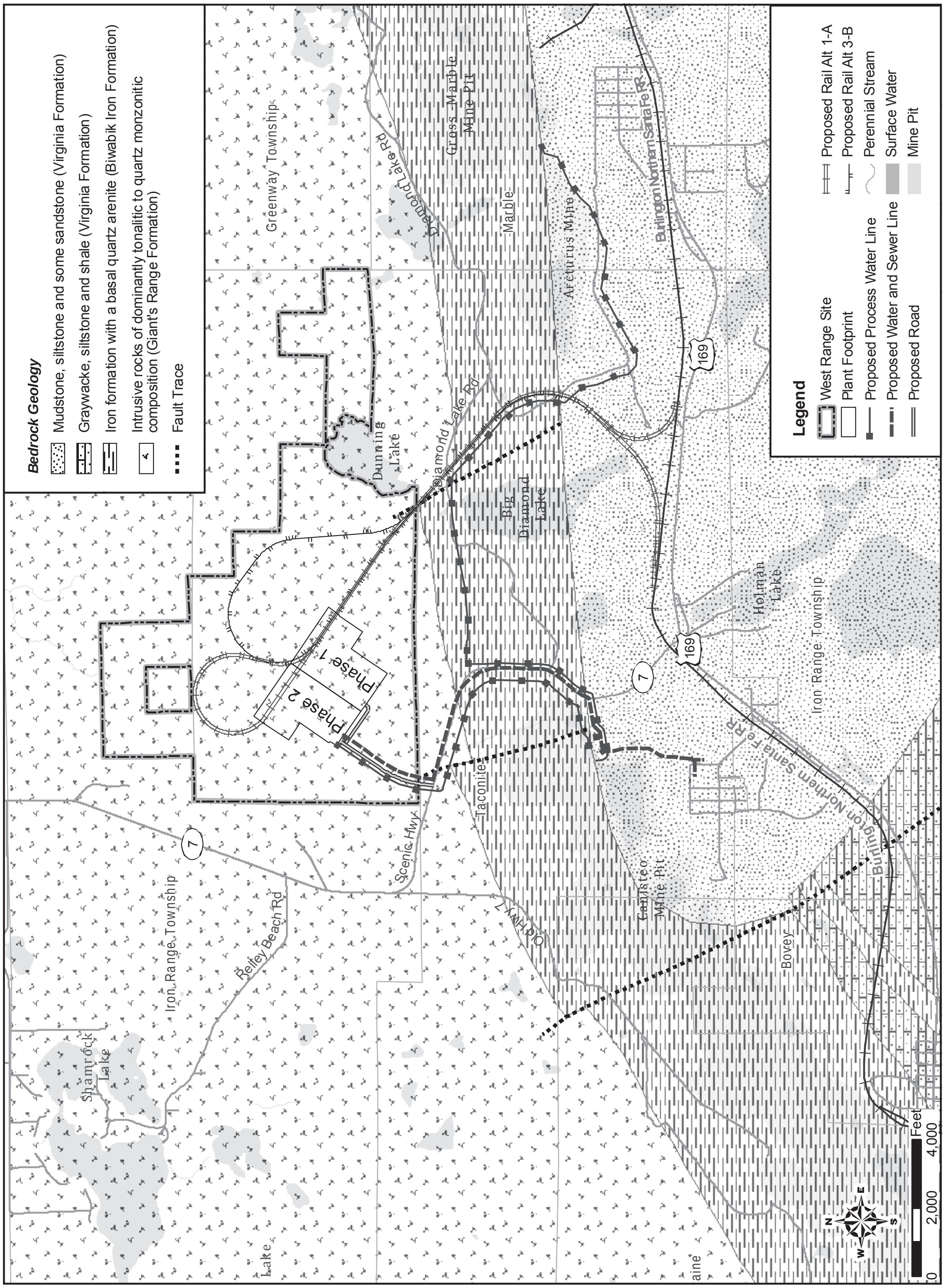

Figure 3.4-1. West Range Site Bedrock Geology

All bedrock is covered by sand and gravel deposits left from the last glaciation. In some locations, organic soils have also developed on top of the glacial deposits. Table 3.4-2 describes the type of Quaternary sediments in more detail. **This table has been revised from the version included in the Draft EIS based on project features that have been eliminated from consideration (West Range blowdown pipelines, Rail Alignment Alternative 1B, Access Roads 1 and 2) and features that have been added (West Range Rail Alignment Alternative 3B and Access Road 3) to the Final EIS.** The IGCC power plant would be located on glacial till of the Nashwauk Moraine Association. The corridors would cross portions of the Nashwauk and Sugar Hills Associations, glacial outwash, glacial lake sediment, glacial till, and peat (Hobbs and Goebel, 1982). Disturbed areas associated with mining activities are also located along the areas proposed for the corridors associated with the West Range Site.

Figure 3.4-2 shows the West Range IGCC power plant and its associated HVTL, pipeline, and transportation corridors in relation to the bedrock depth below ground surface. At the West Range Site, bedrock is closer to the surface near the proposed Mesaba Generating Station, increasing in depth further south. Bedrock is within 20 feet of the surface in three locations within the West Range Site. The bedrock is also within 20 feet of the surface in a location northeast of the Arcturus Mine. Southeast of the West Range Site is a bedrock valley that stretches northeast-southwest underneath Dunning Lake. The bottom of the bedrock valley reaches 200 feet below ground at its deepest. The rest of the bedrock immediately surrounding the IGCC power plant is within 50 feet of the ground surface.

South of Taconite and Bovey, the bedrock depth gradually increases to 250 feet below the surface. There is a subsurface ridge within 50 feet of the ground located 1 mile east of Taconite, between Holmes Lake and Twin Lakes (Meyer et al., 2004) (see Figure 3.4-2). In areas east of the West Range Site, the bedrock depth is within 50 feet of the surface.

Table 3.4-2. Quaternary Geology at the West and East Range Sites

Association	Deposit Type	Description	Location
Nashwauk Moraine Association	Ground moraine (Glacial till)	Till is brown to grey, non-calcareous drift; clasts are predominantly igneous and metamorphic rocks of the Canadian Shield	1,2,3,4,7,8,**9a,10a**
			12,13,14
Vermillion Association	Ground moraine (Glacial till)	Till is extremely stony and sandy and contains only trace amounts of clay.	--
			12,13,14,17,18
Sugar Hills Association	End moraine (Glacial till)	Locally deposited reddish colored lake sediments.	2,3,4,7,8,**9a**
			12,13,14
Culver Moraine Association	End Moraine (Glacial till)	Till is non-calcarous, clay-rich with sporatic clasts of shale. Deposits form rolling and hilly topography including numerous lakes and potholes.	--
			11,12,13,14,15,16,17, 18,19
N/A	Glacial outwash (Alluvium)	Alluvium is sorted sand and gravel deposits.	2,3,4,7,8,**9a**
			13,14
N/A	Gravel glacial lake sediment	Soft to medium stiff, stratified clay and silt deposits. Occasional cobbles and boulders also occur within the deposit. Often has high water table.	2,3,4,8,**9a**
			12,13,14,
N/A	Peat	Holocene-age, soft and highly compressible organic deposits, with a high water table	2,3,7,8,**9a**
			12,13,14,
N/A	Mine tailings pile	Piles contain overburden soil and glacial deposits from iron mining operations, typically consisting of glacial till mixed with rock fragments and low grade ore.	3,4
			13,15
N/A	Mine pit	Areas where overburden and iron deposits have been removed. Depths approach 400 feet. Includes abandoned and active mine pits.	3,4
			13,15

1. West Range IGCC Power Plant site
2. West Range HVTL WRA-1, WRA-1A, and WRB-2A
3. West Range Gas Pipeline Alternative 1, 2, and 3 corridors
4. West Range Process Water Pipeline Segments
5. **Deleted**
6. **Deleted**
7. West Range Portable Water and Sewer Pipelines
8. West Range Rail Line Alternative 1A
9. **Deleted**

9a. West Range Rail Line Alternative 3-B
10. Deleted
10a.West Range Access Road 3

11. East Range IGCC Power Plant site
12. East Range HVTL 38L corridor
13. East Range HVTL 39L/37L corridor
14. East Range Gas Pipeline 1 corridor
15. East Range Process Water Pipelines
16. East Range Potable Water and Sewer Pipelines
17. East Range Rail Line Alternative 1
18. East Range Rail Line Alternative 2
19. East Range Access Roads

N/A = Not Applicable (not organized by Association)

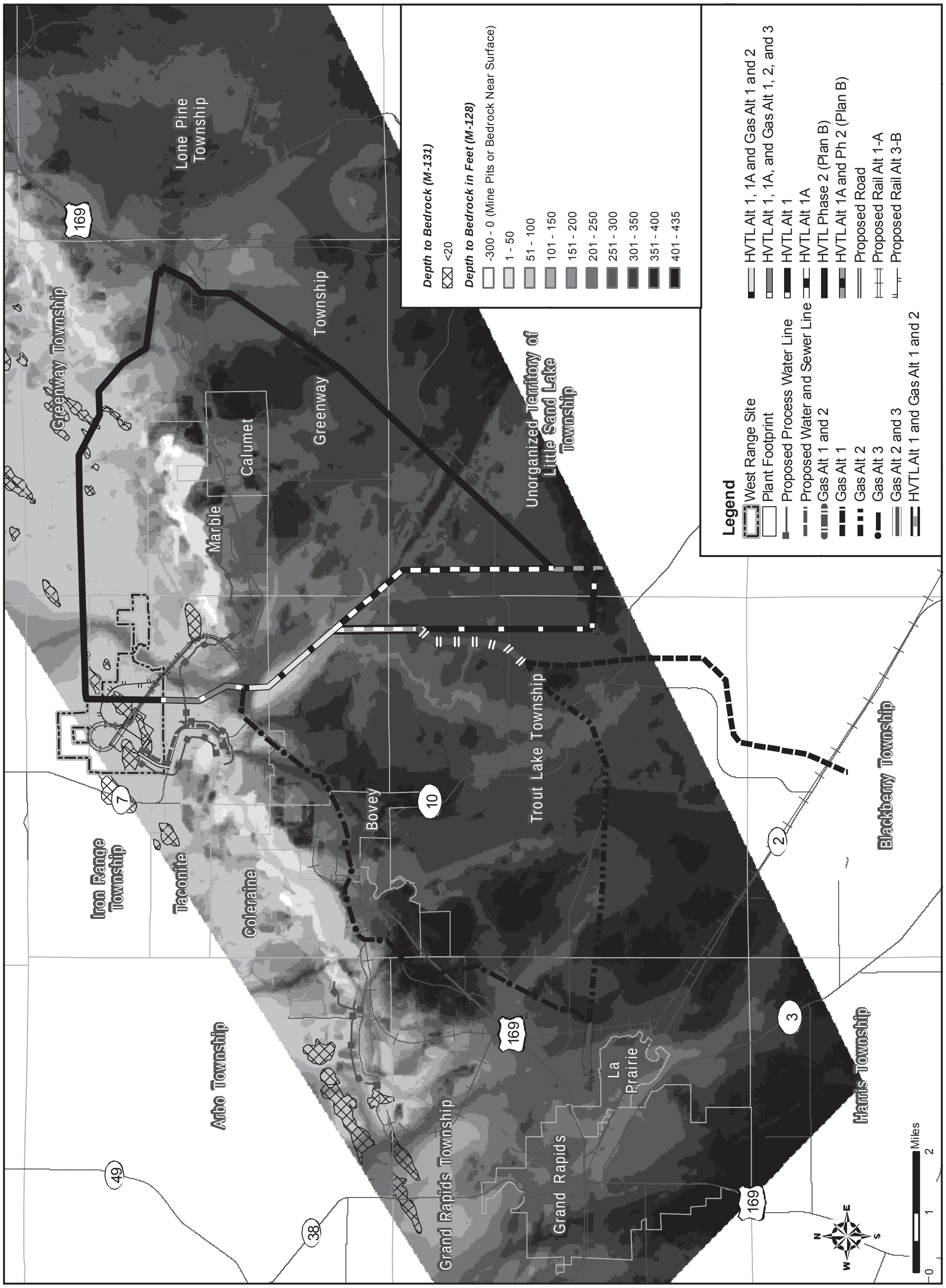

Figure 3.4-2. West Range Corridor Depth to Bedrock

3.4.1.3 East Range Site and Corridors

The East Range Site would be located on vacant land north of Colby Lake and inside the city limits of Hoyt Lakes. The average elevation for the area is 1,500 feet above msl, with a north-south grade that gradually dips approximately 20 to 40 feet into shrub swamp wetland.

The bedrock underlying most of the proposed East Range Site and its associated corridors is the Virginia formation, which consists of interbedded argillite, argillaceous siltstone, and fine-grained feldspathic greywacke. This formation lies south of the Giants Range batholith and the Biwabik Iron Formation. The southeastern corner of the East Range Site is in the Partridge River Intrusion, part of the Duluth Complex, which consists of troctolite and locally grades to gabbro, with numerous inclusions of hornfels and anorthositic rocks (Figure 3.4-3, Table 3.4-1). Some areas proposed for the utility corridors are exclusively located in the Virginia Formation. The Biwabik Formation and the Mud Lake Sequence occur around Eveleth.

The bedrock depth is within 50 feet of the ground surface near the East Range Site, rail alignments, process water pipelines and access roads (Figure 3.4-4). Bedrock is exposed at the extreme southeast corner of the East Range Site and is 1 to 50 feet below the ground surface throughout most of the site. However, there are two areas where the depth to bedrock is 50 to 100 feet below the ground surface. Beneath the area of the proposed power plant footprint, the bedrock surface slopes downward from northwest to southeast. Along the proposed HVTL and natural gas corridors, the bedrock surface gradually slopes to the southwest. The bedrock is at its deepest southwest of Aurora, at over 200 feet below the ground surface. Near Eveleth, the bedrock depth gradually becomes shallower, until it is within 50 feet of the ground surface. There is no data for the area along the proposed HVTL corridors as they approach the Forbes Substation. In areas disturbed by mining activities, the bedrock depth is typically within 50 feet of the ground surface, but may vary locally from irregular fill.

The area proposed for the East Range Site and associated corridors occur on the Culver Moraine Association, an end moraine of the Des Moines lobe. The East Range Site would be located on glacial till of the Culver Moraine Association, layered deltaic sediments, and reworked till deposits as described in Table 3.4-1 and Table 3.4-2. The corridor locations would traverse glacial till, glacial lake sediments and peat. Glacial till of the Vermillion and Nashwauk moraines and mine tailing piles would also be crossed in some areas along the corridors. From a point 200 feet east of the plant site boundary to the east end of the rail corridor, the underlying soils are glacial till of the Vermillion Association of the Rainy Lobe.

3.4.2 Mineral Resources and Mining

3.4.2.1 Regional Features

In the Mesabi Iron Range, iron ore is mined from the Biwabik formation from open pits. Mining operations remove the overburden (including the glacial deposits), any occurrences of the Coleraine Formation, and excess shale and quartzite in order to mine the iron-rich ore. Starting in 1945, many of the mining operations in the area were abandoned as the amount of high-quality ore declined. A typical abandoned mining area contains the pit and the tailings pile, as well as old access roads and a few pieces of old equipment. The area water table is close to the ground surface, and constant pumping was likely required to keep the pits dry when they were actively mined. However, once mining ceased, groundwater and other water inputs began filling the pits. Some abandoned mines in the region have reopened with the development of the taconite pellet process, which uses lower-grade ore. Other mineral resources commercially mined in northern Minnesota are crushed stone, sand and gravel for construction (USGS, 2004). Granite bedrock, as well as sand and gravel from glacial deposits are excavated by aggregate supply companies in Grand Rapids and Hibbing.

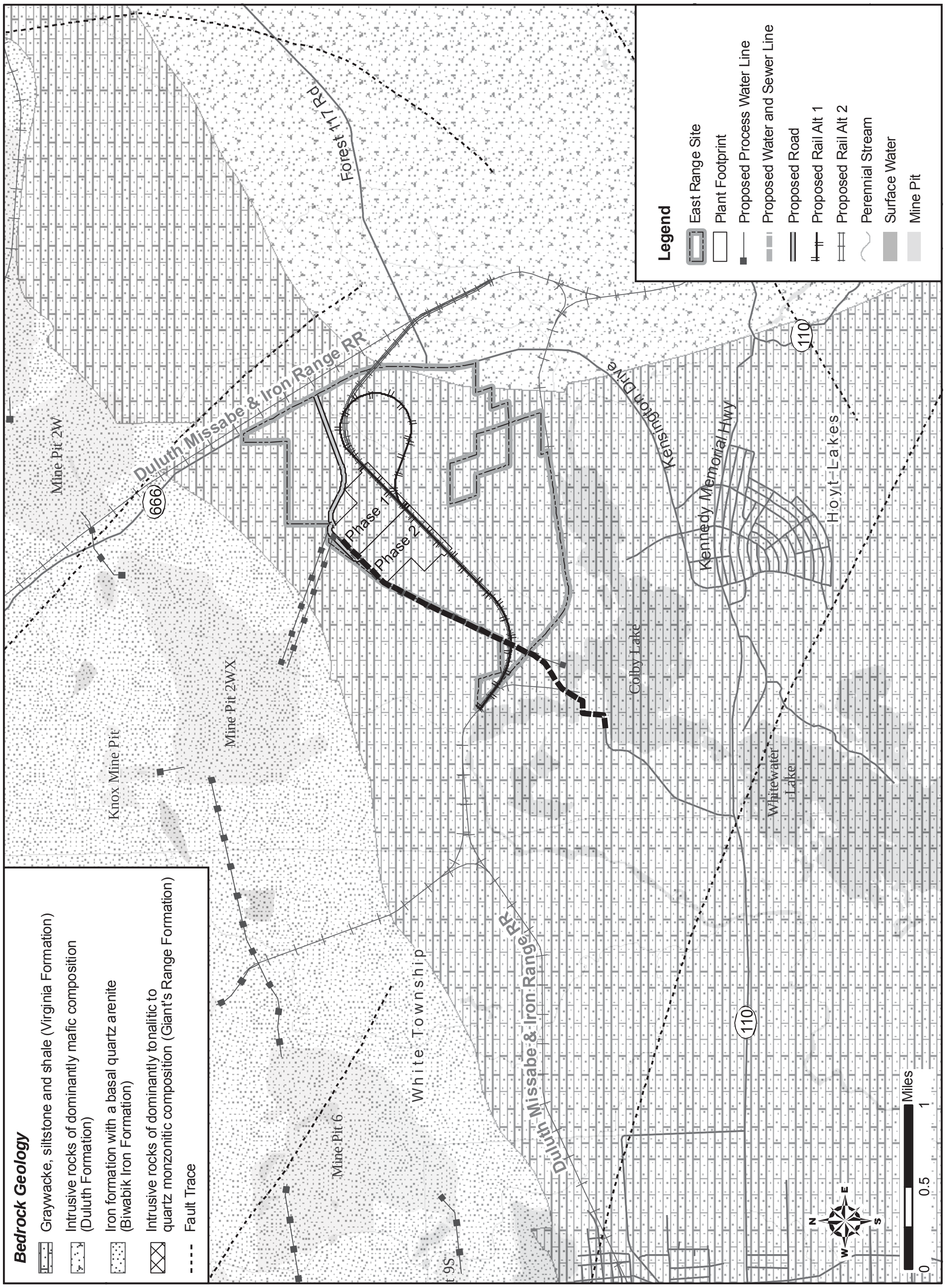

Figure 3.4-3. East Range Site Bedrock Geology

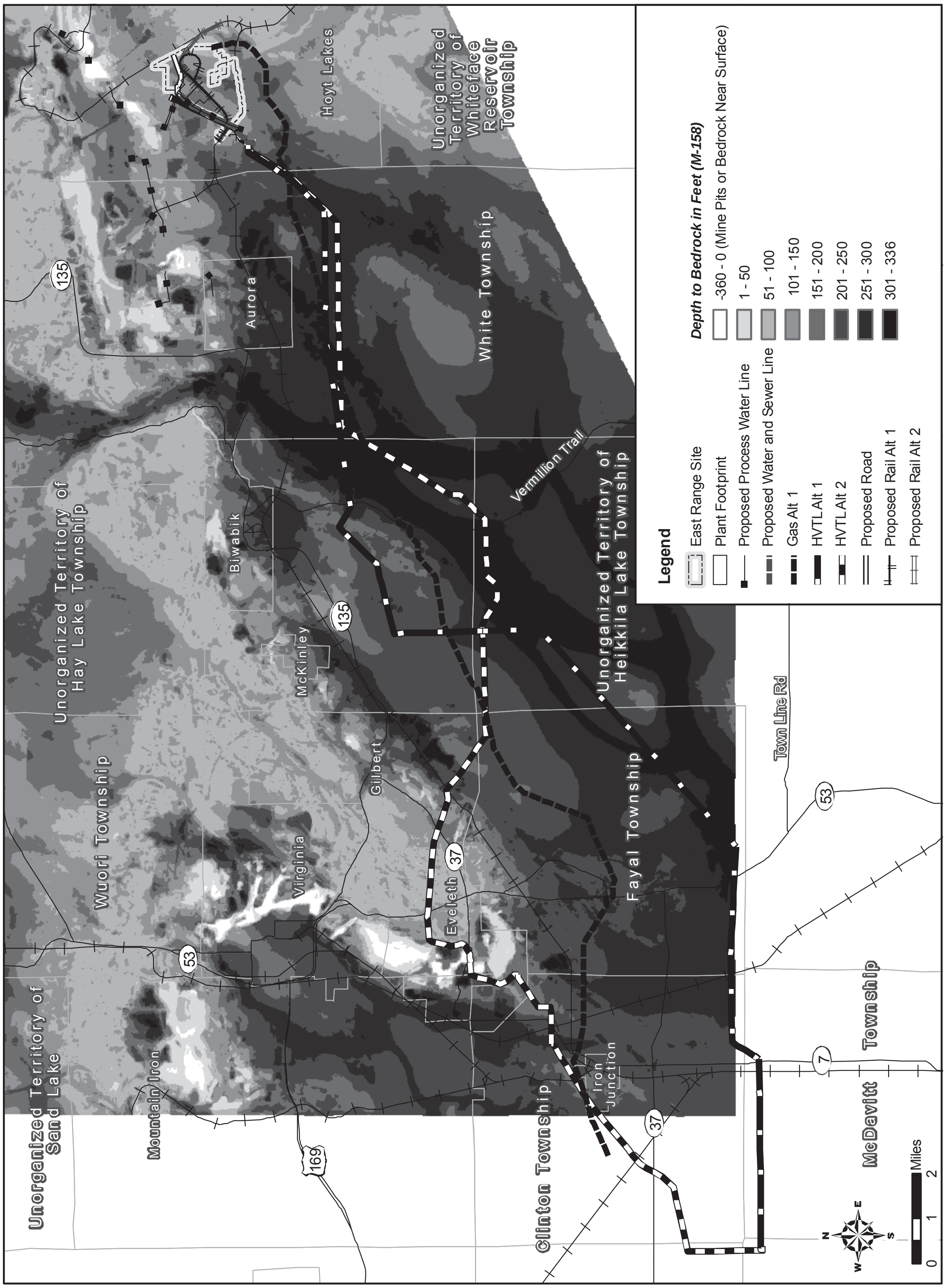

Figure 3.4-4. East Range Corridor Depth to Bedrock Geology

3.4.2.2 West Range Site and Corridors

The West Range Site has not been disturbed by mining activity. However, there are several abandoned mine pits to the southwest and southeast of the West Range site. The CMP is a flooded sequence of mines that stretches from Taconite to Coleraine. The GMMP connects the Arcturus Mine, the Hill Trumbull Mine, and the Hill-Annex Mine Pits during high water conditions. Surrounding these mine pits are mine tailing piles and basins, which are located to the south, west and east of the West Range Site. Previous mining activity is presented in Figure 3.4-5. There are no mining activities occurring near the West Range Site.

3.4.2.3 East Range Site and Corridors

The proposed East Range site has not been disturbed by mining activity (Figure 3.4-6). Two mine pits nearby are located on **former** CE property. One is located approximately 0.25 to 0.5 miles northwest of the proposed plant site and the other is north of the proposed plant site, across CR 666. Mine tailings piles also exist in two locations. One is on the west of the utility easement that forms the west edge of the proposed plant site, and the other is northeast of the proposed plant site, approximately 0.25 miles from CR 666.

Glacial deposits are also occasionally mined for aggregate rock in northern Minnesota; however, there are no rock quarries in the immediate vicinity of the East Range Site. The closest crushed rock supplier to the area is located in Hibbing.

3.4.3 Seismic Activity

3.4.3.1 Regional Features

The structural geology of the Mesabi Range is complicated; faults in the Animike Group (1,600 million years ago) record several tectonic events that occurred within the last 1 billion years. The dominant structural feature of the Mesabi Range consists of a gently dipping fold that strikes east-northeast and dips 5 to 15 degrees southeast (USDI, 1965). Fault traces within the Mesabi Iron Range vicinity tend to strike northwest to southeast. A steeply dipping northeast trending fault is located at the eastern end of the HAMP, but it appears to be inactive. The faults surrounding the Mesabi Iron Range are traces of older tectonic movement, rather than recent causes of seismic activity.

South of the West and East Range Sites is the Morris fault, a primary structural feature in central Minnesota. This fault is part of a larger mid-continent structure, the Great Lakes Tectonic Zone (GLTZ) that extends from central South Dakota to the north shore of Lake Huron in Ontario, Canada. The Morris fault has been interpreted as a late Archean suture that joined two continental blocks over 2 billion years ago. This suture fused a 2,600 to 3,600 million year old gneiss terrane to a 2,650 to 2,750 million year-old greenstone-granite terrane located to the northwest (Chandler, 1994). The Animike Basin extends northeasterly from the northeast end of the Morris fault and is separated by the Penokean fold and thrust belt in central Minnesota.

Some studies have attributed most of the seismic activity in Minnesota to the Great Lakes Seismic Zone, of which the Morris fault is the eastern anchor (Chandler and Morey, 1989). However, more recent geophysical studies in Minnesota have considerably improved the understanding of the GLTZ and adjacent structures. These recent studies have identified northwest-southeast trending substructures (subfaults) trending off of the GLTZ and the suggestion is that the earthquakes concentrated along the GLTZ are related to places where the northeast trending GLTZ is intersected by the northwest-southeast trending substructures (Chandler and Morey, 1989). The primary reason for this interpretation is that the epicenters for earthquakes near the GLTZ occur away from the immediate vicinity of the GLTZ along the northwest trending subfaults.

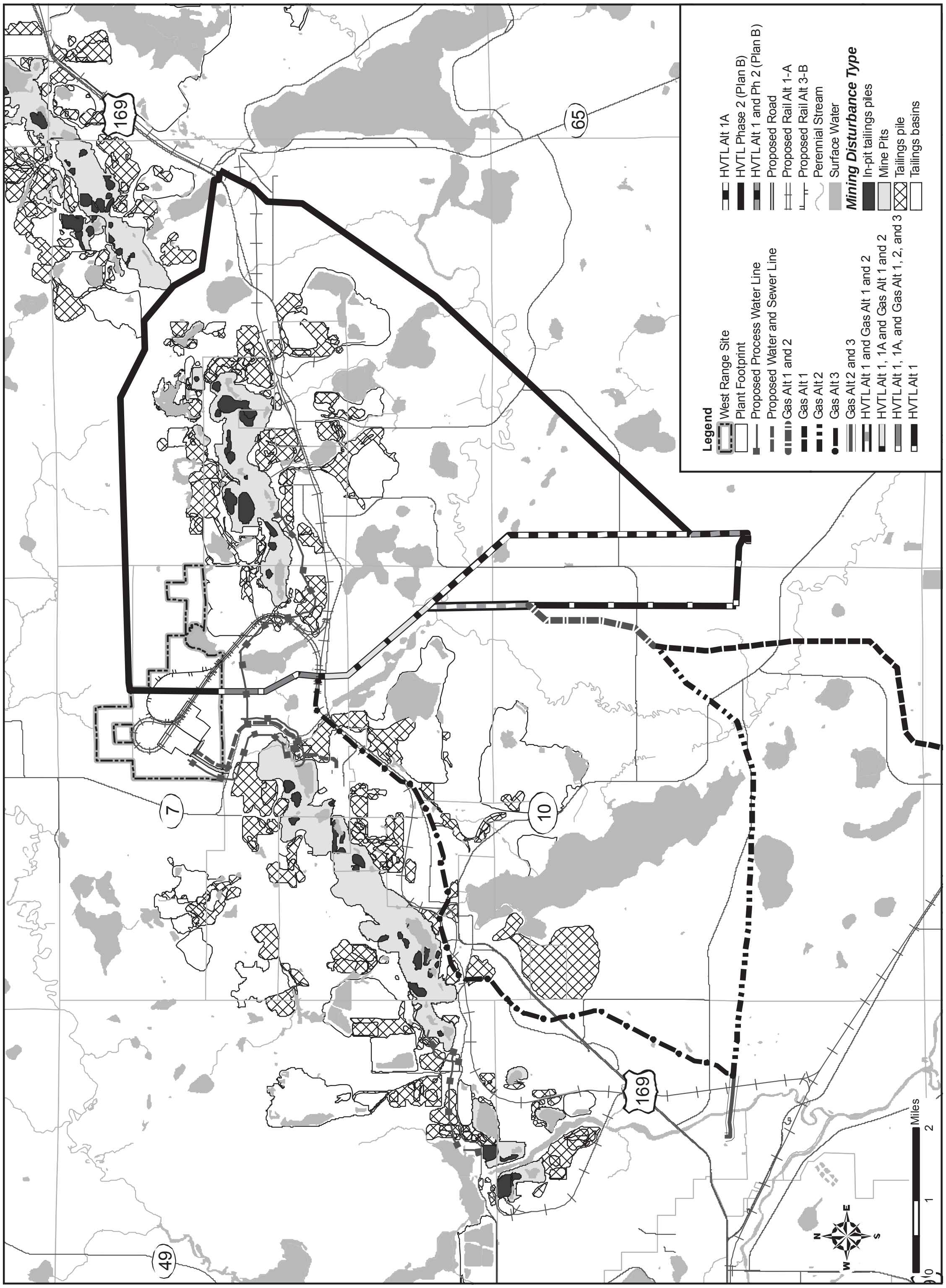

Figure 3.4-5. Mining Disturbances in the Vicinity of the West Range

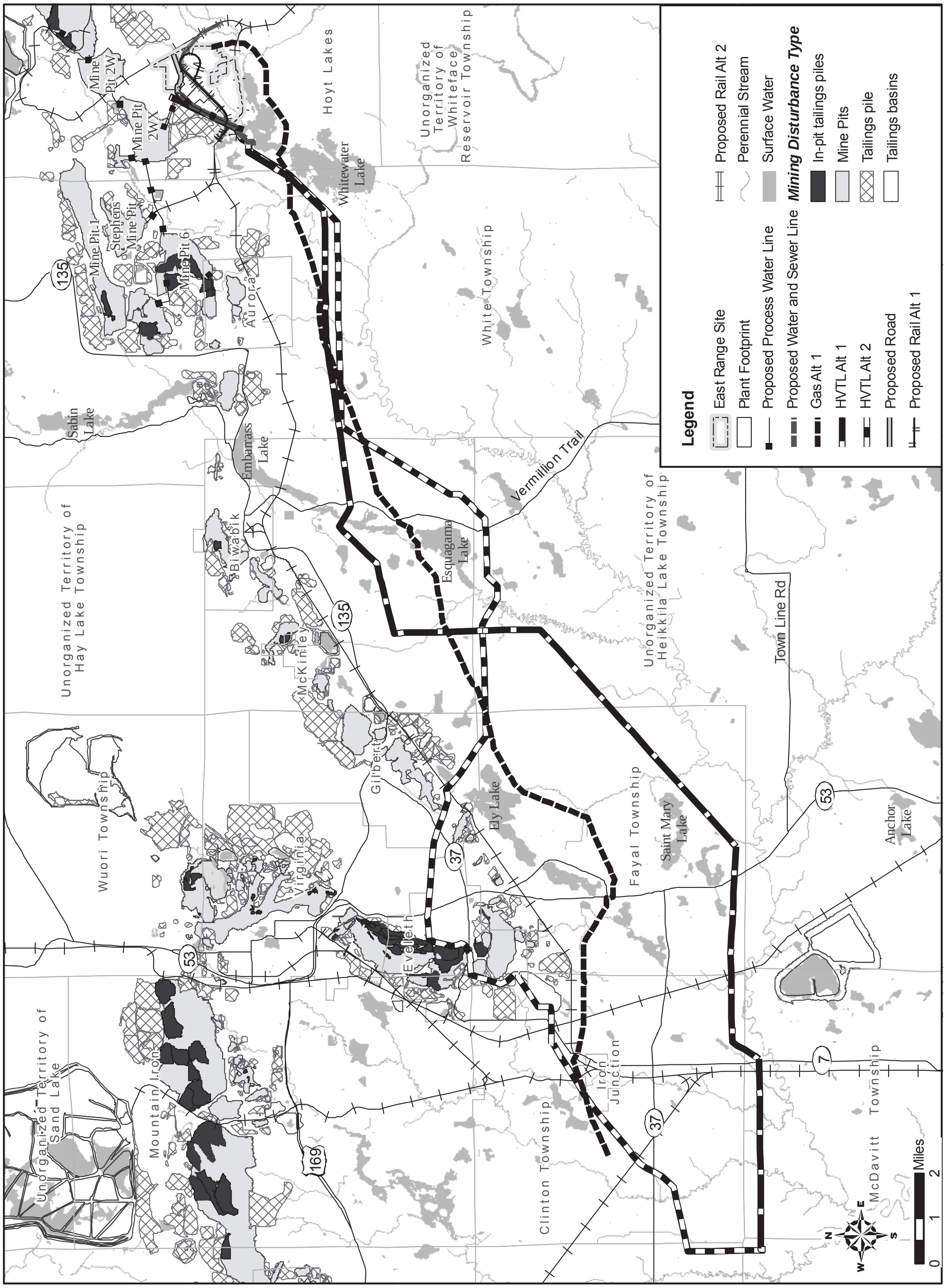

Figure 3.4-6. Mining Disturbances in the Vicinity of the East Range

3.4.3.2 Earthquake History

The mechanism of seismicity in the central United States is poorly understood, but the prevalent model suggests that earthquakes occur by the modern stress field reactivating ancestral faults in Precambrian rocks (Chandler, 1994). Minnesota is considered one of the most seismically stable states in the United States; however, this does not mean that the area is earthquake free. Chandler (1994) reviewed historical documents and cited 19 earthquakes that have occurred in Minnesota since 1860. The largest earthquake in the last 50 years occurred near Morris, Minnesota, on July 9, 1975, and recorded a magnitude of 4.6 to 4.8 on the Richter scale. A similar magnitude quake (4.1) took place about 28 miles south of this location in Dumont on June 4, 1993. Both of these quakes occurred near the Morris fault within the GLTZ. However, there is no record of these quakes being felt near the West or East Range Sites. Other researchers have hypothesized that the 7.8 magnitude New Madrid quake of 1812 would have been felt throughout Minnesota, but due to a lack of population density no records exist for that quake in northern Minnesota (Mooney, 1979). A list of historical seismic activity within Minnesota for the last 100 years is presented in Table 3.4-3.

Table 3.4-3. Minnesota Earthquakes within the Last 100 Years

Epicenter (nearest town)	Month/Day/Year	Latitude	Longitude	Felt Area (km^2)	Maximum Intensity	Magnitude (Richter Scale)
Red Lake	2/6/1917	47.9	95.0	---	V	3.8
Staples	9/3/1917	46.34	94.63	48,000	VI-VII	4.3
Bowstring	12/23/1928	47.5	93.8	---	IV	3.8
Detroit Lakes	1/28/1939	46.9	96.0	8,000	IV	3.9-3
Alexandria	2/15/1950	46.1	95.2	3,000	V	3.6
Pipestone*	9/28/1964	44.0	96.4	---	---	3.4
Morris*	7/9/1975	45.50	96.10	82,000	VI	4.8-4.6
Milaca*	3/5/1979	45.85	93.75	---	---	1.0
Evergreen*	4/16/1979	46.78	95.55	---	---	3.1
Rush City*	5/14/1979	45.72	92.9	---	---	0.1
Nisswa*	7/26/1979	46.50	94.33	v. local	III	1.0
Cottage Grove	4/24/1981	44.84	92.93	v. local	III-IV	3.6
Walker	9/27/1982	47.10	97.6	v. local	II	2.0
Dumont*	6/4/1993	45.67	96.29	69,500	V-VI	4.1
Granite Falls*	2/9/1994	44.86	95.56	11,600	V	3.1

*Denotes earthquakes that were recorded instrumentally. All others and associated magnitudes based solely on intensity data from felt reports.
Source: Chandler, 1994

The closest earthquake epicenter to the Mesabi Iron Range is the 1928 Bowstring earthquake, whose epicenter is located approximately 25 miles to the northwest of the West Range Site. The magnitude of the Bowstring quake was estimated to be 3.8. Magnitude 3 earthquake shocks are barely perceptible by humans. Magnitude 5 shocks will be disturbing to nearby observers but will not do much damage. The Bowstring epicenter is located along one of the northwest trending fault lines emanating out from the iron range. However, the West Range and East Range Sites do not appear to be located on these fault lines.

3.4.4 Paleontological Resources

3.4.4.1 Regional Features

Fossils are found within sedimentary rocks of the appropriate age and type. The Mesabi Iron Range consists of mostly igneous and metamorphic rocks, which do not contain fossils. Only one of the sedimentary rock formations in the area is known to contain fossils. The Coleraine Formation is an irregular conglomerate composed largely of iron-formation clasts, hematite-cemented sandstone, and blue-green shale, and was formed within a marine environment. There are mostly invertebrate fossils in the form of shells preserved in the deposits; though fossilized shark's teeth, ocean snails, clams, and crocodile parts have been uncovered.

3.4.4.2 West Range Site and Corridors

The Coleraine Formation is found within isolated pockets between the Proterozoic and the glacial deposits in the area around the West Range Site. Because glacial deposits cover the majority of the area, the occurrences of the Coleraine Formation are restricted to areas with mining operations, where the overburden has been removed. The Coleraine Formation is primarily known from the walls of the HAMP, which is located in the Hill Annex Mine State Park. The state park also has tailings piles with waste rock excavated from the mining operations. It currently provides fossil-hunting tours to the public.

The West Range Site is located to the north of the assumed extent of the Coleraine Formation; however, the southern portion of the rail alignments and most of the HVTL lines would be located where the formation is hypothesized to be found. The true extent of the Coleraine formation is not known, particularly because it is not continuous.

3.4.4.3 East Range Site and Corridors

The Coleraine formation is not found near the East Range Site or its corridors.

3.4.5 Soils

3.4.5.1 Regional Features

Soil formation in northern Minnesota is dominated by erosion, glacial activity, and the type of parent material. The final retreat of the glaciers at the end of the Holocene left a thick layer of sediment carried from the north. Soil formation today in northern Minnesota occurs primarily on these glacial deposits and is modified by the large amount of glacial water trapped above the igneous bedrock. Wetlands are found in areas of low elevation and generate thick organic soils sequences. Upland areas tend to be well drained and can have a wide variety of clast size. Therefore, landscape position and parent material are some of the primary factors in the area soil formation.

The soil descriptions provided are categorized by their parent material because they are well correlated to the soil characteristics pertinent to the impact analysis. Further discussion of the West Range Site soil series and their attributes can be found in the Itasca County Soil Survey (USDA, 1987).

In some locations, soil surveys in northern Minnesota are still incomplete. The Soil Survey of Itasca County was completed in 1987, and the Natural Resources Conservation Service (NRCS) is currently preparing a soil survey for St. Louis County. Selected areas around Hoyt Lakes are depicted on preliminary maps, and limited soil descriptions are available. An earlier, rudimentary survey mapped soil landscape units around Hoyt Lakes in 1989. These data provide broad descriptions and lower resolutions than standard soil survey maps, and are only used as a baseline description. Since the soil survey information is in draft form, the East Range Site soil types are discussed qualitatively. The West Range and East Range Sites have a similar Quaternary history and topographic profiles, therefore, the soils could be considered similar.

3.4.5.2 West Range Site and Corridors

The West Range Site soils consist of nearly level to very steep, well-drained and somewhat poorly drained loamy and silty soils that formed in glacial till. Organic deposits also occur within the West Range Site, directly north and south of the footprint of the proposed IGCC power plant. Table 3.4-4 presents more detail about the soil series in the West Range Site and corridors. Where areas of wetness occur the soils are described as poorly drained till sediments and peat bogs. The HVTL corridors would cross recent organic deposits and soils formed from lacustrine deposits, glacial till, and glacial outwash. Given the length of the proposed HVTL corridors, there is not one predominant soil type. More information on the soil types is described in Table 3.4-4.

The organic soils have formed nearly level bogs, lake plains, and outwash plains. The depth of the peat extends to at least 6 feet, the maximum depth evaluated by the soil survey. There are numerous areas of compressible, highly organic soils with a groundwater table 3 feet or less below the surface. Shallow excavations in organic deposits are very unstable due to seeping water and cutbank cave-ins. Some organic materials are also found over sandy alluvial materials. These soils consist of 1 to 2 feet of peat underlain by loam, loamy sand, coarse sand, loamy coarse sand, sand, and silt loam. The depth to the seasonal high groundwater table ranges from 2 feet above to 3 feet below ground surface.

Lacustrine deposits are poorly drained and occur on flat and slightly concave slopes on glacial lake plains and outwash plains. They consist of silt loam, clay loam, loam, loamy very fine sand, and very fine sand. The water table is also very high in these soils, which severely impedes shallow excavations because of wetness and caving cutbanks. Glacial till soils are extremely variable, with their characteristics depending on the local topography and water table. The soils consist of silt loams to loamy fine sand, and are located on the tops of glacial moraines to flat glacial till plains. When digging in areas with a high water table, these soils are also unstable.

The majority of soils formed on glacial outwash deposits are well to excessively well-drained. These soils include loamy fine sand, fine sand, fine sandy loam, sandy loam, loamy sand, coarse sand, loamy coarse sand, sand, silt loam, and gravelly sand. The finer soils tend to be near the ground surface and become coarser with depth.

All of the natural gas pipeline alternatives would cross organic, glacial till, and glacial outwash deposits. Given the length of the proposed gas pipeline corridors, there is not one predominant soil type. Organic deposits and a high water table are primarily found along the southern corridor of the NNG Pipeline Alternatives 1 and 2, around Trout Lake, and approaching the town of Blackberry. The process water pipeline corridors would follow existing corridors that, when necessary, cross mine tailing deposits, also known as slickens. Slickens consist of mine tailings left over from the taconite concentration process. Process water pipeline segments 2 and 3 would cross glacial till with a water table deeper than 3 feet below ground surface. More information on these soil types is provided in Table 3.4-4. **This table has been revised from the version included in the Draft EIS based on project features that have been eliminated from consideration (West Range blowdown pipelines, Rail Alignment Alternative 1B, Access Roads 1 and 2) and features that have been added (West Range Rail Alignment Alternative 3B and Access Road 3) to the Final EIS.**

[Text included here in the Draft EIS, relating to the blowdown pipeline, Rail Alignment Alternative 1B, and Access Roads 1 and 2, has been eliminated from the Final EIS.]

The Rail Alignment Alternatives 1A and 3-B would cross peat after branching from the CN rail line, and again within the West Range Site. On their approach to the Mesaba Generating Station, both alternatives would cross glacial till. The rail loops would be located on primarily poorly-drained organic and glacial till deposits. **Itasca County has deferred the project to reroute CR 7, so Access Roads 1 and 2 have been replaced with Access Road 3, which would cross sandy loams formed on glacial till.**

Table 3.4-4. Soil Types along the West Range Site and Corridors

Parent Material	Drainage	Seasonal High Groundwater Table Depth	Potential for Re-vegetation	Location
Recent Organic Deposits	Poorly drained	2 ft below to 2 ft above ground surface	**Good**: wetland plants **Poor**: grasses, wild herbaceous plants, hardwood and coniferous trees	1,2,3,4,7
Recent Organic Deposits over Alluvium	Poorly drained	3 ft below to 2 ft above ground surface	**Good**: wetland plants **Poor**: grasses, wild herbaceous plants, hardwood and coniferous trees	1,2
Lacustrine Deposits	Poorly drained	1 to 3 ft below ground surface	**Good**: wild herbaceous plants, grasses and legumes, hardwood trees and coniferous plants **Fair to Good**: wetland plants **Fair**: grasses, legumes, hardwood trees and plants	2
Glacial Till	Variable; Very poorly drained to Well drained	Variable; 1 to greater than 6 feet below ground surface	Variable; slope and local drainage determines the potential for re-vegetation **Good**: grasses, legumes, wild herbaceous plants, hardwood trees **Fair to Good**: coniferous plants and wetland plants	1,2,3,4,7,8,**9a, 10a**
Glacial Outwash	Well to excessively drained; some locations are poorly drained	Greater than 6 ft below ground surface	**Good**: grasses and legumes, wild herbaceous plants, hard wood trees, and coniferous plants **Fair**: wild herbaceous plants **Poor**: wetland plants	2,3
Mine Pits and Tailings Piles	Tailings piles are well drained. Flooding of mine pits varies by location	Varies by location	**Poor**: grasses, legumes, wild herbaceous plants, hardwood tress, coniferous and wetland plants	4

1. West Range IGCC Power Plant site
2. West Range HVTL WRA-1, WRA-1A, and WRB-2A
3. West Range Gas Pipeline Alternative 1, 2, and 3 corridors
4. West Range Process Water Pipelines
5. **Deleted**
6. **Deleted**
7. West Range Portable Water and Sewer Pipelines
8. West Range Rail Line Alternative 1A
9. **Deleted**

9a. West Range Rail Line Alternative 3-B
10. Deleted
10a. West Range Access Road 3

3.4.5.3 East Range Site and Corridors

Since the St. Louis County Soil Survey is not yet available publicly, soils at the East Range Site were assumed similar to the West Range Site due to their locations in similar climatic conditions and the similar parent materials. The depth to the water table at the East Range Site is not known.

A previous soil landscape study performed for the area was used to provide a limited characterization of the locations of organic deposits (Land Management Information Center, 1996). The East Range Site would be located on glacial till deposits. Initial studies of the soil indicate that the area has well-drained, sandy, light colored soil, which is consistent with the glacial parent materials. The HVTL 38L alternative route would traverse glacial till, glacial lake sediments and peat. The water table would be high around the peat deposits. Glacial lake deposits contain soft to medium stiff, stratified clay and silt deposits, and tend to have a high groundwater table. Occasional cobbles and boulders are also encountered within the deposits. The HVTL 39L/37L alternative route would cross slickens from mine tailings piles around Eveleth, in addition to the glacial till, glacial lake sediments and peat. Mine tailings piles contain overburden soil from iron mining operations, which typically consists of glacial till. They also contain fragments of rock and low-grade iron ore. The ore is typically 3 to 10 inches in diameter, but can range in size from pebbles to large boulders. The tops of the tailings piles are typically flat and the side slopes are steep. Some piles are as much as 200 feet high. The Natural Gas Pipeline corridor would cross soils similar to those along the HVTL corridors.

The process water pipeline corridors would exist on **former** CE property, and would cross soils disturbed from mining operations. The spoil from mining operations includes glacial till and fragments of rock or iron ore, and becomes incorporated into the preexisting soil column. A portion of all of the process water pipelines would cross mine deposits, and segments 6-S-2WX, K-2WX, 2WX-Site, and 2WX-2W would also cross glacial till.

The soils underlying Rail Line Alternatives 1A and **3-B**, the potable water and sewer pipelines, and the access road corridors would consist of glacial till. These soils are discussed in further detail above and in the West Range section (Section 3.4.5.2).

3.4.6 Prime Farmland

3.4.6.1 Regional Features

The Federal Farmland Protection Policy Act (Public Law 97 98; 7 U.S.C. 4201 et seq.) and the Minnesota Agricultural Land Preservation and Conservation Policy Act (M.S. 17.80-17.84) have been enacted in an effort to document the potential impacts to agricultural land through the NEPA process and to preserve land with the potential to consistently produce food and raw materials. The supply of high quality farmlands is limited; therefore, the USDA encourages the preservation of soils classified as "Prime Farmland," "Prime Farmland, if Drained," or "Farmland of Statewide Importance." The NRCS Handbook, part 622.06 (USDA, 2006) defines prime farmland as:

> *Land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops and is also available for other uses. It has the soil quality, growing season, and moisture supply needed to produce economically sustained high yields of crops when treated and managed according to acceptable farming methods, including water management. In general, prime farmlands have an adequate and dependable water supply from precipitation or irrigation, a favorable temperature and growing season, acceptable acidity or alkalinity, acceptable salt and sodium content, and few or no rocks. They are permeable to water and air. Prime farmlands are not excessively erodible or saturated with water for a long period of time, and they either do not flood frequently or are protected from flooding.*

Minnesota Rule 4400.3450, Subpart 4 ("Prime Farmland Exclusion") provides that

> *No large electric power generating plant site may be permitted where the developed portion of the plant site, excluding water storage reservoirs and cooling ponds, includes more than 0.5 acres of prime farmland per megawatt of net generating capacity, or where makeup water storage reservoirs or cooling pond facilities include more than 0.5 acres of prime farmland per megawatt of net generating capacity, unless there is no feasible and prudent alternative.*

The provision does not apply to areas located within home rule charter or statutory cities, areas located within two miles of home rule charter or statutory cities of the first, second, and third class, or areas designated for orderly annexation under Minnesota Statutes § 414.0325 (Excelsior, 2006a).

Prime farmland or farmland of statewide importance may occur in a variety of parent materials, geomorphic locations and climates. In northern Minnesota, soils formed on lacustrine or glacial till parent materials are generally considered prime farmland. Soils that also contain surface water may also be considered "Prime Farmland, if Drained." Some soils are not considered prime farmland but may have properties that are recognized by the state as suitable for production of food, feed, fiber, or forage. The Minnesota state soil surveys identify soils that are considered prime farmland or farmland of statewide importance.

3.4.6.2 West Range Site and Corridors

Fourteen soil series found along the proposed West Range Site and utility corridors are classified as either "Prime Farmland," "Prime Farmland, if Drained," or "Farmland of Statewide Importance." These soils are primarily silt loams located on shallow slopes and are generally well drained.

The West Range Site footprint is primarily located on soils identified either as "Prime Farmland Soils," or "Prime Farmland, if Drained." For the West Range Site, soils that are within the site ownership boundary or within the utility corridor rights–of-way and have been designated as prime or statewide important farmland are shown on Figure 3.4-7. Some soils have a seasonally high water table, but qualify as prime farmland where they have been drained. There currently is no active farming in this area.

Prime and statewide important soils are ubiquitous in the area surrounding the West Range Site (Figure 3.4-7). All of the HVTL, pipeline, and transportation corridors would cross over sections of soils classified as "Prime Farmland," "Prime Farmland, if Drained," and "Farmland of Statewide Importance." Some corridors would cross land that has previously been disturbed from mining activities. The process water pipelines Segments 1, 2, and 3 would cross fewer farmland soils as they approach the mine pits.

Facilities associated with the West Range Site that lie outside the City limits of Taconite and Marble (Taconite and Marble abut one another at the eastern-most boundary of Taconite and both are statutory cities) are limited to the LMP pumping station, Segment 1 of the Process Water Supply Pipeline, and the outfall at its point of termination of the Segment 1 pipeline (Excelsior, 2006a).

3.4.6.3 East Range Site and Corridors

The St. Louis County soil survey is currently being prepared, therefore, only preliminary soils data exists for parts of the county. However, the soils surrounding the East Range Site have been qualitatively analyzed from preliminary maps. Based on available mapping, two soil series are classified as "Farmland of Statewide Importance" soils within the vicinity of the East Range Site. No soils in the southern portion of St. Louis County are associated with the Prime Farmland classification. Since the soil survey data from St. Louis County are preliminary, the maps used in this analysis, as well as soil series classifications, are subject to change. In locations where the corridors cross tailing piles or disturbed mining areas, the presence of prime and statewide important soils is highly unlikely.

The area surrounding the East Range Site is an industrial region with several mining operations. Therefore, there is little farming activity surrounding the East Range site and no current farming practices are being conducted on the proposed project site.

The generating station footprint and many of the station's associated facilities are located entirely within the City limits of Hoyt Lakes, a statutory city. The Process Water Supply Pipeline Segment 7 is located within the City of Aurora, also a statutory city. Facilities associated with the East Range Site that lie outside the City limits of Hoyt Lakes or Aurora are Segment 6 and Segment 8 of the Process Water Supply Pipeline (Excelsior, 2006a).

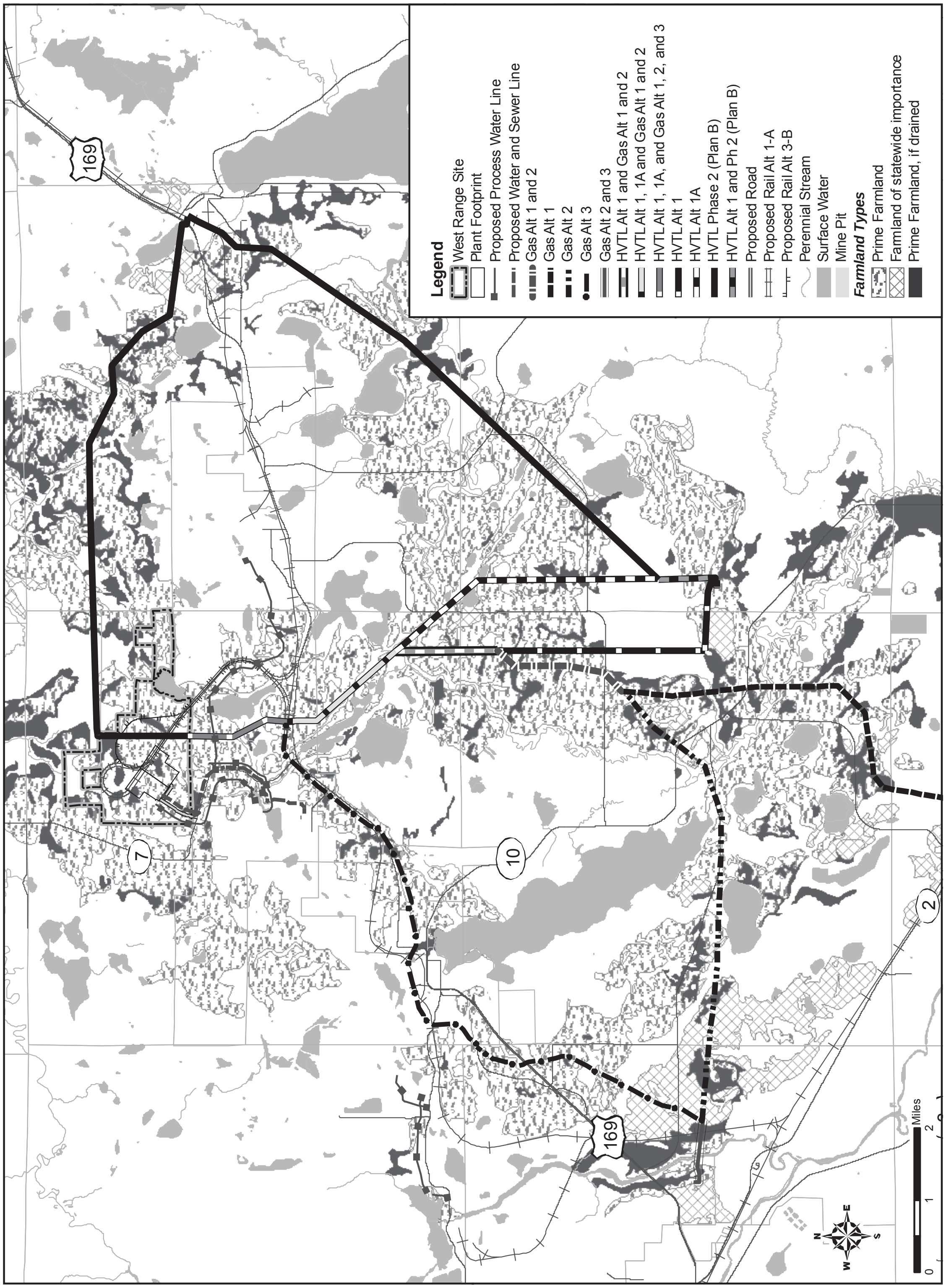

Figure 3.4-7. West Range Location of Prime Farmland Soils

3.4.7 Suitable Formations for Geologic Sequestration of Carbon Dioxide

Excelsior is currently working with the University of North Dakota Energy and Environmental Research Center to assess CO_2 management options as part of the Plains CO_2 Reduction Partnership (see Section 2.2.1.3). The Phase I and Phase II Mesaba Generating Station would be designed as carbon capture adaptable, in the event that the CO_2 can be either commercially used under economically advantageous conditions, or sequestered in response to a nationally implemented climate change program that includes regulatory constraints on greenhouse gas emissions. It is anticipated that approximately one third of the carbon in the PRB feedstock could be captured with existing technology, with a subsequent reduction in capacity and plant efficiency.

Carbon is currently being sequestered in capped sandstone or limestone aquifers, frequently around areas with oil or gas production. Some of the closest areas for potential carbon sequestration around the Proposed Action would be in the oil fields or coal seams in the Williston Basin in northwestern North Dakota (approximately 400 miles from the proposed West Range Mesaba Generating Station). There is also potential for sequestration in saline formations within the Mississippian-Madison Saline Aquifer System in western North Dakota and northwest South Dakota, and within the Lower Cretaceous Saline Aquifer System in central North Dakota and South Dakota (approximately 260 miles from the West Range Mesaba Generating Station). Additional information on these potential sinks and their estimated storage capacities is available in a December 2005 Plains CO_2 Reduction Partnership publication titled "Geologic Sequestration Potential of the Plains CO_2 Reduction Partnership Region" at http://www.netl.doe.gov/technologies/carbon_seq/ partnerships/phase1/pdfs/MDJ-Geologic Sequestration Potential.pdf.

Excelsior prepared a "Plan for Carbon Capture and Sequestration" in October 2006 that explored the economic factors associated with selecting geologic sequestration options and locations. The most promising options would deliver the CO_2 by pipeline for enhanced oil recovery operations in the Williston Basin. The plan also evaluated injection into the Lower Cretaceous Saline Formation in eastern North Dakota. Although existing CO_2 pipelines would be utilized wherever feasible, new CO_2 pipeline would need to be constructed to transport CO_2 to the sequestration sites. Excelsior would continue to work with the Plains CO_2 Reduction Regional Partnership to explore possibilities for sequestering the CO_2 from the Mesaba Energy Project, such as collaborating on a potential Phase III demonstration project proposal under NETL's Carbon Sequestration Program.

Excelsior recently discussed potential carbon sinks in the Upper Midwest with Julio Friedmann, the Associate Program Leader of the Carbon Management Program at Lawrence Livermore National Laboratory and Harvey Thorleifson, Director of the Minnesota Geological Survey. Based on those discussions, Excelsior concluded that prospects do exist in Minnesota for geologic formations that may be appropriate for sequestration. At present, the geological understanding of these formations is limited and further study is necessary to determine their suitability for carbon sequestration.

A formation in eastern Minnesota called the Midcontinent Rift holds the potential to be suitable for carbon sequestration and comes within 100 miles of both proposed plant sites. It contains significant formations of sedimentary rock that may have adequate porosity for carbon sequestration. At this time, it is not certain whether such formations exist at a suitable depth and with a sufficient degree of geological seal for carbon sequestration to be feasible.

The geological formations and reservoirs that Plains CO_2 Reduction Partnership and other regional initiatives identify as carbon sequestration sinks (and quantify capacity thereof) have been relatively well characterized geologically as part of previous oil and gas exploration activities. Such characterization is expensive and therefore is generally (but not strictly) obtainable because of the economic opportunities that accompany fossil fuel exploration. Because of the lack of oil and gas exploration in the area, the Midcontinent Rift in Minnesota has not been characterized to the degree of other identified and confirmed sinks. Excelsior is exploring ways to facilitate this research. However, until this occurs, the potential to sequester carbon in Minnesota is uncertain.

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3.5 WATER RESOURCES

Ready access to an abundant supply for water is an important consideration in siting power plants, as water is necessary for steam generation, cooling, and process water. The following sections describe the water resources (surface and groundwater) near the Mesaba Energy Project alternatives and the associated utility and transportation corridors.

3.5.1 West Range Site and Corridors

The following sections identify the prominent surface water features and describe the major drainage areas and watersheds associated with the West Range.

3.5.1.1 Surface Water Sources

The West Range Site lies in the northern region of the Upper Mississippi River Basin Watershed. Table 3.5-1 lists the major surface water bodies near the Mesaba Generating Station. Figure 3.5-1 illustrates the major drainage areas throughout the Mesaba Generating Station and associated utility and transportation corridors.

There are three primary watersheds within the vicinity of the West Range Site. The Prairie River watershed encompasses the northern portion of the project site. The southern portion of the Power Station lies in a sub-watershed that drains into the CMP. The CMP watershed does not have a surface hydrologic connection to the other watersheds since the CMP does not have a surface water outlet. The Swan River watershed is south of the CMP sub-watershed. Both the Prairie River and the Swan River drain to the Mississippi River.

There are a number of water features (natural lakes, water-filled mine pits, and rivers/streams) located in the area surrounding the proposed generating station. The primary natural lakes in the area include Dunning Lake, adjacent to the east edge proposed generating station property; Big Diamond Lake, to the southeast of the proposed plant; and **Little Diamond Lake and** Holman Lake, to the south. **As mining ceased in areas along the Iron Range, and associated dewatering operations ended, many of the pits filled with water, some to the point that they have connected with adjacent pits.** Specifically, these pits include the CMP and the HAMP Complex. Figure 3.5-2 provides a map of the locations of these water features near the proposed power station. **Because disused mine pits shown on figures in this EIS have been filling with surface water and groundwater, the areas within these pits shown as surface waters based on available geographic information system data may not represent the actual extent of surface waters currently in these pits.** Because the abandoned mine pits are being considered as sources of raw water for the power station, Table 3.5-2 lists the current capacity of each mine pit.

Table 3.5-1. Surface Water Bodies

Surface Water	Watershed	FEMA[1] Designated Floodplain	Public Water[2]	Special Water[3]	MPCA Designated Impaired Water[4]	Target TMDL Study[5]	Source of Impairment
Big Diamond Lake	Swan River		X				
Canisteo Mine Pit (CMP)	Swan River						
Dunning Lake	Prairie River		X				
Greenway Mine Pit	Prairie River						
Hill-Annex Mine Pit (HAMP)	Swan River						
Holman Lake (Hill Lake)	Swan River		X				
Lind Mine Pit (LMP)	Prairie River						
Little Diamond Lake	Swan River		X				
Lower Panasa Lake	Swan River		X		X	NO	Mercury FCA[6]
Mississippi River		X	X	X	X	NO	Turbidity, Low oxygen Mercury FCA[6]
Oxhide Creek	Swan River		X				
Oxhide Lake	Swan River		X		X	NO	Mercury FCA[6]
Prairie River	Mississippi River	X	X				
Snowball Creek	Swan River		X				
Swan River	Mississippi River	X	X		X	NO	Fecal coliform Low oxygen Mercury FCA[6]
Trout Creek	Swan River		X				
Trout Lake	Swan River		X	X	X	NO	Mercury FCA[6]
Twin Lakes	Swan River		X				
Upper Panasa Lake	Swan River		X		X	NO	Mercury FCA[6]
West Hill Mine Pit	Prairie River						

[1]Federal Emergency Management Agency (FEMA)
[2]MNDNR Designated Public Water
[3]MPCA Designated Special Water
[4]MPCA Designated Impaired Water, 2006 EPA Draft 303(d) list of impaired waters. No data does not necessarily mean that the water body is not impaired. It may be that the water body has either not been sampled or there are not enough data to make an impairment determination.
[5]Total Maximum Daily Load
[6]Fish Consumption Advisory
Source: Excelsior, 2006a

Figure 3.5-1. West Range Drainage Features

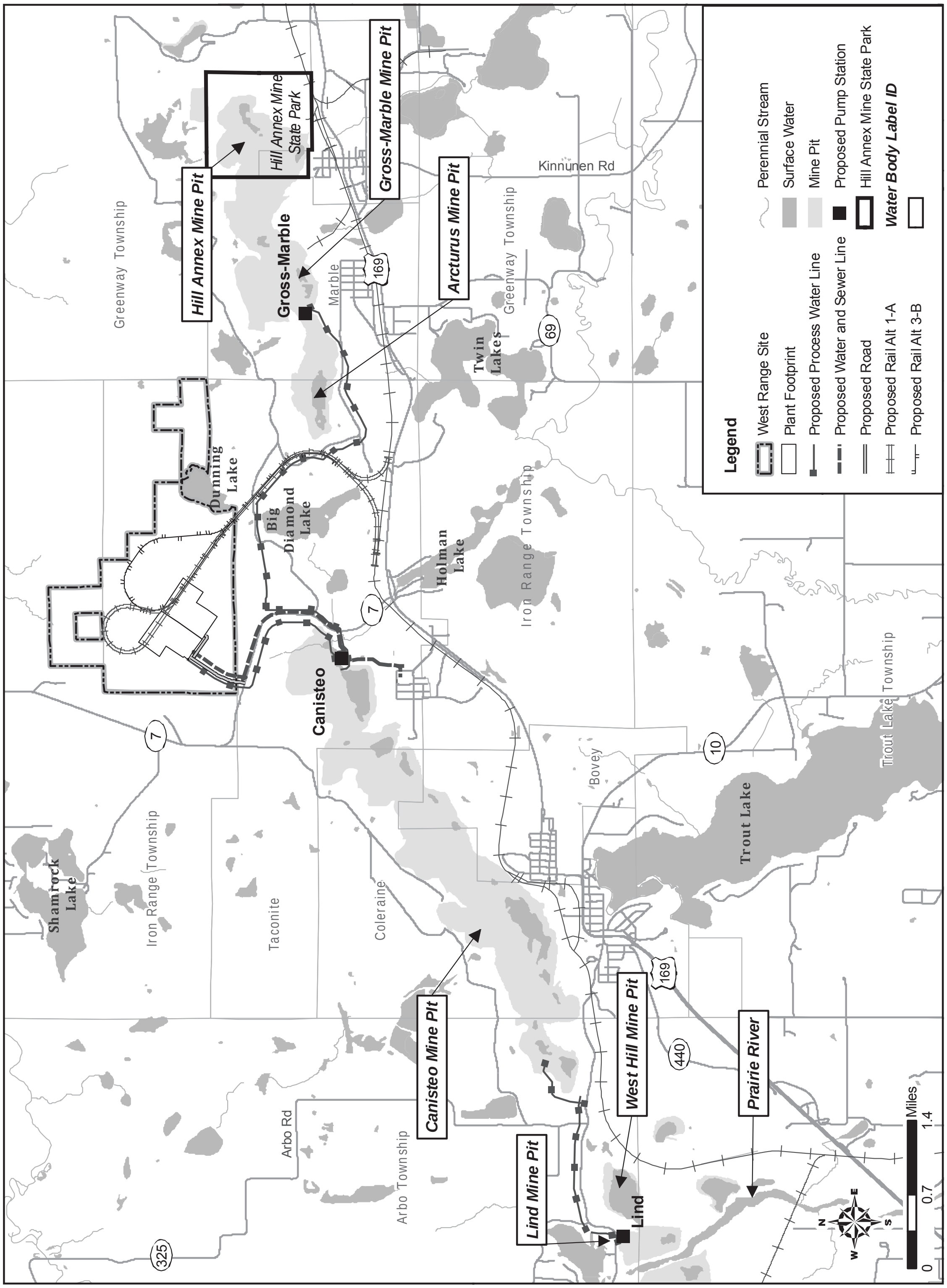

Figure 3.5-2. West Range Surface Waters

Table 3.5-2. Capacity of West Range Mine Pits (November 2005)

Water Source	Water Surface Elevation (feet)	Surface Area (acres)	Estimated Volume (acre-feet)
CMP	1,309	1,400	150,000
HAMP Complex			
Hill-Annex Mine Pit	1,249	216	20,600
Arcturus Mine Pit	1,269	105	4,490
Gross/Marble Mine Pit	1,249	141	11,100
LMP	1,265	82	8,310

Source: Excelsior, 2006a; Acronyms: CMP – Canisteo Mine Pit; HAMP – Hill-Annex Mine Pit; LMP – Lind Mine Pit.

In addition, there are a number of existing operations that use some of these water features as source water. Table 3.5-3 presents a summary of existing MNDNR water appropriation permits near the West Range Site.

Table 3.5-3. Existing Water Appropriation Permits for Surface Waters Near The West Range Site

Permitee	Resource	Permitted		Reported Pumping (Million Gallons)				
		GPM	MG/Y	2000	2001	2002	2003	2004
Jackson, Allen	Mississippi River	250	13	ND	ND	2.2	ND	ND
Schwartz Redi Mix Inc.	West Hill-Annex Pit	900	39	ND	ND	ND	ND	21.6
MNDNR	Hill-Annex Tailing Basin	4,500	500	ND	ND	ND	ND	70.3
MNDNR	Hill-Annex Mine	7,000	3,416	ND	ND	621.1	1,550.3	1,374
U of MN	Prairie River	500	7	ND	ND	ND	ND	ND
U of MN	Prairie River	1,000	60	6.7	17	18.1	25.6	20.1
U of MN	Prairie River	1,000	60	7.8	ND	0.4	23.4	26.5
Blandin Paper Co.	Mississippi River	30,000	7,000	7,985	7,041	6,350	6,429	6,088
Jackson, Allen	Mississippi River	265	4	2.8	ND	ND	2.5	ND
Swan Lake Country Club	Oxhide Creek	540	10	4.6	8.5	9.2	8.4	5.8
City of Coleraine	Trout Lake	400	41	37	19.7	19.7	12.1	11.9

ND – No Data
Source: Excelsior, 2006a

The following sections provide more detail about the primary water bodies that are being considered as raw water sources or receiving waters for discharges from the Mesaba Generating Station.

Canisteo Mine Pit Complex

The CMP Complex is made up of a number of abandoned mine pits. The CMP is situated northeast of the city of Grand Rapids and immediately north of the cities of Coleraine, Bovey, and Taconite. The entire mine pit complex is approximately 4.5 miles long and 0.5 miles wide and has a drainage area of approximately 4,536 acres. The pit complex has a maximum depth of approximately 300 feet and a surface area of almost 1,400 acres. The water surface elevation in the mine pit on November 1, 2005 was

1,308.75 feet mean sea level (msl), which corresponds to a surface area of 1,393 acres and a water volume of 149,500 acre-feet.

The CMP Complex currently does not have a surface outlet. Water enters the complex through surface water runoff and groundwater inflow. Outflow consists only of groundwater seepage and evaporation. The amount of surface and ground water that currently enters the mine pit is greater than the amount of water lost by seepage and evaporation, which results in a net inflow of water. The water surface elevation has continued to rise since pumping of the CMP ceased in September 1985.

The CMP Complex has been modeled with the WATBUD model, which is a water balance model developed by the MNDNR, used to evaluate and predict water inflows and outflows for surface water bodies. The MNDNR has also monitored the water surface elevation in the mine pit and monitoring wells since 1989, and used these data to calibrate the WATBUD model and develop stage-storage relationships for the pit.

Using the stage-storage data from 1989 to 1995, the CMP had a net average inflow of 3,164 gallons per minute. From 1995 to present, recharge rates range from 810 gallons per minute to 4,190 gallons per minute, with an average of 2,580 gallons per minute. The stage-storage data has also indicated that the net inflow decreases as the level of the water in the pit reaches 1,300 feet msl, which is the elevation of the bedrock surrounding the pit. Results of the most recent (2005) modeling effort indicate that the CMP Complex will overflow within the next 4.5 to 8.5 years.

The USGS also conducted a study of the groundwater flow between the CMP and the surrounding aquifers (Jones, 2002). This study modeled the groundwater flows over varying CMP water level elevations (from 1,300 to 1,324 feet msl) and estimated the net inflow of groundwater into the CMP ranged from 628 gallons per minute at the 1,300 feet msl to 40 gallons per minute at the 1,324 feet msl. The 1,324 feet msl is the level at which the CMP will begin to overflow. **Following publication of the Draft EIS, MNDNR announced its plans to construct a gravity outflow device from the CMP to the Prairie River that would allow the CMP to be maintained at an MNDNR-determined maximum water level (Scenic Range News Forum, 2009).**

Jones (2002) found that some groundwater outflow from the CMP did occur at the 1,300 feet msl. The outflow occurred in the area between the CMP and Trout Lake, which is also the location of the two groundwater wells used by the City of Coleraine **and the City of Bovey** as their source from drinking water. The modeling also indicated that the net outflow drops to zero at CMP water levels at or below 1,292 feet msl.

Hill-Annex Mine Pit Complex

The HAMP Complex consists of the Arcturus, Gross-Marble, Hill-Trumbull, and Hill-Annex Mine Pits. These mine pits are located immediately north of the cities of Marble and Calumet, and cover an area of over three miles from east to west. The GMMP, and HAMP Mine Pits were separated by large volumes of waste material (tailings and overburden) deposited during the mining operations. Following the cessation of mining, the water levels in the pits began to rise, and the GMMP became connected to the Hill-Trumbull/Hill-Annex when the water surface elevation reached approximately 1,215 feet msl. The water surface elevation in the Arcturus is higher than that of the other pits, and has not developed a permanent surface connection to other pits; however water currently overflows from the Arcturus into the GMMP. The stage in the GMMP and Hill-Trumbull/Hill-Annex pits were measured at 1,246.70 feet and Arcturus was measured at 1,268.51 feet on November 1, 2005 (Excelsior, 2006b).

Until 1979, mining operations kept the HAMP Complex completely dewatered. After that time, dewatering continued at several of the mine pits, while other pits began to fill with water after dewatering ceased. By 1981, all mining operations had ceased (Barr, 1987) and all the mine pits started filling with surface and groundwater. In 1988, the HAMP was established as a state park that offered tours of the mine pit features and facilities. The park, which is managed by the MNDNR, Division of Parks and

Recreation, does operate a dewatering pump in order to keep the water level below some of the unique features of the mine, but due to limited funding, the dewatering operations cannot be operated more than 5.5 months a year. As a result, the water level has risen above some of the mine features and facilities.

The current water level in the park allows the MNDNR to give boat tours of the pit during the summer months. There are mine features and several historic structures below the current water surface elevation that are viewed during these tours. According to the MNDNR's Draft Management Plan for the park, it is preferred to dewater the mine pit to an elevation between 100 and 150 feet below the current water surface elevation to expose historic structures and improve the interpretive quality of the site, as well as protect the historic structures on the pit rim. However, the dewatering of the pit to this level is currently cost-prohibitive under the State Park's annual budget.

Inflows into the HAMP Complex include seasonal precipitation, surface and ground water components. Discharges from the system include evaporation, seepage (ground water outflow), and dewatering. The water levels in the HAMP Complex fluctuate as a result of the seasonal variations in evaporation, runoff, and dewatering. The dewatering operations at the HAMP by the MNDNR occur from the end of May until October, and the pumping averages 6,200 gpm while in operation.

Pumping records for the HAMP have been kept since 1973, and MNDNR staff continue to report dewatering volumes on a monthly basis, however stage data were not collected on a regular basis. Using the pumping records from 1973 to1979, when the HAMP was in operation, the estimated recharge rate was determined to range from 3,230 to 4,030 gallons per minute. Since these recharge rates are based on keeping the pit empty, they are likely the maximum rates and should decrease as the water level in the pit rises.

For the Arcturus Mine Pit, given that the pit was completely dewatered on January 1, 1979, and was completely full by 1999, an average recharge rate of 2,150 gallons per minute was calculated.

Prairie River

The Prairie River lies within the Upper Mississippi River Basin Watershed and drains into the Mississippi River southeast of Grand Rapids and La Prairie. According to USGS data, the Prairie River watershed has an approximate drainage area of 360 square miles at the gauging station. The USGS also maintains a gauging station (gauge number 05212700) on the Prairie River, several miles upstream of its confluence with the Mississippi River. Prairie Lake lies on the Prairie River between the gauging station and the Mississippi River. Lake levels are controlled at an existing hydroelectric dam, located approximately 5 miles upstream of its confluence with the Mississippi River.

Flow data have also been collected at the gauging station from 1967 to 1983 and 2001 to present. Average monthly flow rates range from 50 to 200 cubic feet per second from August through March and range from 200 to 600 cubic feet per second range during the months of April, May, June, and July.

The Prairie River is being considered as a source of raw water for the West Range Power Station, and therefore, the raw water intake would be subject to the CWA rule 316(b) criteria regarding cooling water intake structures. The rule specifies that, for cooling water intake structures on fresh water rivers, the maximum amount of water that can be taken is "5 percent of the mean annual flow or 25 percent of the 7Q10[1], whichever is the lesser."

The mean annual flow in the Prairie River is 319 cubic feet per second, and five percent of that flow is equal to 16 cubic feet per second. The 7Q10 in the Prairie River was determined to be 22 cubic feet per second, and 25 percent of that flow is equal to 5.5 cubic feet per second. Since 25 percent of the 7Q10 is the smaller amount, the maximum amount of water that can be appropriated from the Prairie River at one

[1] The 7Q10 is the seven day low flow average with a 10-year recurrence interval.

time is 5.5 cubic feet per second (2,468 gallons per minute). Only these data collected by MP at the Prairie Lake Dam from 1998 to 2004 were used in the determination of the mean annual flow and the 7Q10, since there was not a full year of record for 1997 and 2005.

Trout Lake

Trout Lake does not currently receive any surface water discharges from the CMP. Since the CMP water surface continues to rise, surface outlets for the CMP to Trout Lake have been evaluated by the MNDNR and Barr Engineering, and Trout Lake has been evaluated as a potential receiving water. The available studies (Excelsior, 2006b; Barr, 2004) identify a number of potentially negative and positive outcomes as a result of the CMP Complex discharging to Trout Lake.

Upper Panasa Lake

Upper Panasa Lake currently receives water from the HAMP Complex dewatering operations. The amount of water that is discharged ultimately to Upper Panasa Lake from the HAMP Complex is shown in Table 3.5-3. The impacts on Upper Panasa Lake resulting from the discharge water from the HAMP have not been studied.

Greenway Mine Pit

There are very little data on the Greenway Mine Pit. The pit has filled with water and has an outlet pipe that discharges to the Prairie River. Short Elliot Hendrickson, Inc. (SEH) personnel measured the pipe size, flow depth, and flow velocity at the pipe outlet (Excelsior, 2006b) and determined the outflow from the Greenway Mine Pit was approximately 1 cubic foot per second (450 gallons per minute) at the time of the field investigations.

West Hill Mine Pit

There are very little data on the West Hill Pit. The pit has filled with water and has an outlet pipe that discharges to the LMP. SEH personnel (November 2, 2005) measured the pipe size, flow depth, and flow velocity at the pipe outlet and determined the outflow from the West Hill Mine Pit was approximately 3.5 cubic feet per second (1,570 gallons per minute) at that the time of the field investigations.

Lind Mine Pit

There are very little data on the LMP. The pit has filled with water and has an outlet pipe that discharges to the Prairie River. SEH personnel (November 2, 2005) measured the pipe size, flow depth, and flow velocity at the pipe outlet and determined the outflow from the LMP was approximately 4 cubic feet per second (1,800 gallons per minute) at that time. A majority of the outflow comes from the West Hill Mine Pit (3.5 gallons per minute).

Holman Lake

Holman Lake was not considered as a source for process water, but was considered as a potential receiving water for cooling tower blowdown discharges **(note that there would no direct discharges to Holman Lake with use of the enhanced ZLD system. See Section 4.5 for updated discussions on potential impact to surface waters)**. Holman Lake currently receives outflow from Little Diamond Lake, as well as surface water runoff. The lake previously received the dewatering discharge from the Canisteo Mine when the mine was operational. At that time, the water level in the lake was controlled by a concrete spillway. Currently, the water level is affected by a beaver dam built just upstream of the spillway. The lake is listed on MNDNR's Public Waters Inventory, but it is not currently designated for a particular water use classification, however there is a public swimming area on the eastern side of the lake. Some limited water quality information is available for Holman Lake.

3.5.1.2 Water Quality and Uses

The water needs of the Mesaba Generating Station at the West Range Site would be met by appropriating water out of the following nearby abandoned mine pits: the CMP, HAMP Complex, and the LMP. The Prairie River would also serve as a source of water supply and would be integrated into the mine pit water plan. Table 3.5-4 summarizes the current water quality of each water source. In general, the current concentration of each constituent is based on the median concentration of available qualified water quality analyses.

Table 3.5-4. Current Water Quality for West Range Water Bodies

Constituent*	Units*	Water Quality Data*				
		CMP	HAMP Complex	LMP	Prairie River	Holman Lake
Hardness	mg/L	308	229	n/a	n/a	n/a
Alkalinity	mg/L	180	163	178	76	186
Calcium	mg/L	55.3	59.1	73.2	50	50.2
Magnesium	mg/L	40.8	20.5	n/a	22	n/a
Iron	mg/L	<0.05	<0.05	n/a	n/a	0.75
Manganese	mg/L	<0.02	<0.02	n/a	n/a	0.04
Chloride	mg/L	5.15	5.2	4.9	1.3	8.4
Sulfate	mg/L	105	54.7	n/a	<5	10.1
TDS	mg/L	337	252	402	n/a	236
pH	mg/L	8.4	8.3	7.7	7.4	7.9
Aluminum	µg/L	<25	<25	n/a	91	n/a
Barium	µg/L	28.6	29.3	n/a	n/a	n/a
Cadmium	µg/L	<10	<10	n/a	n/a	n/a
Chromium (6+)	µg/L	<5	<5	n/a	n/a	n/a
Copper	µg/L	<10	<10	n/a	n/a	n/a
Fluoride	mg/L	n/a	n/a	n/a	n/a	n/a
Mercury	ng/L	0.9	0.9	0.8	0.59	<4.0
Nickel	µg/L	<5	<5	n/a	n/a	n/a
Selenium	µg/L	<2	<2	n/a	n/a	n/a
Sodium	mg/L	6.7	6.2	5.0	2.5	7.4
Specific Conductivity	µmhos/cm	476	418	n/a	171	n/a
Zinc (3)	µg/L	<10	<10	n/a	n/a	n/a
BOD	mg/L	<2	<2	n/a	n/a	n/a
COD	mg/L	<2	<2	n/a	n/a	n/a
TOC	mg/L	1.9	1.8	n/a	n/a	n/a
TSS	mg/L	2	<1	n/a	n/a	n/a
Ammonia (as N)	mg/L	<0.1	<0.1	0.1	0.018	<0.1
Phosphorus	mg/L	<0.1	<0.1	0.01	0.029	0.01

*n/a – no data available (not analyzed); mg/L – milligrams per liter; µg/L – micrograms per liter; ng/L – nanograms per liter; µmhos/cm – micromhos per centimeter; CMP – Canisteo Mine Pit; HAMP – Hill-Annex Mine Pit; LMP – Lind Mine Pit; TDS – total dissolved solids; BOD – biochemical oxygen demand; COD – chemical oxygen demand; TOC – total organic carbon; TSS – total suspended solids; N - nitrogen
Source: Excelsior, 2006b

The natural surface water bodies within the project area are used for recreational purposes such as fishing, boating, and swimming. The CMP and the Greenway Mine Pit also host recreational uses, while the West Hill Mine Pit and the LMP do not have any known recreational uses.

3.5.1.3 Groundwater

Groundwater Quality and Quantity

The primary aquifer at the site is shallow Quaternary drift comprised of water-bearing sand and gravel deposits. Regionally, these aquifers occur beneath till and in ice contact features on the flanks of end moraines. End moraines are the ridge-like accumulation of till deposits marking a standstill position of a past or present glacier. Buried bedrock valleys in the region create variable thicknesses of Quaternary deposits. North of Taconite, Minnesota, Quaternary deposits range from approximately 10 to 40 feet thick, whereas, near the cities of Coleraine and Bovey (east of the site), Quaternary deposits are approximately 130 feet thick (USDI, 1965). Based on the results of geotechnical borings at the West Range Site, the unconsolidated deposits at the proposed facility consist of varying amounts of till and coarse alluvium, approximately 10 to 35 feet thick combined.

The West Range Site is located at a potentiometric high, and groundwater recharge area for the shallow aquifer is due to the presence of the Giants Range Batholith (Excelsior, 2006b). A groundwater divide (where the groundwater flow direction is north and south with surface water features primarily influencing the direction of shallow flow) is present near the West Range Site. On the site itself, where the facility will be located, the groundwater flow direction of the shallow aquifer appears to be north and northwestward based on groundwater elevation data collected from the on-site groundwater monitoring wells. Ultimately, groundwater in the shallow aquifer at the site discharges to tributaries and surface water bodies that subsequently discharge into the Prairie River.

Immediately south of the West Range Site, a bedrock aquifer exists underlying the Quaternary deposits (Excelsior, 2006b). Bedrock in the area (Giants Range Batholith, Pokegama Quartzite, Biwabik Formation, and Virginia Formation) has very little primary porosity. However, secondary porosity in the form of fractures and leached zones has developed within Biwabik Formation allowing it to act as an aquifer (Excelsior, 2006b). Regional groundwater flow within the Biwabik Formation is south from the Giants Range Batholith toward the Swan River—a regional groundwater discharge feature. The groundwater flow direction of this bedrock aquifer specifically on the West Range site is interpreted to be south and southwest toward the CMP.

Mining activities in the area have influenced the natural groundwater system in the area (Excelsior, 2006b). Fractures and leached zones within the Biwabik Formation appear greatest near the mine pit complexes. The mine pits have been excavated below the water table and groundwater head of the Quaternary and bedrock aquifers. Since the cessation of mining activities**, including dewatering of the mine pits**, water levels in the mine pits have been increasing due to **continued inflow of surface water and groundwater** into the mined excavations. **However, the rate and direction of groundwater flow (i.e., into or out of a mine pit) depends on the hydraulic head difference between the surface water elevation in a mine pit and the adjacent aquifer. For example, the findings of a study conducted by USGS indicated that as the CMP's water level increased from 1,300 to 1,324 ft, its inflow rate decreased by about 0.4 cfs, while its outflow rate increased by about 0.85 cfs (Jones, 2002).**

Transmissivities and hydraulic conductivities of various shallow sand and gravel aquifers in the region have been estimated (Excelsior, 2006b). In studying the hydrogeology of the CMP area, the MNDNR and USGS installed 18 monitoring wells in the Quaternary drift aquifer(s) and performed pumping tests and hydraulic conductivity slug tests.

Average calculated transmissivities for sand and gravel aquifers ranged from 98 to 300 square feet per day. Average calculated hydraulic conductivities for the sand and gravel aquifers ranged from 2.2 to 68 feet per day (Excelsior, 2006b). Hydraulic conductivities for the four wells on the site ranged from 0.5 to

32.5 feet per day. Locally, well yields typically range from 300 to 500 gallons per minute for wells completed in the Quaternary drift deposits (Excelsior, 2006b), with yields up to 1,000 gallons per minute. The Biwabik Formation is a good source of groundwater for domestic use and a fair source of supply for municipal and industrial use (Excelsior, 2006b). While the local aquifers have sufficient capacity to serve local municipal and residential groundwater users, these aquifers do not appear to have sufficient capacity to provide enough groundwater for the process water needs of the Mesaba Generating Station (**10,000** gallons per minute peak requirements). Thus, a large number of wells would be required to pump enough water to meet the station's process water needs.

Although groundwater quantities and local aquifer capacities are limited (as far as being a source of process water supplies), it is feasible that one or more wells could be utilized to provide a potable water supply for the generating station. Several local public water supply wells are drilled into and utilize the Biwabik Formation.

Typically, groundwater quality in the region has moderate dissolved solids content, is moderately siliceous, is very hard, and contains high levels of iron and manganese frequently above the maximum recommended limits of 0.3 milligrams per liter for iron and 0.05 milligrams per liter for manganese (USDI 1965, Excelsior, 2006b). Sand, ice-contact sand and gravel, and buried outwash aquifers have adequate yield (5 gallons per minute or more) and suitable quality for domestic use (total dissolved solids less than 1000 milligrams per liter) (Excelsior, 2006b). Of these, only buried outwash aquifers have suitable yield (900 gallons per minute or more) and quality (total dissolved solids less than 500 milligrams per liter, iron content less than 0.3 milligrams per liter, and hardness less than 180 milligrams per liter) for municipal or industrial use (Excelsior, 2006b).

Groundwater Depth and Recharge Sources

The potentiometric surface of the shallow Quaternary aquifer at the area is approximately 1350 to 1400 feet msl (Excelsior, 2006b), approximately 10 to 60 feet below ground surface (bgs). Static groundwater elevations of the shallow aquifer(s) have been recorded by MNDNR in a series of monitoring wells in the area of the CMP, and from the period between January 2001 and April 2005, the groundwater elevations ranged from 1280 to 1382 feet msl.

Groundwater flow is influenced by mine pits in the area (USDI, 1965); a potentiometric gradient exists between the surface water in mine pit lakes and groundwater in surrounding areas directing flow towards the mine pit complexes (Excelsior, 2006b). During periods of mine operation, dewatering in the mine pits reduced the amount of lateral flow (north to south) through bedrock and Quaternary deposits, and decreased potential vertical recharge to the bedrock aquifer south of the mine pits (Excelsior, 2006b).

Municipal wells for the cities of Bovey, Calumet, Coleraine, Marble, and Taconite are located south of the local mine pits (CMP and HAMP Complex). Table 3.5-5 summarizes the static water elevations and historic pumping in these wells.

Table 3.5-5. Pumping Groundwater Elevations City Municipal Wells

Date		Water Elevation	Pumping Rate	Duration
		ft msl	gpm	hours
Marble 1				
1926	During mining operations	1150	300	-
1955		1164	350	-
1977		1105	248	2
1994	After mining operations ceased	1177	400	-
1999		1189	385	-
2000		1195	420	-
2001		1200	390	-

Table 3.5-5. Pumping Groundwater Elevations City Municipal Wells

Date		Water Elevation	Pumping Rate	Duration
		ft msl	gpm	hours
2002		1232	270	-
2003		1203	350	-
Marble 2				
1955	During mining operations	1199	385	14
1965		1198	340	-
1977		1103	300	25
1989	After mining operations ceased	1236	270	-
1994		1193	300	-
1999		1196	330	-
2000		1201	360	-
2001		1203	310	-
2002		1207	-	-
2003		1221	220	-
Bovey 1				
1953	During mining operations	1256	650	10
Coleraine 1				
1918	During mining operations	1258	500	
Coleraine 3				
1976	During mining operations	1243	1012	5
Taconite 1				
1991	After mining operations ceased	1112	218	12

Average annual recharge to groundwater is approximately 5.7 to 7.6 inches (Excelsior, 2006b). Groundwater recharge to the shallow sand and gravel aquifer(s) is derived from precipitation infiltration and interconnections with surface water bodies (including mine pits that have filled with water). Groundwater recharge to the underlying Biwabik Formation bedrock aquifer is largely by vertical infiltration through the Quaternary deposits where the formation is not overlain by other bedrock (USDI, 1965). Lateral groundwater recharge occurs as groundwater travels south from the Giants Range Batholith.

Usage and Availability

Other than the four groundwater monitoring wells recently constructed, no wells are currently located on the property. However, numerous wells are located on surrounding properties. There are 23 domestic wells, 11 monitoring wells, three "other use" wells, and two public supply non-community transient wells in the area. The domestic supply wells are concentrated along CR 7, US 169, and north of Big Diamond Lake. These domestic wells utilize the Quaternary sand and or gravel aquifers.

Wells are also located adjacent to the CMP and the HAMP Complex. The wells adjacent to the mine pits are used for:

- Community Supply (10)
- Dewatering (1)
- Domestic (19)
- Industrial (2)

- Monitoring (38)
- Municipal (2)
- Public Supply (2)
- Other (7)

Public water supply wells for the cities of Bovey, Calumet, Coleraine, Marble, and Taconite are constructed in Quaternary and Biwabik Formation aquifers. Wells for the cities of Bovey and Coleraine are completed in the same unit of ice-stratified Quaternary drift (USDI, 1965). The wells receive limited amounts of recharge through infiltration and receive some recharge from Trout Lake (USDI, 1965). According to the County Well Index and DNR State Water Use Database System of Water Appropriations Permits, the City of Bovey has one municipal well (Unique No. 228834). This well has a 16-inch diameter casing completed in sand and gravel Quaternary deposits. The static water elevation was 1,268 feet msl at the time of installation (1953). This groundwater level was recorded when the CMP was dewatered for mining activities. The City of Bovey is permitted to pump the well at a rate of 35.0 million gallons per year. The reported volume of groundwater pumped from this well in 2004 was 29.6 million gallons per year.

The City of Coleraine has two wells (Coleraine 1 and **4**: Unique Nos. 241430 and 110457, respectively). Coleraine 1 is completed at a depth of **121** feet within undivided Quaternary drift. Coleraine 1 had a static water level of 1,283 feet msl at the time of well installation (1918). Coleraine **4** is **120** feet deep. It is completed within sand, gravel, and boulder Quaternary deposits. Coleraine **4** had a static water level of 1267 feet msl at the time of well installation (1976). The City of Coleraine is permitted to pump 80 million gallons per year from both wells. The reported pumped volume in 2004 was 52.2 million gallons per year for **both wells**.

The cities of Marble, Calumet, and Taconite each have two public water supply wells. These six wells draw water from the Biwabik Formation bedrock aquifer. Marble 1 (Unique No. 228842) is **500** feet deep. The static water level was 1224 feet msl at the time of well installation (1926). Marble 2 (Unique No. 228846) had a static water level was 1258 feet msl at the time of installation (1955). The city of Marble is permitted to pump 49.0 million gallons per year from both of the wells. The reported volume of groundwater pumped for both wells in 2004 was 12.8 million gallons per year.

Calumet 2 (Unique No. 228839) was completed at a depth of **495** feet in the Virginia and Biwabik formations. The static water elevation was 1178 feet msl at the time of installation (1943). Calumet 3 (Unique No. 228838) is **500** feet deep. It is completed in the Virginia and Biwabik formations. The City of Calumet is permitted to pump 22.0 million gallons per year from both wells. The reported volume of groundwater pumped in 2004 was 5.8 million gallons per year for Calumet 2 and 6.2 million gallons per year for Calumet 3.

The City of Taconite Well 1 (Unique No. 241489) is 384 feet deep and is completed in the Biwabik Formation bedrock aquifer. The approximate static groundwater elevation in the well at the time it was constructed (19**2**6) was 1,273 feet msl. Taconite No. 2 (Unique No. 495997) is 394 feet deep and also utilizes the Biwabik Formation aquifer. Its static water elevation was 1290 feet msl at the time of installation (1991). The City of Taconite is permitted to pump 20 million gallons per year (total) from both wells. The reported volume of groundwater pumped in 2004 was 7.9 million gallons per year for Taconite 1 and 7.3 million gallons per year for Taconite 2.

The cities of Bovey, Calumet, Coleraine, Marble, and Taconite rely on groundwater resources for public water supplies. Each city has public water supply wells open to either the shallow sand and gravel aquifer (the cities of Bovey and Coleraine) or the Biwabik Formation bedrock aquifer (cities of Calumet, Marble, and Taconite). Due to the close proximity of these local public water supply wells to surface water bodies, a hydrologic connection may exist between the groundwater captured by the wells and local surface waters and mine pits. Due to the relatively high tritium concentrations detected by the Minnesota

Department of Health (MDH) in the groundwater pumped from some of these public water supply wells, the source water aquifers (Quaternary sand and gravel deposits and the Biwabik Formation) appear to recharge quickly (i.e., 50 years or less) and are therefore more sensitive to land surface activities and more vulnerable to potential contamination.

Permits

No groundwater use or withdrawal permits currently exist for the Mesaba Energy Project. As previously mentioned in Section 2.5.2.3, MNDNR Water Appropriation Permits for groundwater withdrawal/use have been issued to local municipalities for public water supply systems (the cities of Bovey, Calumet, Coleraine, Marble, and Taconite). Regionally, groundwater appropriation permits have also been issued to mining companies for dewatering and farms for agricultural purposes and irrigation.

Four well permits were obtained from the MDH for constructing the four groundwater monitoring wells installed on the West Range Site in July 2005. These permits will be reissued annually by the MDH to the facility as long as the wells are still necessary and utilized.

Should groundwater be used for a potable water supply for the facility, a well permit from the MDH will be required. If the amount of groundwater pumped from a well for potable water supplies exceeds 10,000 gallons per day or 1 million gallons per year, a Water Appropriation Permit will be required from the MNDNR.

During construction of Phase I and Phase II, dewatering may be necessary that will temporarily lower the shallow water table aquifer in small localized areas. If the dewatering is expected to exceed 10,000 gallons per day or 1 million gallons per year, a Water Appropriation Permit will be attained from the MNDNR.

Any necessary discharges from the facility will be properly managed in accordance with the NPDES permits issued for plant, and applicable state and local regulations to prevent degradation of source water aquifers used for public water supplies.

3.5.2 East Range Site and Corridors

The following sections identify the prominent surface water features and describe the major drainage areas and watersheds, land uses, soil classifications, and abandoned mine pits associated with the West Range.

3.5.2.1 Surface Water Sources

Major watersheds throughout the project area are shown in Figure 3.5-3. The drainage area boundaries shown on Figure 3.5-3 were delineated from the USGS maps of the area. This map, and therefore the drainage area boundaries, does not represent the altered hydrology in this area that has taken place due to mining activities in recent years. The East Range Site lies within the northwest region of the Lake Superior Watershed. The major surface water bodies near the project site are shown in Figure 3.5-4 and listed in Table 3.5-6. **Note that disused mine pits shown on figures in this EIS have been filling with surface water and groundwater. Therefore, the areas within these pits shown as surface waters based on available geographic information system data may not represent the actual extent of surface waters currently in these pits.**

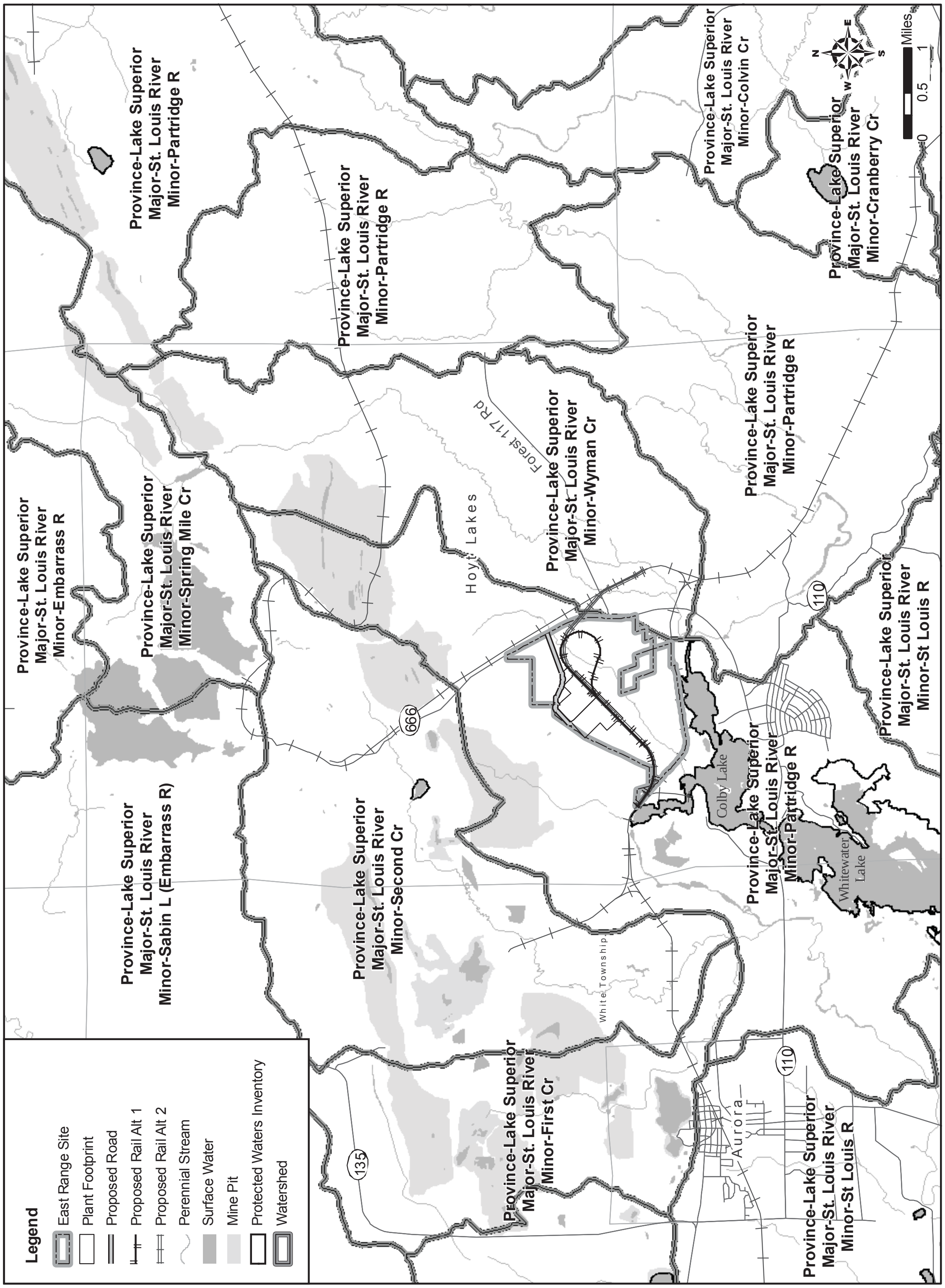

Figure 3.5-3. East Range Drainage Features

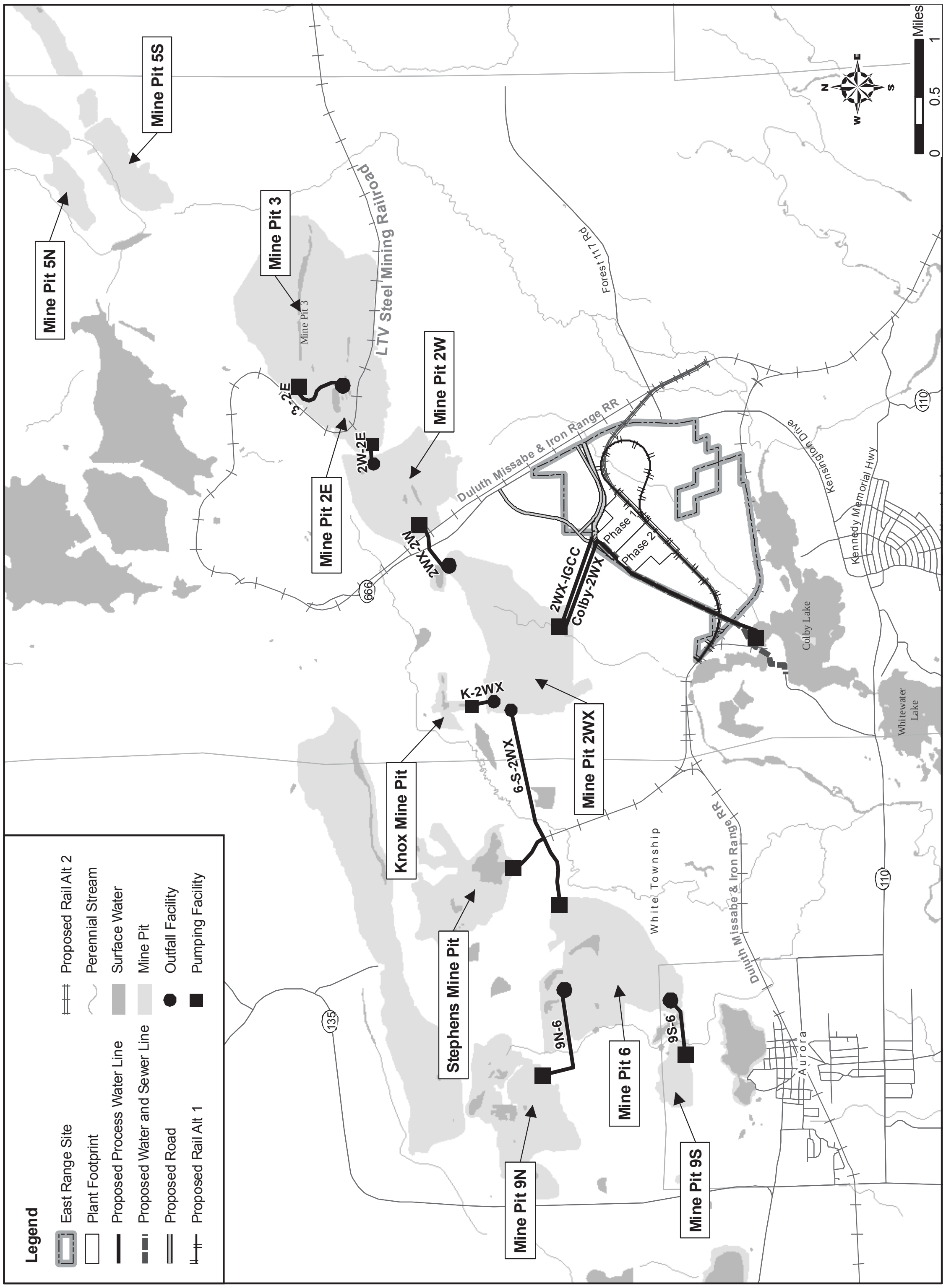

Figure 3.5-4. East Range Surface Waters

Table 3.5-6. East Range Surface Water Bodies

Surface Water	Watershed	FEMA[1] Designated Floodplain	Public Water[2]	Special Water[3]	Impaired Water[4]	Target TMDL Study[5]	Impairment
St. Louis River	Lake Superior	X	X		X	2011	Mercury FCA[6]
Partridge River	St. Louis River	X	X				
2WX Pit	**Partridge River**						
2E Pit	**Partridge River**						
3 Pit	Partridge River						
Wyman Creek	Partridge River		X	X			
5S Pit	Wyman Creek						
6 Pit							
Colby Lake	**Partridge River**		**X**		**X**	**2011**	**Mercury FCA[6]**
Whitewater Reservoir	Partridge River	X	X		X	2011	Mercury FCA[6]
First Creek	Partridge River	X	X				
St. James Mine	First Creek			X			
9S Pit	**First Creek**						
Donora Mine / 9N	**First Creek**						
1W / 1 Pit	First Creek						
Little Mesaba Lake	First Creek						
Second Creek	First Creek	X	X				
Stephens Creek	Second Creek						
Stephens Mine	**Second Creek**						
Knox Mine	**Second Creek**						
2W Pit	**Second Creek**						

[1] Federal Emergency Management Agency
[2] MNDNR Designated Public Water
[3] MPCA Designated Special Water
[4] MPCA Designated Impaired Water, 2006 EPA Draft 303(d) list of impaired waters
[5] Total Maximum Daily Load
[6] Fish Consumption Advisory
Surface Waters shown in bold were considered for either a raw water source or receiving waters for discharges.
Source: Excelsior, 2006a

Most surface water runoff eventually flows into Colby Lake or the Partridge River. Mining activities within this drainage area have significantly altered the regional hydrology. Changes to the hydrology in the watershed include removal of trees and soil, creation of mine pits and other depressions, and changes in topography.

There are a number of mine pits near the East Range Site (see Figure 3.5-4). In locations where mining activities have ceased, these mine pits are filling with water from both groundwater infiltration and surface water runoff. In 2004, the MNDNR completed a study that evaluated the water levels in several of the abandoned mine pits. Data was collected and modeled (using the WATBUD model) for pits

2E, 2W, 2WX, and 6, in order to predict when the pits would overflow and what the average and peak overflow rates would be. In addition, hydrologic changes to Colby Lake, Whitewater Reservoir, and St. James Pit were evaluated as part of the study. Pits 5N, 5S, 9N, and 9S were not included in the study, as they have reached their static water levels (i.e., they would not overflow like the pits near the West Range Site).

Though water levels in several of the pits may rise, unlike the Canisteo and Hill-Annex Mine Pits, there is no immediate need to control water levels in any of the pits on the East Range Site. Therefore, water supplies from any of the individual East Range pits can be pumped as necessary to meet demands of the generating station.

3.5.2.2 Water Quality and Uses

The current water surface elevation, water surface area and estimated water volume in the following mine pits affected by the Proposed Action are summarized in Table 3.5-7.

Table 3.5-7. Abandoned Mine Pit Water Sources

Water Source	Bottom Elevation[1] (ft)	Water Surface Elevation[2] (ft) (11/2005)	Surface Area[3] (acres) (11/2005)	Estimated Volume[3] (acre-ft) (11/2005)
2E	1,427	1,492.2	84	1,700
2W	1,282	1,413	183	13,430
2WX	1,331	1,405.4	322	8,880
6	1,276	1,426.6	207	18,850
3	1,522	1,586.7	ND	ND
5N	ND	ND	ND	ND
5S	ND	ND	ND	ND
9N / Donora	1,493	1,547.2	ND	ND
9S	1,396	1,475.2	ND	ND
Stephens	1,377	ND	ND	ND
Knox	1,362	ND	ND	ND

[1] Bottom elevations are based on blast maps and aerial contour mapping provided by Cliffs-Erie.
[2] Water surface elevations are based on field surveys provided by Cliffs-Erie.
[3] Surface area and estimated volumes were obtained from the MNDNR March, 2004 East Range Hydrology Report.
ND – No data
Source: Excelsior, 2006a

Lakes near the East Range Site are used primarily for recreational purposes, such as fishing, boating, and swimming. Most of the mine pits are located on property owned by mining interests and therefore have little public recreation activity. Cooling water for the Syl Laskin Power Plant comes from Colby Lake. Water from Whitewater Reservoir is used to augment water levels in Colby Lake when needed. Limited water quality information is available for the water sources for the East Range Site. Analytical data supplied by Excelsior Energy for two of the mine pits is presented in Table 3.5-8. The concentration of each constituent shown is based on the median concentration of available qualified water quality analyses.

Table 3.5-8. Water Quality Data for East Range Water Sources

Constituent*	Units*	Water Quality Data*	
		Mine Pit 2WX	Mine Pit 6
Hardness	mg/L	n/a	n/a
Alkalinity	mg/L	310	411
Calcium	mg/L	23.2	46.7
Magnesium	mg/L	73.5	253.5
Chloride	mg/L	17.1	10.6
Sulfate	mg/L	n/a	n/a
TDS	mg/L	449	1,585
pH	mg/L	8.5-8.6	7.7-8.6
Mercury	ng/L	0.9	0.65
Sodium	mg/L	28.7	51.5
Specific Conductivity	umhos/cm	711	1,678
TOC	mg/L	1.8	1.9
TSS	mg/L	<2	<3.3
Ammonia (as N)	mg/L	<0.1	<0.1
Phosphorus	mg/L	<0.1	<0.1

*n/a – no data available (not analyzed); mg/L – milligrams per liter; µg/L – micrograms per liter; ng/L – nanograms per liter; µmhos/cm – micromhos per centimeter; TOC – total organic carbon; TSS – total suspended solids; N – n nitrogen
Source: Excelsior, 2006b

3.5.2.3 Groundwater

Groundwater Quality and Quantity

The surface geology at the site consists of Quaternary outwash and brown silty till. The primary aquifer at the site is shallow outwash deposits comprised of fine to coarse-grained sand and gravel. The static water level in wells near the proposed site is approximately 10 to 40 feet bgs.

Underlying the Quaternary deposits at the site is argillite and greywacke of the Virginia Formation. The formation ranges in total thickness from 0 to 2,000 feet. Although the formation typically has a low yield, fractures in the top of the unit may be used for domestic or stock wells. The Virginia Formation is typically used in conjuncture with iron formation aquifers that contain larger water supplies (Excelsior, 2006b). North of the site, the Biwabik formation is upper most bedrock where the Virginia Formation is not present. Secondary porosity in the form of fractures and leached zones has developed within Biwabik Formation allowing it to act as an aquifer (Excelsior, 2006b). The total thickness of the Biwabik formation in the area ranges from 0 to 800 feet. Regional groundwater flow within bedrock in the area is south, from a bedrock high created by the Giants Range Batholith. The Duluth Complex is the upper most bedrock west of the site. Gabbro of the Duluth Complex is massive with low porosity and permeability and therefore a poor source of water. However, where fractures create secondary porosity, the formation may be used for domestic or stock supply wells.

Typically, groundwater quality in the region is of the calcium magnesium bicarbonate type (Excelsior, 2006b). In some areas water from the argillite, greywacke, and gabbro is sodium-softened. In other areas, water from these units is of sodium chloride type, deep wells may produce saline water. Water in the Biwabik formation is of good quality and suitable for use without softening or iron removal and is lower in total dissolved solids than other sources. Water from the Quaternary drift aquifer is also of the calcium magnesium bicarbonate type. Total dissolved solids from the Quaternary aquifer have been measured as high as 1,800 milligrams per liter. Surface contamination has impacted the surface aquifer in some locations, and where this has occurred, high nitrogen concentrations are the most common contaminant. As well as bedrock aquifers, water produced from drift may have high iron content (Excelsior, 2006b).

Groundwater Depth and Recharge Sources

The potentiometric surface of the shallow Quaternary aquifer at the area is approximately 1440 to 1490 feet msl, approximately 10 to 40 feet bgs (Excelsior, 2006b). The static water level for the bedrock aquifer is approximately 10 to 40 feet bgs. Groundwater flow at and near the site is likely southwest towards Colby Lake.

Usage and Availability

No wells are currently located on the East Range Site. However, numerous wells are located on surrounding properties and include 18 monitoring wells and one domestic well. The monitoring wells are owned by St. Louis County and MP; the domestic well is also owned by MP. The wells range in depth from 14 to 90 feet and are completed in unconsolidated deposits.

Permits

No groundwater use or withdrawal permits currently exist for Mesaba Phase I and Phase II. Water Appropriation Permits have been issued by the MNDNR to CE for wells located within Township 59 North, Range 14 West, Section 29. Three permits were issued for pumping up to 10,512 millions of gallons per year to the corporation; however, there is no reported pumping for the last four years. No unique well numbers are reported for the permits.

Available drawdown for the Quaternary drift aquifer is approximately 5 to 100 feet; the available drawdown for the bedrock aquifer is approximately 100 to 200 feet. Yields for wells completed in the Quaternary drift reach 10 gallons per minute for domestic wells and 1400 gallons per minute for public supply wells.

3.6 FLOODPLAINS

This section discusses the existing floodplain conditions for the affected areas of the two site alternatives. Width, depth, and velocity of streams and rivers vary based on their position within the watershed. Waterways in the upper portion of the watershed generally can be characterized as first order steams lacking an active floodplain and can have varying water depths. As a stream migrates towards base level, the stream order typically increases in proportion to the size of the watershed and result in the development of a noticeable floodplain and potential flooding.

Since flooding events can be very costly natural disasters, the Federal Emergency Management Agency (FEMA), through the National Flood Insurance Program, enables property owners to purchase insurance protection against losses from flooding. The prerequisite for eligibility in the National Flood Insurance Program is that the potentially affected community must adopt and enforce a floodplain management ordinance to reduce future flood risks, particularly with respect to new construction. Therefore, the FEMA Flood Insurance Study floodway maps were used to determine locations of potential flood hazards associated with the Proposed Action.

3.6.1 Local Hydrology Features

3.6.1.1 West Range Site

The West Range Site is in the Upper Mississippi River Basin Watershed. Local watersheds consist of the Prairie River and Swan River sub-watersheds. Both the Prairie River (to the north and west of the site) and the Swan River (to the south) are tributaries to the Mississippi River. The project area also contains numerous small streams and wetland areas that drain into tributaries of the Mississippi River.

3.6.1.2 East Range Site

The East Range Site lies in the St. Louis River Watershed, located in the northwest quadrant of the Lake Superior Watershed. The Partridge River, to the south and east of the site, and the Embarrass River (to the west of the site) join with the St. Louis River, which ultimately drains into Lake Superior. The site also contains many small streams, natural and man-made lakes, and wetland areas that drain into local waterways.

3.6.2 Flood Hazard Areas

Floodplain management activities of the National Flood Insurance Program include the development of Flood Insurance Rate Maps (FIRMs) for flood insurance rating purposes. A FIRM is a map that outlines flood risk zones within communities for insurance purposes. FIRMs are issued, published, and distributed by FEMA to a wide range of users including: private citizens, community officials, insurance agents and brokers, lending institutions, and other Federal agencies. A FIRM is usually issued following a Flood Insurance Study prepared by FEMA that summarizes the analysis of flood hazards within the subject community.

Flood Insurance Studies include detailed engineering studies to map predicted flood elevations at specified flood recurrence intervals. Generally, Flood Insurance Studies are concerned with peak discharges in streams and rivers for the 100- and 500-year storm events and includes engineering analyses of flood elevations for each flood recurrence interval. Based on the results of the engineering analyses flood risk zones are assigned for insurance purposes. The 100-year floodplain is defined as areas that have a 1.0 percent annual chance of flooding. The 500-year floodplain is defined as areas that have a 0.2 percent annual chance of flooding.

FEMA has adopted a maximum allowable increase of water surface elevation of 1.0 foot for a 1.0 percent annual chance (100-year recurrence interval) flood event as the national standard for floodplain management purposes. However, several states and municipalities have adopted more stringent criteria with a less than 1.0-foot allowable increase of water surface elevations.

3.6.2.1 West Range Site Floodplains

The City of Taconite (FEMA Community Number 270209) and Itasca County (FEMA Community Number FM270200, Panels 0675A, 0700A, and 0800A) are the only areas within the vicinity of the site that have published FEMA FIRM panels. The Cities of Coleraine, Bovey, Marble, and Calumet are unmapped; therefore, FEMA does not have defined flood hazard zones within those communities.

According the FIRM panels, the 100-year floodplains near the West Range Site are found along the major rivers, including the Mississippi, Prairie, and Swan Rivers. The floodplains along these rivers are generally about 1,500 feet wide, but extend to almost 1 mile wide in some areas. The exception to this are two large floodplains that are more than 10 square miles in size; one located on the Prairie River at Prairie Lake; and the other on the Swan River just north of its confluence with the Mississippi River. The nearest identified 100-year floodplain is approximately 1 mile northwest of the West Range Site, along the Prairie River. These floodplains are shown in Figure 3.6-1.

The only 500-year floodplains found in the area are located in Grand Rapids, along the Mississippi River.

3.6.2.2 East Range Site Floodplains

Table 3.6-1 describes the communities and corresponding FIRM panels near the East Range Site.

Table 3.6-1. Communities with Potentially Affected Floodplains near the East Range Site

Community	FEMA Community Number	FIRM Panel
St. Louis County	27137	N/A
City of Biwabik	270418	No Map
City of Eveleth	270422	Refer to St. Louis County* 950
City of Hoyt Lakes	270575	No Map
City of Iron Junction	270580	0001
City of Mountain Iron	270424	0002
City of Virginia	270426	No Map
St. Louis County	270416	825, 925, 950, 975, 1050

The City of Hoyt Lakes and the City of Virginia do not have published FEMA FIRM panels; therefore, there are no FEMA-defined floodplains within the jurisdictional boundaries of either of these two cities. Most of the 100-year floodplains in this area are along the St. Louis, Partridge, and Embarrass Rivers, as shown in Figure 3.6-2. The nearest identified 100-year floodplain is roughly 1 mile south-southwest of the East Range Site, along the Partridge River. There are no 500-year floodplains depicted on the FEMA maps in the area that would be affected by the East Range Site.

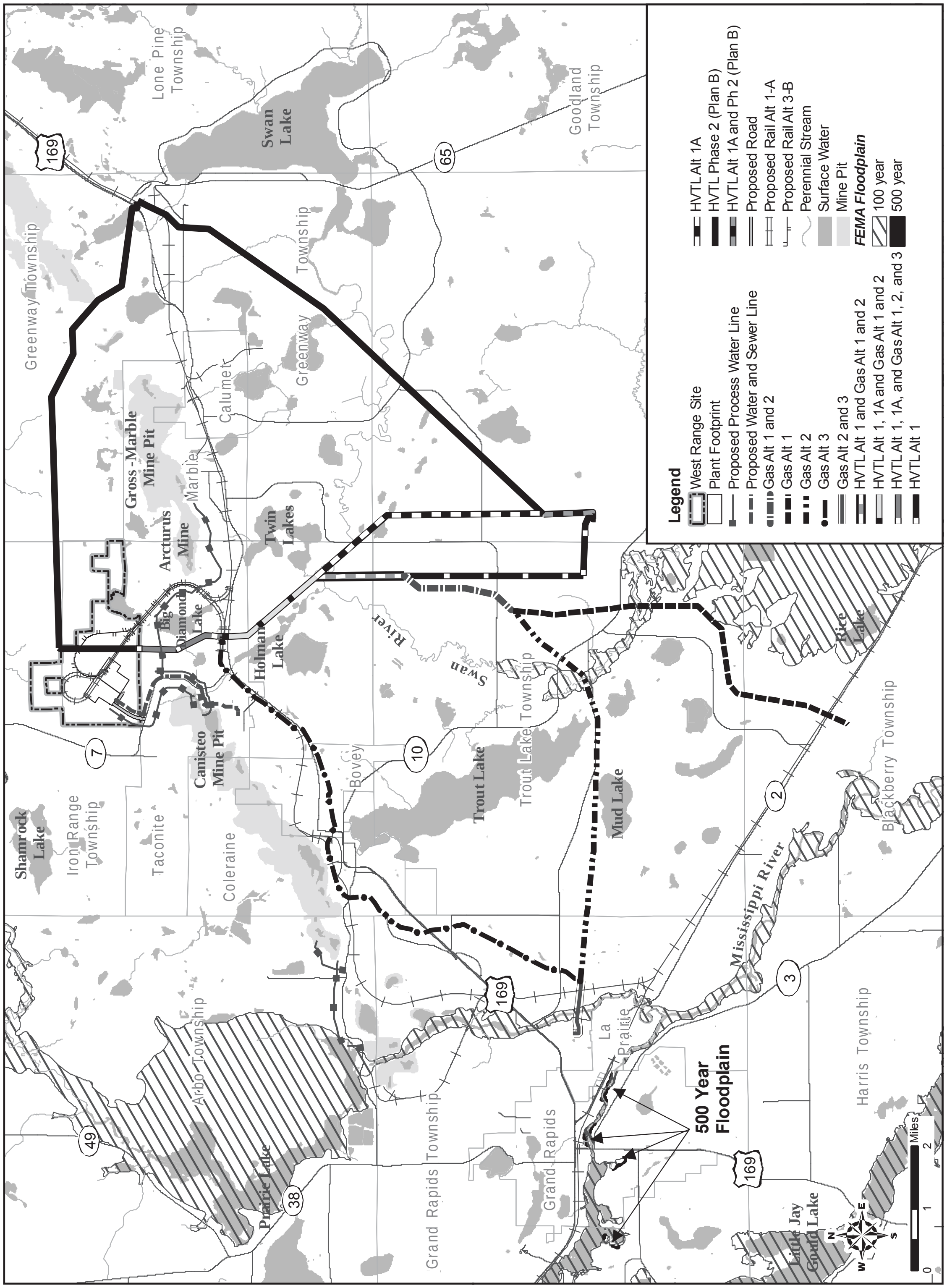

Figure 3.6-1. West Range Corridor FEMA Floodplains

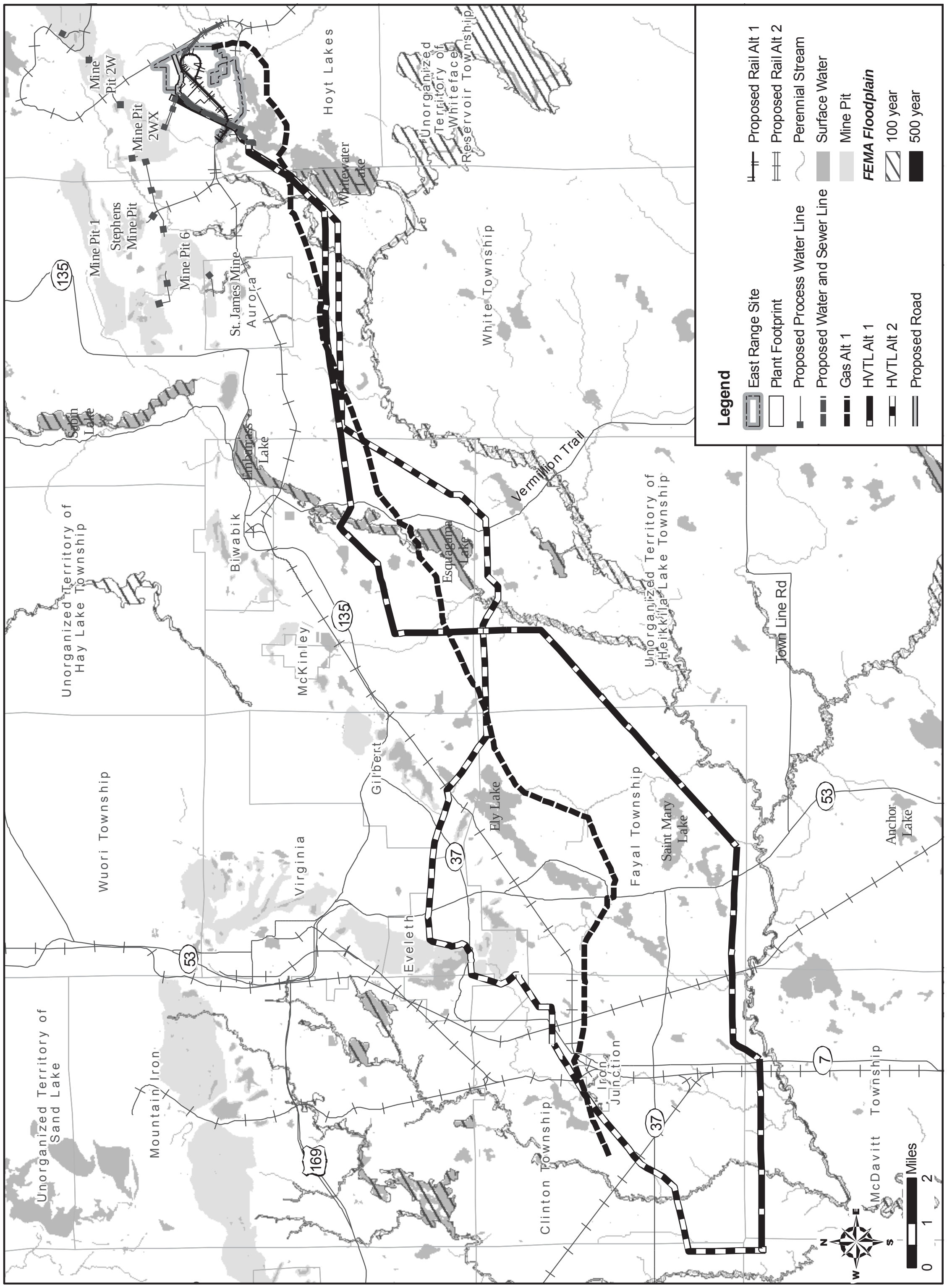

Figure 3.6-2. East Range Corridor and FEMA Floodplains

3.7 WETLANDS

3.7.1 Introduction

Wetlands are defined under the CWA as follows:

> *Those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas.*

Wetlands have unique characteristics that set them apart from other ecosystems. These unique characteristics include a substrate that is saturated or inundated with water for part of the growing season, soils that contain little or no oxygen, and plants adapted to wet or seasonally saturated conditions. The variety of wetland types found in the region result from differences in topography, soils, climate, water chemistry, hydrology, and other factors including human disturbance. Wetlands serve many functions, including the storage and slow release of surface water, rain, snowmelt, and seasonal floodwaters to surface waters. Additionally, wetlands provide wildlife habitat, sediment stabilization/retention functions, and perform an important role in the nitrogen cycle. They also help to maintain stream flow during dry periods, and provide groundwater recharge functions. Wetlands are among the most productive ecosystems in the world, comparable to rain forests and coral reefs. Many species of wildlife, including a large percentage of threatened and endangered species, depend on wetlands for their survival. Wetlands are important for their scientific and educational opportunities and can provide open space for recreation where public access is available.

Wetlands are an important with respect to climate change. Wetlands act as significant carbon sinks and so the destruction of wetlands will release carbon dioxide, a greenhouse gas, while wetland restoration and creation will increase the sequestering of carbon. In addition, wetlands provide a physical buffering to increasing frequency of storms, changing rainfall patterns, rising sea-levels and sea surface temperatures.

3.7.2 Regulatory Framework

Wetlands in the region are regulated by several regulatory agencies, including the USACE, EPA, the Minnesota Board of Water and Soil Resources, and the MNDNR. **Under Section 404 of the CWA, a USACE permit is required for the discharge of dredged or fill material into waters of the U.S. The USACE also has jurisdiction over navigable waters under the Rivers and Harbors Act of 1899 (33 U.S.C. Part 403). Under Section 401 of the CWA, the state is responsible for determining if the proposal will comply with state water quality standards and requirements for wetlands mitigation. The MPCA is the agency in Minnesota responsible for this certification (Minnesota Rules Chapter 7050). Furthermore, once the USACE receives a Section 404 application a copy is forwarded to the MPCA for initiating the State's Section 401 certification process. All special conditions placed on the project during the MPCA Section 401 certification process will become enforceable requirements of the USACE Section 404 Permit.**

In addition, the Minnesota Wetland Conservation Act (WCA) regulates state waters and wetlands (Minnesota Rules Chapter 8420), while the Itasca County Soil and Water Conservation District **(West Range Site)**, and St. Louis County **(East Range Site)** administer the WCA locally. Other state wetland regulations include designated Protected Waters and Protected Waters Wetlands regulated by the MNDNR (Minnesota Rules 6115.0010 to 6115.0810). The Ordinary High Water Level, as established by the MNDNR, of Protected Waters Wetlands defines the upper extent of jurisdiction by the MNDNR on these protected habitats. Development-related projects in Minnesota involving wetland impacts may require wetland encroachment permits or approvals from the above-listed regulatory agencies.

Utility ROWs crossing water bodies listed as protected waters or wetlands by the MNDNR Protected Waters Inventory (PWI) require Licenses for Utility Crossings of Public Lands and Waters under Minnesota Statutes 84.415 and subsequent Minnesota Rules Chapter 6135. The MNDNR Division of Land and Minerals is the administrative agency that issues 25- and 50-year licenses, which may be renewed at the end of the licensing period if both parties (i.e., the project applicant and the MNDNR) wish to renew these licenses. The MNDNR Commissioner establishes the renewal fee and time period of the renewed license(s).

[Text in the Draft EIS pertaining to isolated wetlands has been removed at this point per request of USACE.]

For regulatory purposes, the types of wetlands that may be impacted by a project will dictate how the wetland is regulated and subsequently what type of mitigation would be required for impacts to the wetland. For example, impacts to undisturbed tamarack bogs may have more stringent regulatory requirements than disturbed wetlands in urban settings. The MNDNR uses the **report: *Wetland Plants and Plant Communities of Minnesota and Wisconsin* (Eggers and Reed, 1997). Wetlands were also characterized using the** USFWS Circular 39 *Wetlands of the United States* (Shaw and Fredine, 1956) **and** USFWS publication *Classification of Deepwater Habitats of the United States* (Cowardin et al., 1979) **as described below**. **The majority of wetlands identified at each alternative site are regulated by USACE, because they have a connection to interstate commerce (meaning that a wetland/water body crosses a state boundary or boundary of a Federally recognized tribal reservation and that the wetland/water body was used in the past, is currently used, or may be used in the future for commerce). However, some wetlands appear to be isolated and, therefore, not regulated by USACE. [A sentence in the Draft EIS pertaining to isolated wetlands has been removed at this point per request of USACE.]**

3.7.3 Wetland Classification Systems

USFWS Circular 39 *Wetlands of the United States* (Shaw and Fredine, 1956) is a wetland classification inventory developed by the USFWS, which was initiated due to the steady decline of wetland habitats available to wildlife. The purpose of the Circular 39 wetland inventory is to identify the correlation between wetlands and wildlife, and identify areas susceptible to habitat loss from activities such as draining, filling, or otherwise human-related alteration of water resource habitats. Aerial photographs, USGS topographic maps, charts of the U.S. Coast and Geodetic Survey, Federal and state agency mapping, soil maps, and county highway maps were used to provide information identifying the locations of wetlands for the inventory (Shaw and Fredine, 1956).

The USFWS inventory identified 20 types of wetland habitats used by wildlife, which primarily focused on waterfowl habitat. Wetland habitats identified by Circular 39 were grouped into four categories: 1) Inland Fresh Areas (Types 1-8); 2) Inland Saline Areas (Types 9-11); 3) Coastal Fresh Areas (Types 12-14); and, Coastal Saline Areas (Types 15-20). Inland Fresh Areas are the only wetland group occurring in Minnesota. There are eight wetland types associated with the Inland Fresh Area group.

As stated in the Draft EIS, the USACE St. Paul District requested that wetlands be characterized by community type using *Wetland Plants and Plant Communities of Minnesota and Wisconsin* (Eggers and Reed, 1997). That document was produced for the primary purpose of assisting USACE personnel working with the regulatory program under Section 404 of the CWA and Section 10 of the Rivers and Harbors Act of 1899. The guide specifically addresses wetland plants and plant communities of Minnesota and Wisconsin and is organized by wetland plant community. In general, the wetland plant communities are organized according to water permanence and depth, and degree of soil saturation. Thus, the guide progresses from deepwater wetlands (i. Shallow, Open Water Communities) to temporary water-holding wetlands (viii. Seasonally Flooded Basins). Photographs and descriptions are provided for each of the 15 wetland

plant communities, along with representative plant species of each. Interested readers may view the document online at http://www.npwrc.usgs.gov/resource/plants/mnplant/intro.htm.

A comparison of wetland classifications under Eggers and Reed, Cowardin et al., and Shaw and Fredine is presented in Table 3.7-1, which has been revised from the table included in the Draft EIS.

Table 3.7-1. Comparison of Wetland Classification Systems in Minnesota

Wetland Plant Community Types (Eggers and Reed, 1997)	Classification of Wetlands and Deep Water Habitats of the United States (Cowardin et al. 1979)	Fish and Wildlife Service Circular 39 (Shaw and Fredine 1971)
Shallow, Open Water	Palustrine or lacustrine, littoral; aquatic bed; submergent, floating, and floating-leaved	Type 5: Inland open fresh water
Deep Marsh	Palustrine or lacustrine, littoral; aquatic bed; submergent, floating, and floating-leaved; and emergent; persistent and nonpersistent	Type 4: Inland deep fresh marsh
Shallow Marsh	Palustrine; emergent; persistent and nonpersistent	Type 3: Inland shallow fresh marsh
Sedge Meadow	Palustrine; emergent; narrow-leaved persistent	Type 2: Inland fresh meadow
Fresh (Wet) Meadow	Palustrine; emergent; broad- and narrow-leaved persistent	Type 1: Seasonally flooded basin or flat; Type 2: Inland fresh meadow
Wet to Wet-Mesic Prairie	Palustrine; emergent; broad- and narrow-leaved persistent	Type 1: Seasonally flooded basin or flat; Type 2: Inland fresh meadow
Calcareous Fen	Palustrine; emergent; narrow-leaved persistent; and scrub/shrub, broad leaved deciduous	Type 2: Inland fresh meadow
Open Bog	Palustrine; moss/lichen; and scrub/shrub; broad-leaved evergreen	Type 8: Bog
Coniferous Bog	Palustrine; forested: needle-leaved evergreen and deciduous	Type 8: Bog
Shrub - Carr	Palustrine; scrub/shrub; broad-leaved deciduous	Type 6: Shrub swamp
Alder Thicket	Palustrine; scrub/shrub; broad-leaved deciduous	Type 6: Shrub swamp
Hardwood Swamp	Palustrine; forested; broad-leaved deciduous	Type 7: Wooded swamp
Coniferous Swamp	Palustrine; forested; needle-leaved deciduous and evergreen	Type 7: Wooded swamp
Floodplain Forest	Palustrine; forested; broad-leaved deciduous	Type 1: Seasonally flooded basin or flat
Seasonally Flooded Basin	Palustrine; flat; emergent; persistent and non-persistent	Type 1: Seasonally flooded basin or flat

3.7.4 Wetland Identification and Mapping Methodology

Wetlands were identified and delineated at the West Range Site, the East Range Site, and the associated utility and transportation corridors. Identification of potential wetlands was completed in **four** successive stages: (1) **off-site assessment,** (2) on-site screening, (3) field delineation, **and (4) refined off-site assessment**. Field investigations for the presence of wetlands could not be conducted in areas where access to private land was not granted. These areas consist of the majority of the utility and transportation corridors. Therefore, only a desktop review for approximating the potential presence and extent of wetlands was conducted in areas with restricted access.

3.7.4.1 Off-Site Assessment

[Text in the Draft EIS has been replaced at this point with the following discussion]

Off-site assessment was conducted first by review of available documentation to identify potential wetland locations, wetland type and conditions, and to engage in preliminary planning and siting of facilities. Several resources were used in the off-site assessment including:

- **USFWS National Wetlands Inventory (NWI),**
- **USGS topographic maps,**
- **MNDNR PWI,**
- **Itasca County Soil Survey and St. Louis County preliminary soil survey data, and**
- **Farm Service Agency Aerial photographs (2003).**

The above-mentioned resources were used to create a preliminary map of potential wetland habitats, including NWI boundaries where available, overlaid on aerial photography using GIS. The preliminary data was then used for early site planning and for on-site screening of wetland locations throughout the property.

The off-site assessments were also utilized to identify wetland locations, types, and estimates of wetland impacts for the areas of the transportation and utility corridors that were not accessible during the field wetland delineations.

3.7.4.2 On-Site Screening

The on-site investigations consisted of a preliminary wetland field reconnaissance to verify the location, and extent of potential water resources identified during the desktop review. The wetland reconnaissance was performed in early June 2005 at the West Range Site and in late summer 2004 at the East Range Site.

3.7.4.3 Field Delineation

The majority of the West Range Site was delineated **between June and September** 2005 (Figures **3.7-1A and 3.7-1B**). **Additional field delineation was performed in September 2008 in the southwestern-most corner of the West Range Site. The southwestern corner of the site and that area south to Highway 7 were delineated to confirm the location of wetland habitat in the area of a potential plant access road.** Potential wetlands were delineated at the East Range Site in October 2004 and August 2005 (Figures **3.7-2A and 3.7-2B**). Sections 3.7.5 and 3.7.6 describe the results of these delineations. Section 4.7 describes the locations of specific wetlands that may be impacted by proposed project features. **Note that disused mine pits shown on these figures have been filling with surface water and groundwater. Therefore, the areas within these pits shown as "lakes" based on available geographic information system data may not represent the actual extent of surface waters currently in these pits. Also, these mine pits are not "lakes" by MNDNR classification.**

The field investigations identified areas meeting wetland criteria as defined in the USACE Wetland Delineation Manual (USACE, 1987), herein referred to as the "1987 Manual." **Determination of the wetland/upland boundary was accomplished using the three-parameter approach (hydrophytic vegetation, hydric soils, and wetland hydrology) as outlined in the 1987 manual. [Per request of USACE the preceding sentence replaces text in the Draft EIS pertaining to wetland delineation.]**

The Routine On-site Determination Methodology described in the 1987 Manual was applied during the wetland delineation effort. Field notes were taken at representative points within each wetland to characterize the aquatic resource habitat. Collected data were transcribed on to the wetland data sheets, highlighting plant species, hydrologic conditions, and a description of hydric soil characteristics. The boundary of each wetland was delineated with a surveyor's tape or wire stakes labeled "Wetland Boundary," and marked with a sequential alphanumeric nomenclature. The wetland boundaries were then recorded with a Trimble Pro XR or XRS Global Positioning System (GPS). The collected GPS data were processed and incorporated into project plans and GIS.

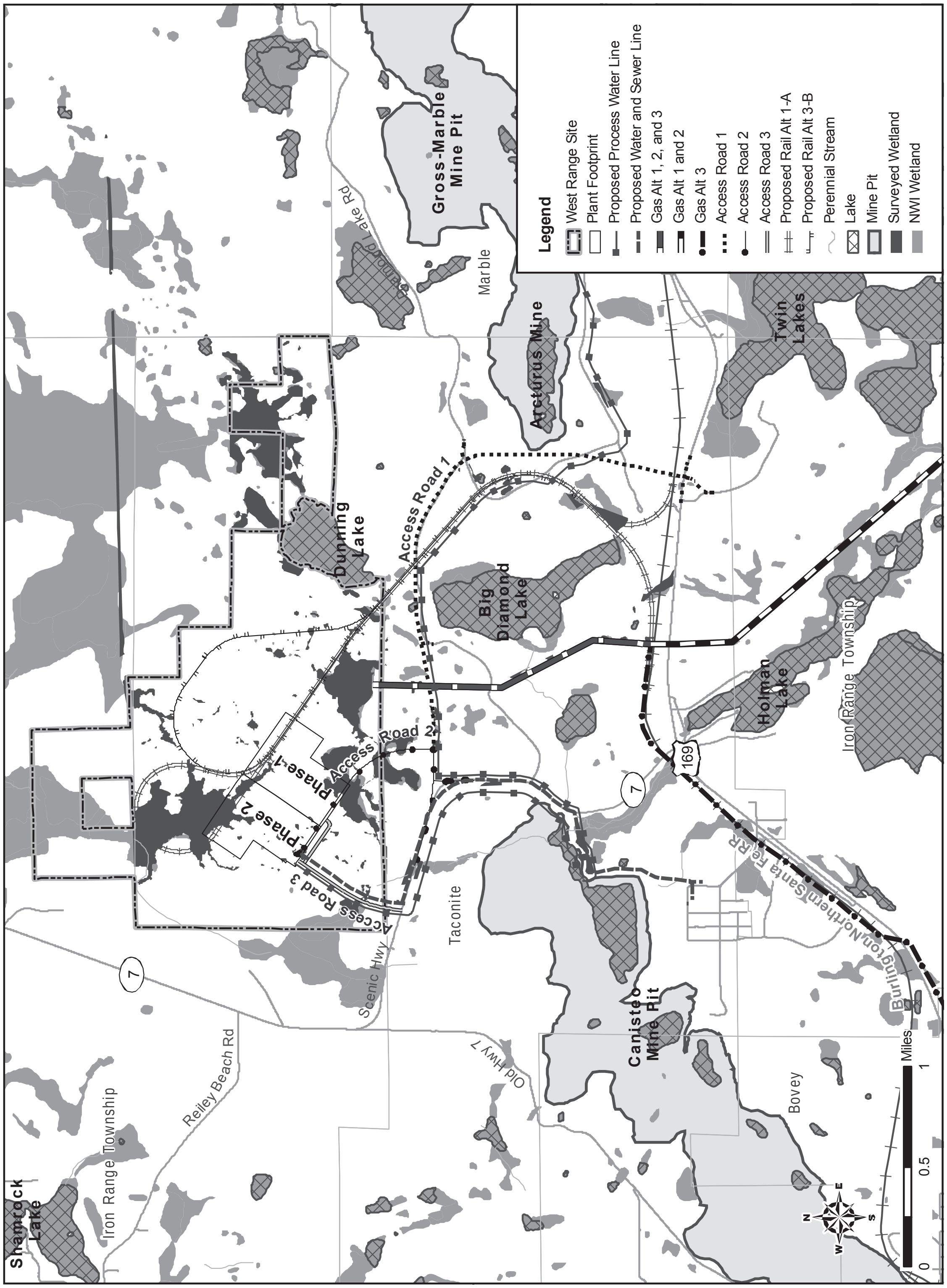

Figure 3.7-1A. Wetlands at West Range Site

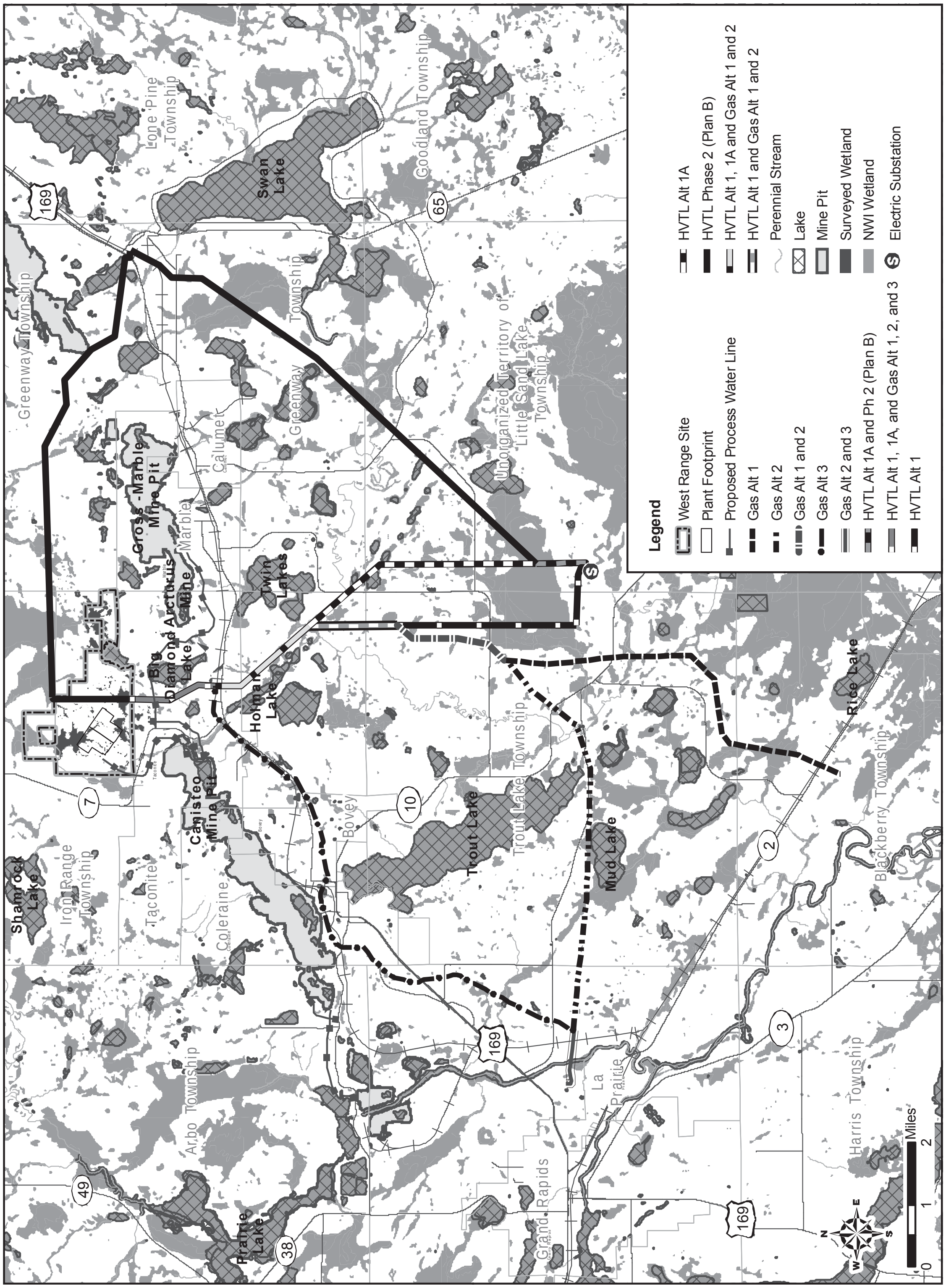

Figure 3.7-1B. Wetlands along West Range Corridors

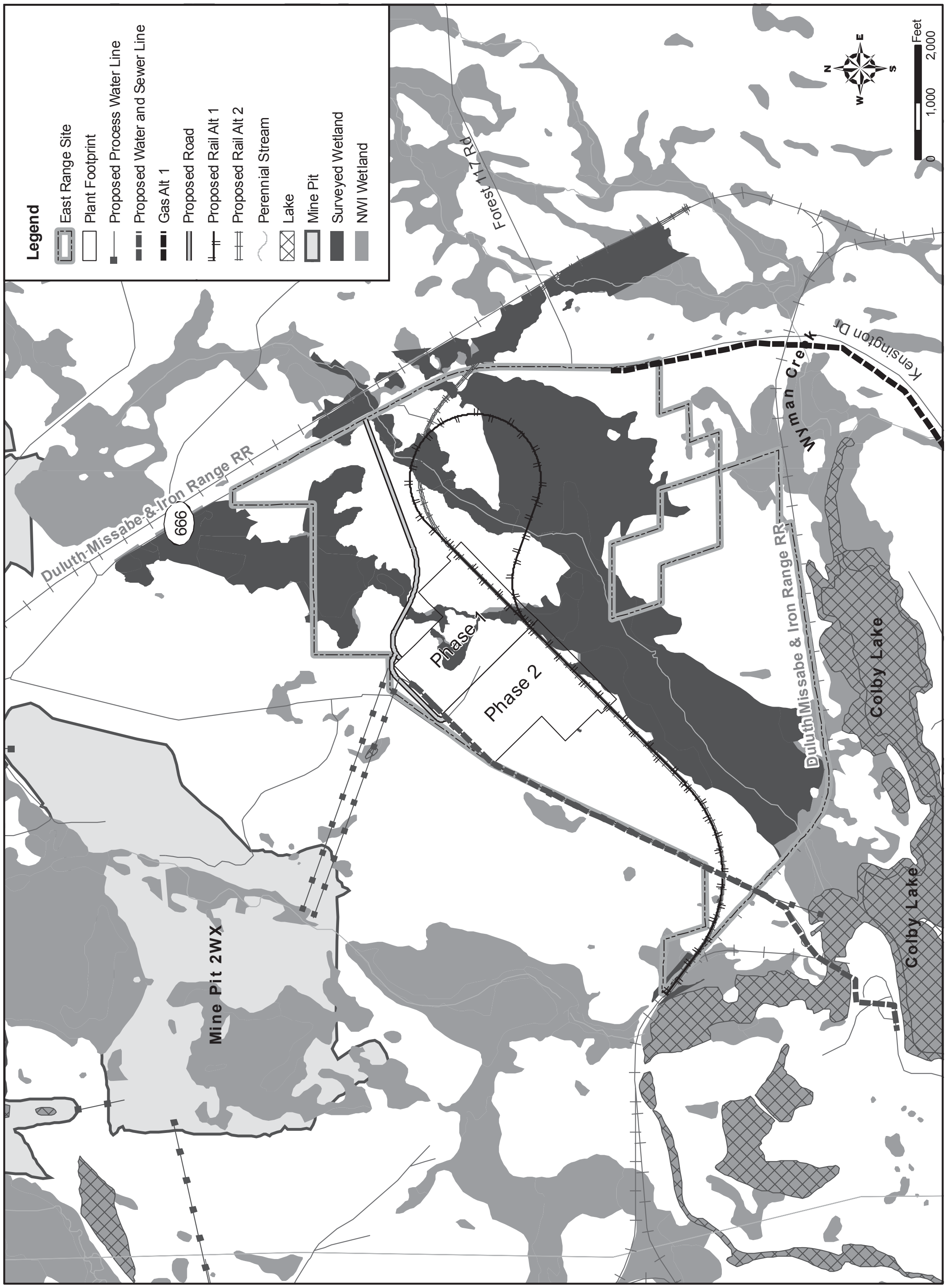

Figure 3.7-2A. Wetlands at East Range Site

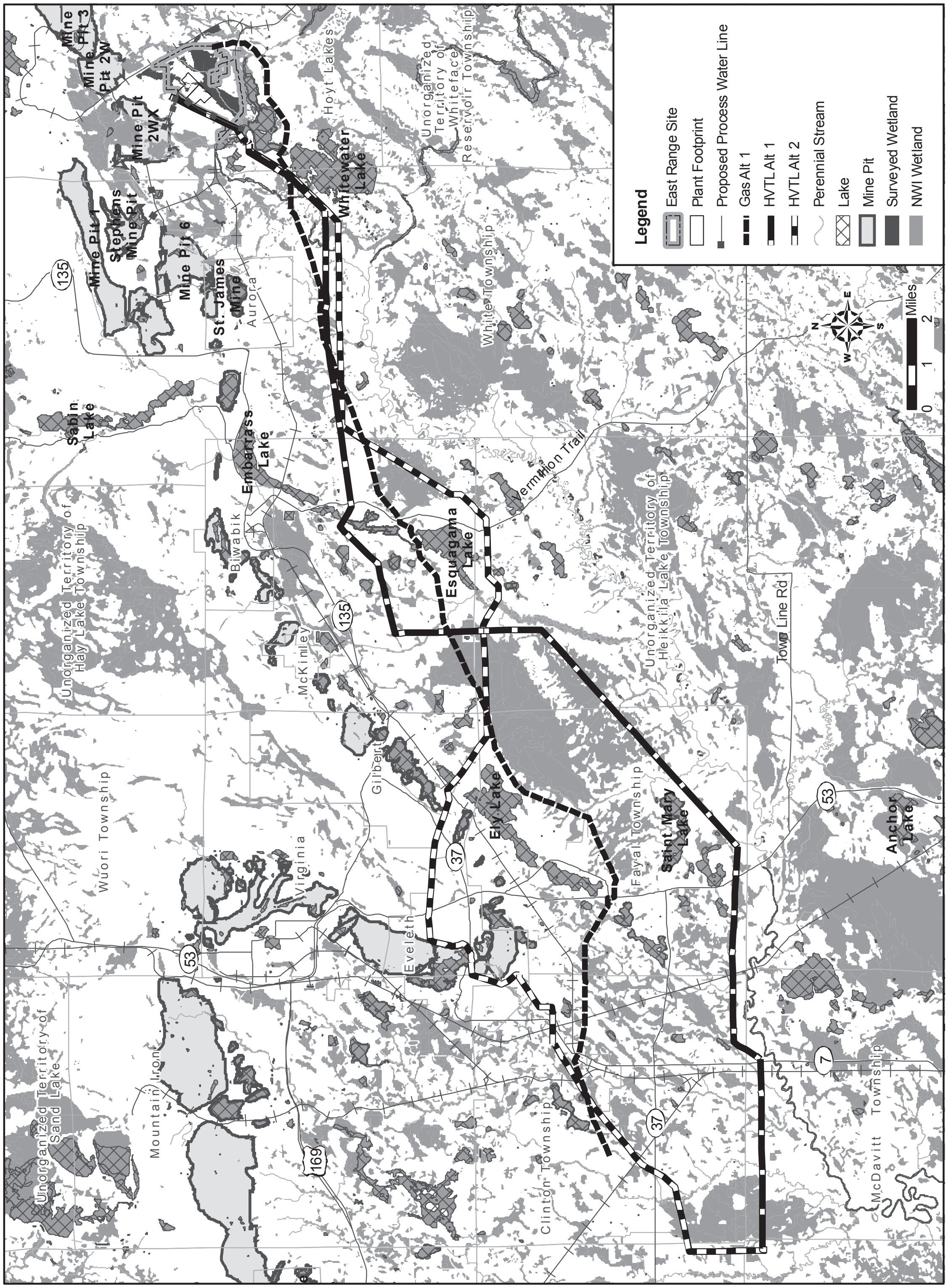

Figure 3.7-2B. Wetlands along East Range Corridors

Each delineated wetland was categorized according to the wetland types presented in the USFWS Circular 39 publication *Wetlands of the United States* (Shaw and Fredine, 1956). Those data and the wetland classification for each wetland were recorded on the wetland data sheets.

A two-person team of wetland scientists delineated boundaries of the wetlands. Up to four teams were used to delineate wetlands at the West Range Site and one two-person team delineated the wetland boundaries at the East Range Site. Access to the East Range and West Range was conducted by foot and/or by all-terrain vehicles.

Plant Identification

Plant taxonomy keys, field guides, and regional botanical experience were used to identify upland and wetland plants. The botanical nomenclature and wetland indicator status for each plant identified was verified by referencing the USFWS National List of Plant Species that Occur in Wetlands, Region 3 – North Central (Reed, 1988). The wetland indicator classification is presented below:

- OBL – Obligate wetland plant species; occurs with an estimated 99 percent probability in wetlands.
- FACW – Facultative wetland plant species; estimated 67 – 99 percent probability of occurrence in wetlands.
- FAC – Facultative plant species; equally likely to occur in wetlands and non-wetlands (uplands), 34 to 67 percent probability in wetlands.
- FACU – Facultative upland plant species; 67 to 99 percent probability of occurrence in non-wetlands, 1 to 33 percent probability in wetlands.
- UPL – Obligate upland plant species; not found in wetlands with a 99 percent probability.
- NI – No Indicator; insufficient information exists to determine indicator status.

Hydric Soils

Wetland soils were examined for hydric traits and recorded on the data sheets. The mineral and subsoil were extracted from pits excavated with a tile spade or as cores from soil probes. Soil profiles were evaluated from ground surface to a maximum depth of 24 inches. The soil matrices were assigned a chroma color using the Munsell Soil Color Charts. Hydric soil indicators generally consisted of observations of gleying (reducing environment), presence of organic soils (histosols), a low chroma (color) soil matrix, iron or manganese concretions, sulfidic odors, and other indicators of a reducing or oxidizing environment. The USDA NRCS describes a hydric soil as "a soil that formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions in the upper part."(USDA-NRCS, 2006). Consequently, wetlands are characterized by soil inundation or saturation within a major portion of the root zone (typically within 12 inches of the surface) (USACE, 1987).

Wetland Hydrology

Evidence of subsurface wetland hydrology was determined by examining soil cores and/or soil pits to confirm soil saturation and groundwater hydrology. Primary wetland hydrology indicators are recorded on the datasheets as direct observations of surface inundation, watermarks, drift lines, sediment deposits on plants and woody debris, and drainage patterns. Secondary wetland hydrology indicators include state or nationally listed hydric soils, oxidized root channels, water stained leaves, the FAC-neutral test (used to determine the presence of wetland hydrology by describing the plant community as being dominated by either wetland or upland plant species), multiple trunks on woody plants, observations of buttressing, fluted tree trunks, elevated root structures and topographic depressions. When no primary indicators were observed, two or more secondary wetland hydrology indicators were used to confirm wetland hydrology.

3.7.4.4 Refined Off-Site Assessment

In an effort to improve the accuracy of estimation of wetland habitat along the inaccessible linear utility corridors, an exercise comparing aerial photography, hydric soils, and the NWI was performed along the gas pipeline corridor. The exercise included assessment of the entire length of pipeline corridor inaccessible to field investigation.

Where the NWI identified wetland habitat, aerial photography was interpreted to confirm and refine wetland boundaries. Where hydric soils mapping identified hydric soils, with or without NWI wetland identification, aerial photograph interpretation was used to identify the presence of wetlands and to estimate wetland boundaries if present. NWI wetland classifications were maintained where defined, and signatures on the aerial photography used where NWI classification was unavailable.

The result of the exercise provided a refined inventory of wetlands along the gas pipeline corridor. This inventory differed only slightly from the NWI, and resulted in an overall reduction of wetland habitat within the West Range corridor from 30.07 acres to 28.29 acres, a difference of less than six percent. The exercise reduced the amount of wetland represented by the NWI and added only 0.50 acres of previously unidentified wetland along the length of the 15-mile corridor. A similar exercise was performed on a 15-mile segment of gas pipeline corridor for the East Range Site with similar results.

The refined NWI data was used to estimate temporary impacts associated with the gas pipeline. Because the level of effort required to refine wetland habitat estimates using aerial photography and hydric soils mapping did not provide substantial differences in the wetland inventory, further use of this methodology on the HVTL and other inaccessible corridors was not performed. It is assumed that the NWI provides a reasonable estimate of wetlands in areas not yet field delineated.

3.7.5 Wetlands within the West Range Site Buffer Land and Utility and Transportation Corridors

A total of **108** wetlands and associated corridors were delineated at the West Range Site and its respective corridors (in areas where access was **available)**. Table 3.7-2 lists wetlands near the West Range Site **(revised for Final EIS)**. Section 4.7.3 includes a description of specific wetlands that may be impacted by proposed project features in the West Range Site and associated corridors.

Table 3.7-2 West Range Site Wetland Summary

ID[1]	Area within Site (Acres)	Wetland Classification			Isolated Wetland
		Cowardin	Circular 39	Eggers & Reed	
A1	78.26	PEMB, PSS1, PFO4	Type 3/6/8	Shallow Marsh, Shrub Carr, Coniferous Bog	No
A2	0.06	PFO1B	Type 7	Hardwood Swamp	Yes
A3	0.10	PFO1C	Type 7	Hardwood Swamp	Yes
A4	96.34	PFO1C/F	Type 7	Hardwood Swamp	No
A6	0.38	PEMC/PFO1C	Type 7	Hardwood Swamp	Yes
A7	0.04	PFO1C	Type 7	Hardwood Swamp	Yes
A8	0.04	PEMC	Type 3	Shallow Marsh	Yes
A9	1.18	PFO1B	Type 7	Hardwood Swamp	Yes
A10	0.17	PEMC	Type 3	Shallow Marsh	Yes
A11	0.13	PEMC	Type 3	Shallow Marsh	Yes
A12	0.35	PSS1B	Type 6	Alder Thicket	Yes
A13	0.45	PFO1B	Type 7	Hardwood Swamp	Yes
A14	0.44	PFO1B	Type 7	Hardwood Swamp	Yes
A15	0.26	PEMC/PFO1C	Type 3/7	Shallow Marsh/Hardwood Swamp	Yes
A16	0.07	PEMC	Type 3	Shallow Marsh	Yes

Table 3.7-2 West Range Site Wetland Summary

ID[1]	Area within Site (Acres)	Wetland Classification			Isolated Wetland
		Cowardin	Circular 39	Eggers & Reed	
A17	0.02	PEMC/PFO1C	Type 3/7	Shallow Marsh/Hardwood Swamp	Yes
A18	0.11	PEMC/PFO1C	Type 3/7	Shallow Marsh/Hardwood Swamp	Yes
A19	0.02	PEMC/PFO1C	Type 3/7	Shallow Marsh/Hardwood Swamp	Yes
A20	0.19	PFO1C	Type 7	Hardwood Swamp	Yes
A21	0.01	PEMC/PFO1C	Type 3/7	Shallow Marsh/Hardwood Swamp	Yes
A22	0.04	PEMC/PFO1C	Type 3/7	Shallow Marsh/Hardwood Swamp	Yes
A23	0.24	PEMC/PFO1C	Type 3/7	Shallow Marsh/Hardwood Swamp	Yes
A25	0.18	PFO1C	Type 7	Hardwood Swamp	Yes
A26	0.03	PFO1C	Type 7	Hardwood Swamp	Yes
A27	0.07	PFO1C	Type 7	Hardwood Swamp	Yes
A28	0.22	PEMC/PFO1C	Type 3/7	Sedge Meadow/Hardwood Swamp	Yes
A29	0.08	PEMC/PFO1C	Type 3/7	Sedge Meadow/Hardwood Swamp	Yes
A30	0.04	PEMC	Type 3	Shallow Marsh	Yes
A31	0.48	PFO1C	Type 7	Hardwood Swamp	Yes
A32	0.14	PEMC	Type 3	Shallow Marsh	Yes
A33	0.07	PEMC	Type 3	Shallow Marsh	Yes
A34	0.08	PEMC	Type 3	Shallow Marsh	Yes
A35	0.02	PEMC	Type 3	Shallow Marsh	Yes
A36	0.04	PEMC	Type 3	Shallow Marsh	Yes
A37	0.36	PEMC	Type 3	Sedge Meadow	Yes
A38	0.07	PSS1C/PFO1C	Type 6/7	Alder Thicket/Hardwood Swamp	Yes
A39	0.27	PEMC/PSS1C	Type 3/6	Sedge Meadow/Alder Thicket	Yes
A40	0.06	PEMC/PSS1C	Type 3/6	Shallow Marsh/Alder Thicket	Yes
B1	0.15	PFO1B	Type 7	Hardwood Swamp	Yes
B2	0.38	PFO1A	Type 7	Hardwood Swamp	Yes
B3	1.06	PFO1A	Type 7	Hardwood Swamp	Yes
B4	0.25	PFO1A	Type 7	Hardwood Swamp	Yes
B5	0.02	PFO1A	Type 7	Hardwood Swamp	Yes
B6	0.03	PFO1A	Type 7	Hardwood Swamp	Yes
B7	0.03	PFO1A	Type 7	Hardwood Swamp	Yes
B8	0.06	PFO1A	Type 7	Hardwood Swamp	Yes
B9	0.29	PFO1A	Type 7	Hardwood Swamp	Yes
B10	0.06	PFO1A	Type 7	Hardwood Swamp	Yes
B11	0.29	PFO1A	Type 7	Hardwood Swamp	Yes
B12	0.05	PFO1A	Type 7	Hardwood Swamp	Yes
B13	0.16	PFO1A	Type 7	Hardwood Swamp	Yes
B14	0.37	PFO1A	Type 7	Hardwood Swamp	Yes
B15	9.12	PEMB/PSS1C/ PFO1A	Type 2/6/7	Wet Meadow/Alder Thicket	Yes
B16	0.27	PEMC	Type 3	Sedge Meadow	Yes
B17	0.03	PEMB	Type 2	Sedge Meadow	Yes
C1	0.31	PEMC	Type 3	Shallow Marsh	No
C2	0.13	PEMB	Type 3	Shallow Marsh	Yes
C3	2.47	PEM1H	Type 5	Shallow Open Water	No
C4	71.67	PEM1H	Type 5	Shallow Open Water	No
C6	0.16	PEMC	Type 3	Shallow Marsh	No
C9	21.35	PEMC/PFOB7	Type 3/8	Shallow Marsh/Coniferous Bog	No
C10	4.89	PSS1A	Type 6	Alder Thicket	No
C11	0.88	PEM2H	Type 5	Shallow Open Water	No
C12	0.67	PSSC1	Type 6	Alder Thicket	No
C13	0.90	PSS1C/PFO1C	Type 6/7	Alder Thicket/Hardwood Swamp	No
C14	1.02	PEM2H	Type 5	Shallow Open Water	No
C15	1.36	PSS1C	Type 6	Alder Thicket	No
C16	6.12	PEMC	Type 3	Sedge Meadow	No

Table 3.7-2 West Range Site Wetland Summary

ID[1]	Area within Site (Acres)	Wetland Classification			Isolated Wetland
		Cowardin	Circular 39	Eggers & Reed	
C17	0.54	LAB2	Type 5	Shallow Open Water	No
C18	0.22	PSS1C	Type 6	Alder Thicket	No
C19	1.42	PEM2H	Type 5	Shallow Open Water	No
C20	0.13	PEMC/PSS1C	Type 3/6	Sedge Meadow/Alder Thicket	No
C21	4.18	PSS1C	Type 6	Alder Thicket	Yes
C22	0.69	PSS1C	Type 6	Alder Thicket	Yes
C23	0.09	PSS1C/PFO1C	Type 6/7	Alder Thicket/Hardwood Swamp	No
C24	0.62	PFO2B	Type 8	Coniferous Bog	No
C26	0.48	PFO1C	Type 7	Coniferous Swamp	No
C27	3.05	PFO1C	Type 7	Coniferous Swamp	No
C28	1.10	PFO1C	Type 7	Coniferous Swamp	No
D1	0.02	PFO1C	Type 7	Hardwood Swamp	Yes
D2	1.64	PEMB	Type 3	Shallow Marsh	Yes
D3	0.01	PEMC/PFO1C	Type 3/7	Sedge Meadow/Hardwood Swamp	Yes
D5	0.10	PEMC	Type 3	Sedge Meadow	Yes
D6	0.09	PEMC/PFO1C	Type 3/7	Shallow Marsh/Hardwood Swamp	Yes
D8	2.61	PEMC/PFO1C/ PFO4B	Type 3/7/8	Shallow Marsh/Hardwood Swamp/Coniferous Bog	Yes
D9	1.46	PEMH/PSS1C	Type 4/6	Deep Marsh/Alder Thicket	No
D10	0.75	PEMC/PSS1C	Type 3/6	Sedge Meadow/Shrub Carr	Yes
D12	0.27	PEMC/PFO1C	Type 3/7	Sedge Meadow/Hardwood Swamp	Yes
D13	0.06	PEMC/PFO1C	Type 3/7	Sedge Meadow/Hardwood Swamp	Yes
D14	1.13	PSS1C/PFO1C	Type 6/7	Shrub Carr/Hardwood Swamp	Yes
E1	1.37	PEMC	Type 3	Shallow Marsh	No
E2	0.70	PEMB	Type 2	Wet Meadow	No
E3	0.08	PEMC	Type 3	Shallow Marsh	Yes
E4	0.67	PEMC	Type 3	Shallow Marsh	Yes
E5	0.65	PEMH	Type 8	Coniferous Bog	Yes
E6	0.42	PEMC	Type 3	Shallow Marsh	Yes
E7	1.44	PEMC	Type 3	Shallow Marsh	Yes
E9	0.19	PEMB	Type 3	Shallow Marsh	Yes
E11	18.34	PEMC	Type 3	Shallow Marsh	No
E12	5.65	PFO2C	Type 8	Coniferous Bog	No
E13	0.13	PEMC	Type 3	Shallow Marsh	No
E14	0.49	PEMC/PEMG	Type 3/4	Shallow Marsh/Deep Marsh	No
E15	0.14	PEMC	Type 3	Shallow Marsh	Yes
E16	0.15	PEMC	Type 3	Shallow Marsh	Yes
E17	0.76	PEMC	Type 3	Shallow Marsh	Yes
E18	8.24	PEMC	Type 3	Shallow Marsh	No
F1	3.52	PSS1C/PFO1C	Type 6/7	Alder Thicket/Hardwood Swamp	No
F2	0.06	PEMC/PFO1C	Type 3/7	Shallow Marsh/Hardwood Swamp	Yes
Total	**369.32**				

[1] The ID numbers in this table correspond to wetland locations identified on illustrations in Appendix F2. Some wetland ID numbers were combined when it was determined that wetlands were connected or part of a large single wetland complex (e.g., A5 is now combined with A4; C5 through C8 are now one wetland).

Results of the wetland delineations, and review of NWI mapping indicates that a suite of wetland types occur within the West Range Site and associated utility/transportation corridors. Dominant wetland habitats consist of Type 3 shallow marsh, Type 6 scrub-shrub swamp, and Type 7 forested swamp. The most common wetland type encountered at the West Range Site and along the utility/transportation corridors is characterized by the Circular 39 classification nomenclature as forested swamp (Type 7). Type 7 wetlands typically possess mixed forest communities vegetated by deciduous conifers (tamarack), needle leave evergreen (spruce and fir) and hard or softwood deciduous trees. These areas are generally characterized as lowland hardwood and coniferous swamps. Type 8 bog habitat occurs as a wetland component within larger wetland systems or was found in association with Dunning Lake. Type 4 (deep marsh) and Type 5 (shallow open water) occur on site, but with less frequency than Types 3, 6, and 7 wetlands. No Type 1 seasonally saturated wetlands, occurred within the West Range Site or its associated corridors based on the 2005 wetland delineation. As shown in Table 3.7-2, approximately **369** acres (**149** hectares) of wetlands were delineated for the West Range Site.

The wetland types occurring within the existing utility or transportation corridors vary from emergent to forested. A majority of the wetlands can be characterized as Type 3 and Type 6 wetlands. The majority of wetlands identified have a connection to interstate commerce; however, some appear to be isolated wetlands. Approximately 66 acres (26 hectares) of wetlands, which either are shown on the NWI mapping or were field delineated, lie within the utility and transportation corridors associated with the West Range Site. **[Table 3.7-3 in Draft EIS has been deleted at this point. Refer to Appendix F2 for more information about wetlands in corridors.]**

3.7.5.1 Descriptions of Wetland Types for the West Range Site

A discussion describing the wetland habitats occurring at the West Range Site is presented in the sections below. Although not all of the utility and transportation corridors have been field surveyed, the descriptions provide a summary of typical habitat that could be encountered.

Type 1 Seasonally Flooded Basin or Flat

Type 1 wetlands were not encountered at either the West Range Site nor at the East Range Site, though Type 1 wetlands occur within the utility and transportation corridors.

Type 1 seasonally flooded basins or flats are generally characterized by having soils covered with water, or water-logged, during variable seasonal periods, but usually are well drained during much of the growing season. This type is found both in upland depressions and in overflow bottomlands. Along river courses flooding occurs in late fall, winter, or spring. In the uplands, basins or flats may be filled with water during periods of heavy rain or melting snow. Vegetation varies greatly according to the season and the duration of flooding. It includes bottom-land hardwoods as well as some herbaceous growths. Where the water has receded early in the growing season, smartweeds, wild millet, fall Panicum (*Panicum dichotomiflorum*), tealgrass (*Eragrostis hypnoides*) chufa (*Cyperus esculentus*), redroot cyperus (*Cyperus erythrorhizos*), and weeds such as marsh elder (*Iva* sp.), ragweed (*Ambrosia* sp.), and cocklebur (*Xanthium* sp.) are likely to occur. Shallow basins that are submerged only temporarily usually develop little or no wetland vegetation (Shaw and Fredine, 1956).

Type 2 Wet Meadow

Type 2 wet meadow wetlands were primarily restricted to existing linear corridors (powerline) and ROWs on the West Range Site. These wetlands are a result of ROW construction and maintenance. The right-of-way was constructed through or across a wetland and mowing maintains the land cover as a herbaceous wet meadow. Canada blue-joint grass (*Calamagrostis canadensis*) is the dominant vegetative cover within the wet meadow habitats. Sedges (*Carex* sp.), woolgrass (*Scirpus cyperinus*), sensitive fern (*Onoclea sensibilis*), and goldenrods (*Solidago* sp.) are also common.

Type 2 wetlands typically had surface organic soils underlain by sandy clay loam, clay loam, sandy loam, and less frequently, loamy sands. Hydric soil indicators most frequently encountered in Type 2 wetlands include a histic epipedon, depleted matrices in subsurface mineral soils, gleying in subsurface soils, low chroma in mineral soils, and occasionally high organic content at the surface of sandy soils. The primary hydrology indicator in the Type 2 wet meadows were soils that were saturated to the surface.

Type 3 Shallow Marsh

Type 3 shallow marsh wetlands were observed most frequently throughout the West Range Site and existing utility and roadway corridors, and were most often associated with Type 6 and Type 7 wetlands forming a complex of wetland types. Type 3 wetlands were dominated by herbaceous species, such as sedges and/or grasses, and were either temporarily flooded basins or seasonally flooded marshes. The most commonly observed herbaceous vegetation throughout the site was Canada blue-joint grass. Several species of sedges observed include wiregrass sedge (*Carex lasiocarpa*), inflated sedge (*C. intumescens*), slender sedge (*C. tenera*), pointed broom sedge (*C. scoparia*), Tuckerman's sedge (*C. tuckermanii*), and lake sedge (*C. lacustris*). Other dominant herbs include woolgrass, broad-leaf cattail (*Typha latifolia*), sensitive fern, fowl manna grass (*Glyceria striata*), marsh marigold (*Caltha palustris*), blue-flag iris (*Iris versicolor*), woodland horsetail (*Equisetum sylvaticum*), jewelweed, (*Impatiens capensis*), and bugleweed (*Lycopus americanus*).

Type 3 wetlands typically had surface organic soils underlain by sandy clay loam, clay loam, sandy loam, and less frequently, loamy sands. Hydric soil indicators most frequently encountered in Type 3 wetlands include a histic epipedon, depleted matrices in subsurface mineral soils, gleying in subsurface soils, low chroma colors in mineral soils, and occasionally high organic content at the surface of sandy soils. Most of the Type 3 wetlands hydrology were saturated at the surface or were inundated with up to six inches of water.

Type 4 Deep Marsh and Type 5 Shallow Open Water

Types 4 and 5 wetlands were less commonly observed, but were dispersed throughout the West Range Site. Most of these wetlands appeared to be formed through beaver activity. Other Type 4 and 5 wetlands were located along fringe areas of Dunning Lake. These habitats typically contained herbaceous and/or open water and ranged from semi-permanently flooded to permanently flooded.

Type 4 and 5 wetlands were dominated by broad leaved cattail, Canada blue-joint grass, blue-flag iris, white water lily (*Nymphaea odorata*), and water hemlock (*Cicuta maculata*). For those Type 4 and 5 wetlands around Dunning Lake, vegetation included herbaceous and/or woody fringes surrounding the deeper open water habitat. Woody species observed with herbaceous vegetation in these areas typically included speckled alder (*Alnus rugosa*), black ash (*Fraxinus nigra*), and black spruce (*Picea mariana*).

Type 6 Shrub Swamp

Type 6 wetlands are widespread throughout the study area. These wetlands ranged in size and hydrologic connectivity from small, isolated depressions to large swamps embedded within larger wetland complexes having multiple wetland types. Type 6 wetlands were often present with Type 3 shallow marsh habitats. Typically, Type 6 wetlands were dominated with shrub canopies comprised of monocultures of speckled alder or mixtures of alder (*Alnus* sp.), young black ash, and the occasional willow species (*Salix* sp.). Sweet gale (*Myrica gale*) and red-osier dogwood (*Cornus sericea*) were also occasionally observed in the Type 6 wetland communities.

Type 6 wetland soils typically consisted of deep organic soil, or similar to Type 3 wetlands, soil with a histic epipedon over sandy or clayey soil. Deep, dark peat and mucks were most commonly observed within larger wetland complexes. Other hydric soil indicators observed commonly included depleted matrices in subsurface mineral soils, gleying in subsurface soils, low chroma colors in mineral soils, and occasionally high organic content at the surface of sandy soils. Type 6 wetlands typically had soils saturated to the surface and/or standing water.

Type 7 Wooded Swamp

Type 7 wetlands were also common throughout the West Range Site. These habitats were generally comprised of pure stands of black ash or with mixed stands of black ash, black spruce, balsam poplar (*Populus balsamifera*), balsam fir (*Abies balsamea*), and quaking aspen (*P. tremuloides*). A shrub layer of speckled alder and young trees was observed occasionally. The herbaceous layer was typically dominated with species common to the Type 3 wetlands areas, such as Canada blue-joint grass, sedges, marsh marigold, and jewelweed.

The size of these wetlands varies from small, isolated depressions to large complexes with multiple wetland types. These wetlands are classified as broad-leaved deciduous semi-permanently flooded, seasonally flooded, or saturated wetlands depending on their landscape position. Many of the small, isolated depressions are found in the heavily forested areas west of the existing utility ROW that bisects the site. These wetlands appear to be ephemeral with seasonal flooding in the spring or early summer; surface water evaporation follows in mid-summer leaving the wetland saturated for much of the remaining growing season. In contrast, the large forested swamps are typically found in a complex of wetland types, including shallow marsh, scrub-shrub, and sometimes bog habitats. These large complexes provide much of the natural drainage through the site and are hydrologically connected to other upstream and downstream resources outside of the project area.

Soils in the Type 7 wetlands were similar to Type 6 wetland habitat with deep organic muck forming a histic epipedon over sandy or clayey soils. In some of the large wetland complexes the soils consisted of deep peat and muck soils. The small, isolated wetlands typically had soils with dark surface horizons of muck or mineral soils over depleted subsurface clay loams. The Type 7 wetlands were typically saturated to the surface or were inundated with a few inches to several feet of standing water.

Type 8 Bogs

Type 8 bogs and fens are common to this region of Minnesota. There are several areas of Type 8 bog habitat throughout the West Range Site and its respective utility corridors. Conifers dominate the majority of the bog habitat.

The dominant vegetation associated with bog habitat included black spruce and tamarack *(Larix laracina*). In the understory or canopy openings, ericaceous shrubs and other heath vegetation were dominant. These species included, but were not limited to, Labrador tea (*Ledum groenlandicum*), leatherleaf (*Chamaedaphne calyculata*), bog rosemary (*Andromeda glaucophylla*), small cranberry (*Vaccinium oxycoccus*), and bog laurel (*Kalmia polifolia*). Other shrub species observed included speckled alder and bog birch (*Betula pumila*). The herbaceous layer was often comprised of cotton grass (*Eriophorum* sp.), woolgrass, wiregrass sedge, mud sedge (*Carex limosa*), three-seeded bog sedge (*C. trisperma*), northern pitcher plant (*Sarracenia purpurea*), northern manna grass (*Glyceria boreali*), horsetail, Canada blue-joint grass, and northern bog orchid (*Platanthera hyperborea*) all growing in deep Sphagnum moss (*Sphagnum* sp.) peats. Sphagnum moss, Labrador tea, leatherleaf and small cranberry were often the most dominant species found in this diverse herbaceous layer.

In areas closest to the adjacent upland where groundwater influence would be higher, floating Sphagnum mats were encountered and wetland vegetation trended toward more deciduous shrubs, sedges, and grasses. In the areas upslope from the wetland edge, the Sphagnum soils were dense and with less influence from the shallow surficial groundwater, where vegetation trended toward ericaceous shrubs, cottongrass, and conifers. This difference in habitat conditions demonstrates the boundary between true bog habitat with little groundwater influence and fen habitat in the lagg area with groundwater influence from the surrounding upland.

The Type 8 bogs were comprised of deep histosols that were saturated at ground surface and contained Sphagnum moss. The organic soils varied in decomposition with undecomposed fibric material at the ground surface, to moderately decomposed hemic peat from 1 to 2 feet below the surface, to well decomposed sapric peat several feet below the surface.

3.7.5.2 Surface Water Crossings

Several streams and one waterway crossing are located within the utility corridor alternatives for the West Range Site. Section 404 of the CWA regulates these resources. These streams and surface waters are discussed in Section 3.5.1.1. Table 3.7-3 describes the surface water crossings and wetland types adjacent to those waters within the HVTL, gas pipeline, and water process line alternative corridors. The specific surface waters that may be impacted by utility and transportation corridor crossings for the West Range Site are discussed in Sections 4.5.3 and 4.7.3.

Table 3.7-3. Utility and Corridor Crossings of Surface Waters (West Range Site)

Utility Corridor	Number of Crossings	Total Length of Crossings (linear feet)	Adjacent Wetland Types
HVTL Alternative 1	2	123	Types 3, 6
HVTL Alternative 1A	6	533	Types 3,6
HVTL Phase II	5	283	Types 2, 3, 5, & 6[1]
Natural Gas Pipeline Alternative 1	4	133	Types 1, 2, 6, & 3
Natural Gas Pipeline Alternative 2	4	313	Types 6, 3[1]
Natural Gas Pipeline Alternative 3	4	236	Types 3, 6, 8
Process Water Blowdown Pipeline 1	2	6	Types 3, 6[1]

[1] Some wetland areas adjacent to these crossings do not have identified wetland types due to limitations in NWI information and site access for field identification.
Source: Excelsior, 2006b

3.7.6 Wetlands within the East Range Site Buffer Land and Utility and Transportation Corridors

Wetland types were delineated at the East Range Site and its associated corridors (where access was granted) during October 2004 and August 2005. Wetlands near the East Range Site are listed in Table 3.7-**4 (revised for Final EIS)**. The results of the wetland delineation efforts describe the water resources and wetland habitats encountered during the field investigations. A description of specific wetlands that may be impacted by proposed project features in the East Range Site and associated corridors is included in Section 4.7.4.

The dominant wetland types at the East Range Site include Type 6 shrub swamps, Type 7 wooded swamps, and Type 8 bogs. Type 2 wet meadows were also observed. Type 3 shallow marshes and Type 4 deep marshes were less common but were observed in areas where wildlife (i.e., beaver activity) has modified wetland hydrology. No Type 1, seasonally saturated wetlands, or Type 5, open water wetlands were identified at the East Range Site and its associated utility and transportation corridors during the 2004 and 2005 field investigations.

Table 3.7-4. East Range Site Wetland Summary

ID	Area within Site (Acres)[1]	Wetland Classification[2]			Isolated Wetland
		Cowardin	Circular 39	Eggers & Reed	
A	0.08	PEMC	Type 2	Sedge Meadow	Yes
B	5.53	PFOC	Type 7	Coniferous Swamp	No
C1	18.18	PSS1B	Type 6	Alder Thicket	No
C2	2.09	PFO2B	Type 8	Coniferous Bog	No
C3	28.23	PFO2B	Type 7	Coniferous Swamp	No
C4	62.90	PEMH	Type 4	Deep Marsh	No
C5	3.03	PEMB	Type 2	Fresh Wet Meadow	No
C6	80.52	PFO1B	Type 7	Hardwood Swamp	No
C7	172.29	PSS1B	Type 6	Hardwood Swamp - Logged	No
C8	24.86	PEMC	Type 3	Shallow Marsh	No
C9	174.03	PSS1B	Type 6	Shrub Swamp	No
D	2.03	PSS1B	Type 6	Alder Thicket	No
E	14.20	PSS1B	Type 6	Alder Thicket	No
F	2.11	PFOC/PFO2B	Type 7/Type 8	Hardwood Swamp, Coniferous Bog	No
G	19.23	PFOC/PFO2B	Type 7/Type 8	Hardwood Swamp, Coniferous Bog	No
H	97.24	PEMC/PFOC/ PFO2B	Type 3/Type 7/ Type 8	Shallow Marsh, Hardwood Swamp, Coniferous Bog	No
I	4.95	PSS1B	Type 6	Alder Thicket	No
J	0.07	PEMC	Type 2	Fresh Wet Meadow	Yes
K	0.48	PFO1B	Type 7	Hardwood Swamp	Yes
Total	**712.05**				

[1] Total Wetland Area is an approximation based upon partially delineated wetland boundaries and the NWI. This acreage accounts for wetlands that were not delineated that extend beyond the established project limits.
[2] Circular 39 and Eggers and Reed classifications are assumed from the Cowardin classifications, aerial photograph interpretations, and assumptions based on known characteristics of delineated wetlands.

3.7.6.1 Descriptions of Wetland Types for the East Range Site

The sections provided below discuss the typical wetland plant communities that could be encountered within the East Range Site. Although not all of the utility and transportation corridors have been field-verified for the presence of wetlands, the following descriptions provide a summary of the types of wetland habitats that could be encountered within the proposed utility and transportation corridors based on NWI mapping.

Type 2 Wet Meadow

Type 2 wet meadows primarily occurred as small isolated wetlands, although small amounts of Type 2 wetlands also existed in the fringes of the larger wetland complexes. Canada blue-joint grass and woolgrass were the dominant vegetation in the wet meadow habitats. Red top (*Agrostis alba*), fowl manna grass, and several species of sedges were also common. Scattered black ash trees were also observed occasionally.

Type 2 wetland soils typically consisted of mineral surface horizons of sandy and loamy clays underlain by bedrock. Hydric soil indicators present included a depleted matrix in subsurface mineral soils, low chroma colors, and occasionally iron and manganese concretions. The primary hydrology indicators in the Type 2 wet meadows were soils that were saturated in the upper 12 inches.

Type 3 Shallow Marsh

Type 3 shallow marshes only occurred in association with larger wetland complexes at the East Range Site and were typically vegetated by Canada blue-joint grass, broad-leaf cattail, pickerelweed (*Pontederia cordata*), spotted joe-pye weed (*Eupatorium maculatum*), wire grass sedge, and other species of sedges.

Texture of soils typically consisted of organic muck or peat and had a black chroma matrix in the Munsell color chart. In areas hydrologically modified by wildlife (i.e., beaver activity), the soil texture consisted of silt and muck and possessed a black chroma matrix. Wetland hydrology throughout the Type 3 shallow marsh areas ranged from saturated soils to two feet of inundation in open water areas.

Type 4 Deep Marsh

Type 4 deep marshes occurred in association with larger wetland complexes in the East Range Site, specifically where hydrology has been altered by beaver activity. Type 4 deep marshes were dominated by broad-leaf cattail and pickerelweed in the fringe areas bordering open water.

Texture of soils in Type 4 deep marshes typically consisted of organic muck and peat. A mixture of silts and mucky soils were observed in areas that had recently been modified by wildlife (beaver activity). Wetland hydrology indicators noted included visual observations of standing water possessing a water column ranging from two to six feet of water, drift lines, and water marks.

Type 6 Shrub Swamp

Type 6 wetlands were common throughout the East Range Site. Type 6 scrub-shrub swamps occurred as isolated depressions and in association with larger wetland complexes. Type 6 wetlands were characterized as transitional zones between Type 3 shallow marshes, Type 7 wooded swamps and Type 8 bogs. Speckled alder typically dominated the scrub-shrub swamps while red-osier dogwood, black ash, and black spruce were also often observed in the shrub layer. Canada blue-joint grass and wire grass sedge dominated the herbaceous layer, while scattered broad-leaf cattail and red top were also observed.

Soils in the Type 6 scrub-shrub swamps typically consisted of a sandy clay surface horizon underlain by a clay horizon. Soils consisting of deep organic muck or peat were observed in the large wetland complexes. One wetland had a soil texture containing a mixture of rock and gravel. Hydric soil indicators observed included a depleted matrix in subsurface mineral soils, iron and manganese concretions, and low chroma colors in mineral soils. Type 6 wetlands typically had soils that were saturated to the surface or inundated with up to six inches of water.

Type 7 Wooded Swamp

Type 7 wooded wetlands were common throughout the East Range Site. These habitats were typically associated with Type 8 bogs and were typically vegetated by white cedar (*Thuja occidentalis*), black ash, or speckled alder with lesser amounts of black spruce, and tamarack (*Larix laricina*). Speckled alder, black spruce, tamarack, and quaking aspen formed the dominant plant community in the shrub layer while the herbaceous layer was mostly comprised of Canada blue-joint grass, wiregrass sedge, and Sphagnum moss.

Soil texture in Type 7 wooded swamps were typically comprised of deep organic black muck or peat. In some situations, a thick layer of mineral soils underlay layers of relatively shallow peat. For the most part soils in the Type 7 wetlands were saturated at the surface or were inundated with two to three inches of standing water.

Type 8 Bogs

Type 8 bogs were common throughout the East Range Site. The majority of bog habitat is vegetated by conifers such as black spruce, white cedar, and tamarack. The understory was characterized by a thick Sphagnum moss mat along with leatherleaf (*Chamaedaphne calyculata*). Soils in the Type 8 bogs typically consisted of black, deep organic peat soils. Texture of peaty soils varied from undecomposed fibric peat (O_f) at the surface, to moderately decomposed hemic peat (O_h) from 1 to 2 feet below the surface, to well decomposed sapric peat (O_s) several feet below the surface. The soils in the Type 8 wetlands were saturated at the surface.

3.7.6.2 Surface Water Crossings

Construction of utility and transportation corridors associated with the East Range Site would require crossing streams or rivers as well as crossing other bodies of water, including wetlands. The water crossings are associated with the HVTL alternatives, gas pipeline alternatives, three process water supply pipelines, the potable water and sewer pipelines, and the rail alternatives. There are no "other water" crossings associated with the location, placement, or construction of the Mesaba Generating Station and access roads. Table 3.7-**5** describes the surface water crossings within the HVTL, gas pipeline, process water supply pipeline, and rail line alternative corridors. The specific surface waters that may be impacted by utility and transportation corridor crossings for the East Range Site are discussed in Sections 4.5.4 and 4.7.4.

Table 3.7-5. Utility and Transportation Corridor Crossings of Surface Waters (East Range Site)

Utility Corridor	Number of Crossings	Total Length of Crossings (linear feet)	Adjacent Wetland Types
HVTL Alternative 1	21	1194	Types 2, 5, 6[1]
HVTL Alternative 2	20	1760	Types 2, 5, 6, 7, & 8[1]
Natural Gas Pipeline Alternative 1	19	792	Types 2, 6, 7, & 8[1]
Process Water Supply Pipeline – Area 6 and Stephens Mine to Area 2WX	2	33	Type 6
Process Water Supply Pipeline – Area 9 South to Area 6	1	3	N/A[1]
Process Water Supply Pipeline – Area 9 North (Donora Mine) to Area 6	1	3	N/A[1]
Potable Water and Sewer Pipelines	1	460	N/A[1]
Rail Line Alternative 1	2	6	Types 2, 3, 4, 6, 7, & 8
Rail Line Alternative 2	2	6	Types 2, 3, 4, 6, 7, & 8

[1] Some wetland areas adjacent to these crossings do not have identified wetland types due to limitations in NWI information and site access for field identification.
Source: Excelsior, 2006b

3.7.7 Wetland Functional Assessment

The Minnesota Routine Assessment Method (MnRAM) 3.1 (MBWSR, 2007) was completed for each wetland delineated on the West Range and East Range Sites using data collected at the time of the field wetland delineations. The MnRAM 3.1 rates overall wetland community as well as wetland functions and values using several parameters.

The Wetland Community Summary rates each wetland based upon native plant species diversity, presence of rare plant species, and presence of non-native and invasive species. Of the wetlands surveyed on the West Range, 81 percent had a high rating, 16 percent had a moderate rating, and 3 percent had a moderate/high rating. On the East Range 80 percent had a high rating and 20 percent had a moderate rating. MnRAM 3.1 Comprehensive Guidance (MBWSR, 2007) details the rating system.

The Wetland Functional Assessment Summary rates each wetland on the following parameters on a scale of low, moderate, high, exceptional, or not applicable: maintenance of hydrologic regime, flood/stormwater storage, downstream water quality protection, maintenance of wetland water quality, shoreline protection (if applicable), maintenance of wildlife habitat, maintenance of fish

habitat, maintenance of amphibian habitat, aesthetics and recreation, commercial uses (if applicable), groundwater interaction, and sensitivity to storm water. Optional questions for restoration potential and stormwater treatment needs were not answered.

The results of the MnRAM 3.1, including the Wetland Community Summary and the Wetland Functional Assessment Summary, can be found in Appendix F3.

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3.8 BIOLOGICAL RESOURCES

Projects receiving Federal funds are subject to the Fish and Wildlife Coordination Act, requiring that Federal agencies consider the effects on fish and wildlife and their habitats prior to implementation of an action. Fish and game species are protected through the hunting, fishing, and trapping regulations enforced by the MNDNR and the USFWS. Birds and their nests, including any songbirds or raptors that may inhabit the sites, are protected under the Federal Migratory Bird Treaty Act. **Consultation with Native American tribes is also required when a Federal Action could affect biological resources under their management. Sections 1.6.1.3 and 1.8 describe the consultation with the local Native American tribes in more detail.**

The following sections describe the ecological conditions and biological communities that are present on the West Range and East Range Sites and their associated utility and transportation corridors. Section 3.8.1 describes the types of terrestrial floral (vegetative) and faunal (animal) communities present at the West Range Site, the East Range Site, and the associated corridors. Section 3.8.2 describes the aquatic biota associated with each of the alternative project site locations. State- and Federally listed rare, special concern, threatened, or endangered species and associated habitats located within the vicinities of the potential project locations are discussed in Section 3.8.3.

Flora and fauna and associated habitats were assessed in conjunction with the field reconnaissance for wetland habitat. Specific locations of potential protected habitats and/or species occurrences located within or near the project areas were targeted during the reconnaissance and identified prior by conducting a review of MNDNR Natural Heritage Information System (NHIS) data.

Section 3.8 of this Final EIS includes additional information as compared to Section 3.8 of the Draft EIS. New Table 3.8-1 has been added, which provides detailed information about terrestrial habitats in the areas of the West and East Range Sites as well as some wildlife species that would be expected to utilize those habitats. Section 3.8.2 has been revised to include more information about aquatic biota, and Section 3.8.3 has been revised in response to the December 2008 addition of the gray wolf (*Canis lupus*) to Federal legal protection status, although it is currently unclear what the status will be in the future (see Section 3.8.3.1 for more information). Several minor changes have also been made in response to public comments received on the Draft EIS, as well as editorial revisions.

3.8.1 Terrestrial Communities

Loss of habitat and habitat degradation have contributed to the population decline of some types of wildlife in Minnesota. Consequently, the MNDNR and the USDA Forest Service have developed an Ecological Classification System (ECS) in Minnesota for mapping and classifying landscape features based on the ecological functions that these features provide. Ecological land classifications are used to identify, describe, and map progressively smaller areas of land with increasingly uniform ecological features. The system utilizes associations of biotic and environmental factors, which include climate, geology, topography, soils, hydrology, and vegetation (MNDNR, 2007).

Based on the ECS, the West Range Site lies within the Nashwauk Uplands Subsection, and the East Range Site lies within the Laurentian Uplands Subsection. Subsections are ECS units that are defined using glacial deposition processes, surface bedrock formations, local climate, topographic relief, and the distribution of vegetation, particularly tree species (MNDNR, 2007).

The Nashwauk Uplands Subsection is bounded by Giant's Ridge to the north and the Mesabi Range to the south. Before settlement by people of European descent, forests in this region consisted of red pine (*Pinus resinosa*), white pine (*Pinus strobus*), balsam fir (*Abies balsamea*), white spruce (*Picea alba*), and aspen-birch (*Populus spp.-Betula spp.*). Vegetation in wetlands consisted of evergreen conifer trees and shrubs. Forestry and mining activities are the most common types of land use in this subsection. Animal species of note that are known or expected to occur in this subsection include bald eagles (*Haliaeetus leucocephalus)*, Canada lynx (*Lynx canadensis)*, spruce grouse (*Falcipennis canadensis*), American bitterns (*Botaurus lentiginosus*), bobolinks (*Dolichonyx oryzivorus*), Connecticut warblers (*Oporornis agilis*), gray jays (*Perisoreus canadensis*), northern goshawks (*Accipiter gentilis*), ospreys (*Pandion haliaetus*), trumpeter swans (*Cygnus buccinators*), and northern brook lampreys (*Ichthyomyzon fossor*) (MNDNR, 2006b).

The Laurentian Uplands Subsection is bounded by the North Shore Highlands and Border Lakes Subsections. The high elevations in this subsection are the source of many rivers, including the St. Louis, Cloquet, and Whitefish. Lakes and wetlands are numerous in this area. Before settlement by people of European descent, major upland forest types consisted of aspen-birch, jack (*Pinus banksiana*), and red and white pine. Lowland areas contained conifer swamps and bogs. At present, forestry is the most important land use, and quaking aspen (*Populus tremuloides*) has become the dominant tree species. The size and shape of areas affected by forestry practices influences the types of wildlife species utilizing large, contiguous blocks of land. Animal species of note that are known or predicted to occur in this subsection include bald eagles, gray wolves, Canada lynx, spruce grouse, black-throated warblers (*Dendroica caerulescens*), common loons (*Gavia immer*), gray jays, and heather voles (*Phenacomys intermedius*) (MNDNR, 2006c).

Table 3.8-1 (new in Final EIS) provides descriptions of the ECS habitat types existing in the areas of the West and East Range Sites. Also included are the Species in Greatest Conservation Need (SGCN), as defined by the MNDNR, that typically utilize those habitat types.

Table 3.8-1. Wildlife Species Assemblages by Habitat Association

ECS Habitat Code and Name*	Definition	SGCN Species*
APn80 - Northern Spruce Bog	Includes bogs dominated with black spruce trees (*Picea mariana*). Trees are usually stunted (< 30 feet tall) with 25 – 75% coverage. The understory is dominated by Sphagnum moss (*Sphagnum sp.*) and fine-leaved graminoids such as cotton grass (*Eriophorum vaginatum*) and sedge species (*Carex spp.*) Low-shrubs, such as cranberry species (*Vaccinium sp.*) and Labrador tea (*Ledum groenlandicum*) comprise approximately 25% of the canopy	**Mammals** ***Lynx canadensis* – Canada lynx** *Canis lupus* – grey wolf *Phenacomys intermedius*– heather vole *Snaptomys borealis* – N. bog lemming **Birds** *Chodeiles minor* – Common nighthawk *Contopus cooperi* – olive-sided flycatcher *C. virens* – eastern wood pewee *Empidonax* - flycatchers *Melospiza georgina* – Swamp sparrow *Scolopax minor* – American woodcock **Amphibians** *Hemidactylum scutatum* – four toed salamander *Plethodon cinereus* – E. red backed salamander

Table 3.8-1. Wildlife Species Assemblages by Habitat Association

ECS Habitat Code and Name*	Definition	SGCN Species*
APn81 - Northern Poor Conifer Swamp	Includes bogs dominated by black spruce and tamarack (*Larix laricina*). Trees are usually stunted (< 33 feet tall) with 25 – 50% coverage. The understory is dominated by Sphagnum moss, fine-leaved graminoids, and low-shrubs. The tall shrub layer is dominated by speckled alder (*Alnus incana*) and willow species (*Salix spp.*). The tall and low shrub layers comprise approximately 25% coverage of the canopy.	**Mammals** ***Lynx canadensis* – Canada lynx** *Canis lupus* – grey wolf *Phenacomys intermedius*– heather vole *Snaptomys borealis* – N. bog lemming **Birds** *Chodeiles minor* – Common nighthawk *Contopus cooperi* – olive-sided flycatcher *C. virens* – eastern wood pewee *Empidonax* - flycatchers *Melospiza georgina* – Swamp sparrow *Opornis agilis* – Connecticut warbler *Scolopax minor* – American woodcock *Sphyrapicus varius* – yellow bellied flycatcher *Wilsonia canadensis* – Canada warbler **Amphibians** *Hemidactylum scutatum* – four toed salamander
APn90 - Northern Open Bog	Includes bogs dominated by low-shrubs, Sphagnum moss and fine-leaved graminoids. Graminoids species present include bog wiregrass sedge (*Carex oligosperma*), cottongrass, and miscellaneous other sedge species. Tree cover is sparse or absent (< 25%) and generally comprised of stunted black spruce and tamarack mix.	**Mammals** ***Lynx canadensis* – Canada lynx** *Canis lupus* – grey wolf *Phenacomys intermedius*– heather vole *Snaptomys borealis* – N. bog lemming **Birds** *Chodeiles minor* – Common nighthawk *Melospiza georgina* – Swamp sparrow *Scolopax minor* – American woodcock *Zonotrichia albicollis* – white throated sparrow
FPn73 - Northern Alder Swamp	Includes tall-shrub wetlands dominated by speckled alder, red-osier dogwood (*Cornus sericea*), and current species (*Ribes spp.*). The herbaceous layer is comprised of Canada bluejoint (*Calamagrostis canadensis*), fowl manna grass (*Glyceria striata*), sedge species, common marsh marigold (*Caltha palustris*), touch-me-nots (*Impatiens spp*.), and fern species (*Dryoptteris spp.*)	**Mammals** ***Lynx canadensis* – Canada lynx** *Canis lupus* – grey wolf **Birds** *Chodeiles minor* – Common nighthawk *Botaurus lentiginosus* – American bittern *Melospiza georgina* – Swamp sparrow *Scolopax minor* – American woodcock *Scolopax minor* – American woodcock

Table 3.8-1. Wildlife Species Assemblages by Habitat Association

ECS Habitat Code and Name*	Definition	SGCN Species*
FPn82 - Northern Rich Tamarack Swamp (Western Basin)	Includes wetlands dominated by tamarack trees with black spruce, red maple (*Acer rubrum*), paper birch (*Betula papyrifera*), and balsam fir (*Abies balsamea*) in the understory. Tree canopy is patchy to interrupted with 25-75% coverage. Speckle alder and willows dominate the tall-shrub layer. Sphagnum moss, Canada bluejoint grass, and sedge species comprise the herbaceous layer.	**Mammals** ***Lynx canadensis* – Canada lynx** *Canis lupus* – grey wolf **Birds** *Chodeiles minor* – Common nighthawk *C. virens* – eastern wood pewee *Empidonax* - flycatchers *Melospiza georgina* – Swamp sparrow *Scolopax minor* – American woodcock
LKi54 - Inland Lake Clay/Mud Shore	Includes inland lakes and ponds with plant communities growing in a clay, mud, or silt substrates. Vegetation cover and composition vary seasonally and from year to year dependent on water levels.	**Mammals** *Canis lupus* – grey wolf **Birds** *Chodeiles minor* – Common nighthawk *Botaurus lentiginosus* – American bittern *Gavia immer* – common loon *Haliaeetus leucocephalus* – bald eagle *Melospiza georgina* – Swamp sparrow *Scolopax minor* – American woodcock **Reptiles** *Chelydra serpentina* – snapping turtle **Amphibians** *Rana palustris* – pickerel frog

Table 3.8-1. Wildlife Species Assemblages by Habitat Association

ECS Habitat Code and Name*	Definition	SGCN Species*
MHn35 - Northern Mesic Hardwood Forest	Includes hardwood forest on well-drained to moderately well-drained soils. Tree canopy is usually continuous (> 75% cover) and comprised of sugar maple (*Acer saccharum*), basswood (*Tilia americana*), northern red oak (*Quercus rubra*) with occasional area of paper birch and quaking aspen (*Populus tremuloides*) The shrub layer includes sapling of the tree canopy species with beaked hazelnut (*Corylus cornuta*), chokecherry (*Prunus virginiana*), and balsam fir. The herbaceous layer ranges from 5 – 75% coverage and dominated by Pennsylvania sedge (*Carex pennsylvanica*), large leaved aster (*Aster macrophyllus*), and bedstraw species (*Galium spp.*)	**Mammals** ***Lynx canadensis* – Canada lynx** *Canis lupus* – grey wolf **Birds** *Chodeiles minor* – Common nighthawk *Accipiter gentiles* – N. goshawk *Buteo lineatus* – Red shouldered hawk *Catharus fuscescens* – veery *Coccocyzus erythropthalmus* – black-billed cuckoo *C. virens* – eastern wood pewee *D. castanea* – bay-breasted warbler *D. tigrina* – Cap May warbler *Empidonax*- flycatchers *Haliaeetus leucocephalus* – bald eagle *Hylocichlia mustelina* – wood thrush *Opornis agilis* – Connecticut warbler *Pheuticus ludovicianus* – rose breasted grosbeak *Seiurus aurocapillus* – ovenbird *Sphyrapicus varius* – yellow bellied flycatcher *Wilsonia canadensis* – Canada warbler **Amphibians** *Hemidactylum scutatum* – four toed salamander

Table 3.8-1. Wildlife Species Assemblages by Habitat Association

ECS Habitat Code and Name*	Definition	SGCN Species*
MHn44 - Northern Wet-Mesic Boreal Hardwood-Conifer Forest	Includes forests on generally wet-mesic to mesic soils. Tree canopy is dominated by quaking aspen, paper birch, balsam fir with occasional red maple, white spruce (*Picea glauca*), and black ash (*Fraxinus nigra*). The shrub layer is comprised of beaked hazelnut, chokecherry, and juneberries (*Amelanchier spp.*). The ground layer is dominated by large-leaved aster, bedstraw species, and Canada mayflower (*Maianthemum canadense*).	**Mammals** *Canis lupus* – grey wolf *Lynx canadensis* – Canada lynx **Birds** *Chodeiles minor* – Common nighthawk *Accipiter gentiles* – N. goshawk *Buteo lineatus* – Red shouldered hawk *Catharus fuscescens* – veery *Coccocyzus erythropthalmus* – black-billed cuckoo *C. virens* – eastern wood pewee *Dendroica cearulescens* – black throated blue warbler *D. castanea* – bay-breasted warbler *D. tigrina* – Cap May warbler *Empidonax*- flycatchers *Haliaeetus leucocephalus* – bald eagle *Hylocichlia mustelina* – wood thrush *Opornis agilis* – Connecticut warbler *Pheuticus ludovicianus* – rose breasted grosbeak *Seiurus aurocapillus* – ovenbird *Sphyrapicus varius* – yellow bellied flycatcher *Wilsonia canadensis* – Canada warbler **Amphibians** *Hemidactylum scutatum* – four toed salamander *Plethodon cinereus* – E. red backed salamander
MRn83 - Northern Mixed Cattail Marsh	Includes wetland complexes that are dominated by cattail species (*Typha spp.*). The cattails are often found is dense stands interspersed with pools of open water. Associated species are highly variable.	**Mammals** *Canis lupus* – grey wolf **Birds** *Chodeiles minor* – Common nighthawk *Botaurus lentiginosus* – American bittern *Melospiza georgina* – Swamp sparrow *Scolopax minor* – American woodcock

Table 3.8-1. Wildlife Species Assemblages by Habitat Association

ECS Habitat Code and Name*	Definition	SGCN Species*
MRn93 - Northern Bulrush-Spikerush Marsh	Include emergent marsh communities typically dominated by bulrush species (*Scirpus spp.*) and spike rushes (*Eleocharis spp.*). Associated species include pondweeds (*Potamogeton spp.*), broad-leaved arrowhead (*Sagittaria latifolia*), and bur reed (*Sparganium spp.*). Cattail species present but not dominant.	**Mammals** *Canis lupus* – grey wolf **Birds** *Chodeiles minor* – Common nighthawk *Botaurus lentiginosus* – American bittern *Melospiza georgina* – Swamp sparrow *Scolopax minor* – American woodcock
OW- Other Water Body	Includes open water body not associated with a natural body of water. An example is abandoned open pit mine filled with water.	**Mammals** *Canis lupus* – grey wolf **Birds** *Chodeiles minor* – Common nighthawk *Botaurus lentiginosus* – American bittern *Gavia immer* – common loon *Haliaeetus leucocephalus* – bald eagle **Reptiles** *Chelydra serpentina* – snapping turtle **Amphibians** *Rana palustris* – pickerel frog
WFn55 - Northern Wet Ash Swamp	Includes forested wetlands dominated (50-100% cover) with black ash primarily. Fine-bladed sedges and fern species dominate the herbaceous layer.	**Mammals** ***Lynx canadensis* – Canada lynx** *Canis lupus* – grey wolf **Birds** *Chodeiles minor* – Common nighthawk *C. virens* – eastern wood pewee *Empidonax* -flycatchers *Melospiza georgina* – Swamp sparrow *Opornis agilis* – Connecticut warbler *Scolopax minor* – American woodcock *Sphyrapicus varius* – yellow bellied flycatcher *Wilsonia canadensis* – Canada warbler **Amphibians** *Hemidactylum scutatum* – four toed salamander

Table 3.8-1. Wildlife Species Assemblages by Habitat Association

ECS Habitat Code and Name*	Definition	SGCN Species*
WMn82 - Northern Wet Meadow/Carr	Includes open wetlands dominated by dense cover of broad-leaved graminoids and/or tall shrubs. Tall shrubs include speckled alder, willow species, and red-osier dogwoods. Herbaceous layer dominated by Canada bluejoint, tussock sedge (*Carex stricta*), and lake sedge (*Carex lacustris*).	**Mammals** ***Lynx canadensis* – Canada lynx** *Canis lupus* – grey wolf **Birds** *Chodeiles minor* – Common nighthawk *Coturnicops novaboracensis – Yellow rail* *Zonotrichia albicollis* – white throated sparrow
AFXXXX - Aspen Forest1	Includes forested areas dominated primarily by sapling quaking aspen. Generally these are areas that were logged using clear cutting methods.	**Mammals** *Canis lupus* – grey wolf *Lynx canadensis* – Canada lynx **Birds** *Chodeiles minor* – Common nighthawk *C. virens* – eastern wood pewee *Empidonax* -flycatchers
XDXXOF - Old Field1	Includes native habitats that were disturbed by agricultural, development, or construction activities. The current vegetation likely dominated by non-native vegetation.	**Mammals** ***Lynx canadensis* – Canada lynx** *Canis lupus* – grey wolf **Birds** *Chodeiles minor* – Common nighthawk *Asio flammeus – Short eared owl* *Circus cyaneus* – northern harrier *Zonotrichia albicollis* – white throated sparrow
XDXXXX - Disturbed Land1	Includes primarily mine spoil areas that have not been vegetated.	**Mammals** ***Lynx canadensis* – Canada lynx** *Canis lupus* – grey wolf **Birds** *Chodeiles minor* – Common nighthawk *Asio flammeus* – Short eared owl *Circus cyaneus* – northern harrier *Zonotrichia albicollis* – white throated sparrow

***ECS – Ecological Classification System; SGCN – Species in Greatest Conservation Need**
Note: All SGCN bird species are considered migratory

3.8.1.1 West Range Site

Habitats were first identified for the West Range Site using offsite methods primarily consisting of aerial and satellite imagery review. Assessments of vegetation cover type were completed using LandSat-Based Land Use-Land Cover data, which is Raster-based land cover data derived from 30-meter resolution Thematic Mapper satellite imagery (MNDNR, 2006d). The review was followed by field reconnaissance completed during June 2005. The terrestrial (upland) habitats described below are based on observations collected during the June 2005 field reconnaissance. Supplemental information describing terrestrial habitats was obtained during wetland surveys performed in the summer of 2005.

In some areas, biological communities could not be determined for segments of the proposed HVTL and gas pipelines. Permission to access existing or proposed corridors was not granted by the various landowners and/or easement holders at the time of the field surveys. For areas where access was not permitted, assessments of vegetation cover type were completed through aerial imagery only. Although the source of imagery ranges from June 1995 to June 1996, the overall land use in this area of the state has not changed dramatically. Therefore, the dataset from 1995 to 1996 was considered appropriate for providing land cover information.

Physiography

The onsite geology of the West Range Site is comprised of Pleistocene glacial till over Precambrian bedrock. The glacial till is within the Nashwauk Moraine Association of the Rainy Lobe glacial advance. Deposits of peat and bedrock outcrops are embedded within the till. The site topography is varied with gently sloping hills located in the western half of the West Range Site and a more rugged series of north-south trending ridges located in the eastern half. Flat areas consist of peat deposits (wetlands), which are described in Section 3.7, Wetlands.

Flora (Vegetation)

Timber harvesting has historically been the primary land use in the area, which has influenced the composition and dynamics of the forest cover on the site, creating stands of differing age and species composition. Both clear-cutting and selective harvesting of timber are evident along defined tracts of land within the site resulting in a patchwork of recently cut areas as well as stands of forest cover of varying ages and compositions.

Results of the field studies identified several ecologically successive stages of terrestrial communities possessing a variety of trees, shrubs, and herbs. The following descriptions of the floral communities found on the West Range Site are derived from the *Field Guide to the Native Plant Communities of Minnesota: The Laurentian Mixed Forest Province* (MNDNR, 2003), a vegetation classification system for north-central and northeastern Minnesota. The wetland communities on the site are discussed in Section 3.7. State- and Federally protected flora species are addressed in Section 3.8.3.

The most common forested terrestrial habitat onsite is characterized as the northern mesic hardwood forest, and further classified as the plant community type red oak-sugar maple-basswood-(bluebead lily) forest (MNDNR Code MHn35b). This hardwood forest typically occurs on well-drained to moderately well-drained loamy soils, most often on stagnation moraines and till plains and less frequently on bedrock hills. This plant community association is dominated by sugar maple (*Acer saccharum*), basswood (*Tilia americana*), and northern red oak (*Quercus rubra*). The presence of paper birch (*Betula papyrifera*), red maple (*A. rubra*), and occasionally yellow birch (*B. allegheniensis*) and quaking aspen indicate the plant community type MNDNR Code MHn35b. Subcanopy species in the northern mesic hardwood forest commonly include sugar maple and ironwood (eastern hop hornbeam, *Ostrya virginiana*). Sugar maple is the dominant species in the shrub layer, but other frequent shrub species include beaked hazel (*Corylus cornuta*), chokecherry (*Prunus virginiana*), pogoda dogwood (*Cornus alternifolia*), fly honeysuckle (*Lonicera canadensis*), and balsam fir. Common understory species include wild sarsaparilla (*Aralia nudicaulis*), large-leaved aster (*Aster macrophyllus*), mountain rice grass (*Oryzopsis asperifolia*), and rose twistedstalk (*Streptopus roseus*). Common herbaceous species include Pennsylvania sedge (*Carex pennsylvanica*), sweet-scented bedstraw (*Galium triflorum*), large-flowered bellwort (*Uvularia grandiflora*), and bluebead lily (*Clintonia borealis*).

Field investigations identified northern mesic hardwood forest as one of the more mature forest stands, which was dominated by sugar maple and yellow birch. Trees in this forest stand had approximate diameters at breast height that ranged between 8 to 18 inches. Based upon visual observations, it was estimated that timber-harvesting activities of northern mesic hardwood forest had not occurred within the past 30 to 60 years. Sugar maple and yellow birch were the largest tree species, with many yellow birches averaging a diameter at breast height of 8 to 12 inches and sugar maples averaging diameters at breast height of 12 to 14 inches. The subcanopy and shrub-layer were sparsely vegetated, but contained a few small maples, oaks, ironwood, hazel, honeysuckle, and serviceberries. Forbs and herbaceous plants were commonly represented by bluebead lily, Pennsylvania sedge, maple seedlings, wild sarsaparilla, and large-leaved aster. Stands of sugar maple saplings dominated areas where sunlight penetrated the forest canopy.

The second most common terrestrial habitat at the West Range Site consists of the northern wet-mesic boreal hardwood-conifer forest, and further classified as the aspen-birch-red maple forest (MNDNR Code MHn44a). This hardwood forest association is most commonly encountered on level, clayey sites with a seasonally shallow local water table on glacial lake deposits, stagnation moraines, and till plains. Species composition is variable, and the canopy is often dominated by quaking aspen, paper birch, and balsam fir. Less common associates include red maple, white spruce, and black ash (*Fraxinus nigra*). Trees that formed the forest canopy also formed the subcanopy. The most prevalent species in the shrub layer was beaked hazel, but other common species included chokecherry, juneberries (*Amelanchier* spp.), bush honeysuckle (*Diervilla lonicera*), and mountain maple (*Acer spicatum*). Common understory forbs included Canada mayflower (*Maianthemum canadensis*), wild sarsaparilla, sweet-scented bedstraw, dwarf raspberry (*Rubus pubescens*), and large-leaved aster, which is most common.

The northern wet-mesic boreal hardwood-conifer forest at the West Range Site was characterized as a less mature forest than the northern mesic hardwood forest, and was mostly dominated by paper birch interspersed less frequently with balsam fir. Other less common species included white pine (occasional), American elm (*Ulmus americana*), sugar maple, and green ash (*Fraxinus pennsylvanica*). Understory species consisted mostly of beaked hazel and serviceberries. Immature red maple, basswood, quaking aspen, and big-toothed aspen (*Populus grandidentata*) were also observed at the shrub and sub-canopy layer. Common understory forbs included, but were not limited to, large-leaved aster, bracken fern (*Pteridium aquilinum*), bluebead lily, species of clubmoss, Canada mayflower, and sweet coltsfoot (*Petasites frigidus*).

The remaining terrestrial forested cover types within the West Range Site were identified as second growth aspen forest, which was characterized as early successive, near monotypic, even-aged stands emerging after logging activities. This community had a tree canopy dominated by quaking aspen and balsam poplar (*Populus balsamifera*). Generally, vegetation in these areas ranged from 10 to 20 years in age and was defined by even-aged canopy trees, many of which were relatively young with small stems. Herbaceous species consisted mainly of big-leaf aster, bracken fern, and goldenrods (*Solidago* sp.). The early successional aspen forest community is recognized in the MNDNR's Mesic Hardwood Forest System as being approximately 0 to 35 years in age, but it has not been assigned a plant community classification code (MNDNR, 2005a). Consequently, these clear-cut areas are referred to as aspen forest.

There were no old-growth or mature conifer forests observed during the field reconnaissance. White pines were observed infrequently and red pine was not observed at the site. All of the terrestrial communities identified have been impacted by silvicultural (forest management) practices and other land use activities at some point in time. The eastern half of the West Range Site had recently been harvested for timber (2005) and portions of the western half of the West Range Site exhibited evidence of logging activities within the past 10 to 20 years, as evidenced by dense stands of quaking aspen sprouts. Evidence of beaver activity was also observed, particularly in the eastern half of the site.

Invasive species observed on the West Range Site consisted of reed canary grass (*Phalaris arundinacea*) and smooth brome (*Bromus inermis*), which were identified in maintained utility ROWs. Other invasive species not observed onsite, but are known to occur within the Arrowhead Region include plant species such as: purple loosestrife (*Lythrum salicaria*), typically located within disturbed emergent wetlands; buckthorn (*Rhamnus cathartica* and *R. frangula*), honeysuckle (*Lonicera tatarica*), and black locust (*Robinia pseudoacacia*), typically located within disturbed forests and along forest edges; and, garlic mustard (*Alliara petiolata*) and crown vetch (*Coronilla varia*), located in herbaceous layers (MNDNR, 1999).

The linear maintained utility ROWs transecting portions of the West Range Site were dominated by a variety of persistent and non-persistent herbaceous plants and occasional shrubs. Wetlands within these linear features typically occupied the lower elevations of the ROWs. Uplands in the ROWs were dominated with old field vegetation, which were comprised of Timothy grass (*Phleum pratense*), Canada blue-joint grass (*Calamagrostis canadensis*), goldenrods (*Solidago* sp.), smooth brome, reed canary grass (*Phalaris arundinacea*), big-leaf aster, bracken fern, wild sarsaparilla, and other pioneer vegetation typical of disturbed areas. Reed canary grass is an invasive species in Minnesota that is a major threat to wetlands and often produces large, single-species stands in which native vegetation are unable to compete for necessary resources. Smooth brome is also an invasive species in Minnesota that is somewhat less noxious than reed canary grass and spreads into disturbed areas as well as moist wooded areas (MNDNR, 2006e). Old field areas that were disturbed or maintained were not assigned specific classification in the MNDNR system for the Laurentian Mixed Forest Province.

LandSat Vegetative Cover Types

For utility and transportation corridors that were not accessible during the 2005 field surveys, GIS-based LandSat-Based Land Use-Land Cover (Raster) data were used to characterize vegetative coverage. The data originated from the Manitoba Remote Sensing Centre, and are downloadable from the MNDNR on-line Data Deli (MNDNR, 2006d). Table 3.8-**2** describes the Land Cover Types from the LandSat-Based Land Use-Land Cover data and Table 3.8-**3** summarizes the Terrestrial Land Cover Types encountered within each utility or transportation ROW during field reconnaissance.

The NWI (Cowardin et al., 1979) and USFWS Circular 39 (Shaw and Fredine, 1956) classifications were used to characterize land cover types within the utility and transportation corridors that were not field surveyed.

Table 3.8-2. Terrestrial Land Cover Types from LandSat-Based Land Use-Land Cover

Land Cover	Definition
Coniferous Forest	Includes areas with at least two thirds or more of the total canopy composed of predominantly woody coniferous species. It may contain deciduous species but is dominated by coniferous species. It includes woodlots, shelter belts, and plantations.
Deciduous Forest	Includes areas with at least two-thirds or more of the total canopy cover composed of predominantly woody deciduous species. It may contain coniferous species but is dominated by deciduous species. It includes woodlots, shelter belts, and plantations.
Grassland	Includes areas covered by grasslands and herbaceous plants. May contain up to one third shrubs and/or tree cover. Areas may be small to extensive and range from regular to irregular in shape. These areas are often found between agricultural land and more heavily wooded areas, along ROWs and drains. Some areas may be used as pastures and be mowed or grazed, and may range in appearance from very smooth to quite mottled. Included are fields which show evidence of past tillage but now appear to be abandoned and grown to native vegetation or planted to a cover crop.
Mixed-Wood Forest	Areas of forest where the canopy is composed of approximately equal amounts of deciduous and coniferous species.
Regeneration/Young Forest	Areas where commercial timber has been completely or partially removed by logging; management activities whose goal is to enhance timber productivity and/or wildlife habitat and to provide age class and species diversity; and catastrophic events, primarily fire and wind damage. These activities have taken place in the last 15 years. Almost all of these areas have been replanted or naturally regenerated into young trees.
Shrubby Grassland	This class includes a combination of grass, shrubs, and trees in which deciduous and/or coniferous treed cover comprises from one third to two thirds of the area, and/or the shrub cover comprises more than one third of the area. This complex is often found adjacent to grassland or forested areas, but may be found alone. These areas are often irregular in shape and vary greatly in size.

Source: MNDNR, 2006d

Table 3.8-3. Terrestrial Land Cover Types within Utility and Transportation Corridor ROWs (West Range Site)

Utility or Transportation Corridor	Land Cover Types from LandSat-Based Land Use-Land Cover					
	Coniferous Forest	Deciduous Forest	Grassland	Mixed-Wood Forest	Regeneration/Young Forest	Shrubby Grassland
HVTLs	X	X	X	X	X	X
Gas Pipelines	X	X	X	X	X	X
Process Water Pipelines	X	X		X	X	
Process Water Blowdown Pipelines	X	X	X	X	X	
Potable Water and Sewer Pipelines	X	X	X	X	X	
Rail Lines	X	X	X	X	X	
Access Roads	X	X	X	X	X	

Source: MNDNR, 2006d

Fauna (Wildlife)

Wildlife at the West Range Site included species typical to northern Minnesota. The following discussion describes the wildlife habitats as related to wetland communities (described in Section 3.7) and terrestrial vegetative communities described above, and faunal assemblages that would be expected to occur within each of those communities. Fauna that were observed during the field investigations are also addressed. State- and Federally protected fauna are addressed in Section 3.8.3.

The quality of the wildlife habitat varies throughout the site, and the majority of the site could be characterized as medium habitat quality based upon the plant species composition, wildlife habitat structure, vegetation interspersion, and habitat complexity. Wetlands qualify as the highest quality habitats on site and the bog wetlands would rank as high quality due to their uniqueness and lack of disturbance, when compared to the condition and spatial distribution of terrestrial habitats at the West Range Site. Areas experiencing recent timbering and areas with monoculture stands of aspen with little or no forest structure diversity would be considered low value habitat. However, these areas are distinguished from other disturbed areas such as mined areas within utility or road ROWs because these areas, when viewed over a long period of time, would succeed from one successive stage to another.

A combination of timbering, mining, and development (utilities, roads, and buildings) has created areas of fragmented habitat. Habitat fragmentation is prevalent southwest of the site boundary because of the types of land management that has historically occurred. The existing roads and high voltage transmission corridors in and around the project area have resulted in permanent habitat fragmentation for some species. Land uses and types of habitats are similar in areas surrounding the West Range Site.

The quality of habitat often dictates the abundance and diversity of both plant and animal species found within the ecosystem. For instance, trees with a diameters at breast height of greater than 10 inches could be utilized as dens for cavity-dwelling birds. Also, habitat structure becomes increasingly complex along a vertical axis from the forest floor to the top of the canopy, which also correlates positively with the potential use of these habitats by avifauna (birds) (Bartoldus et al., 1994) and mammals. Animal communities within each of these habitat types are discussed below.

Mammals

Mammals that commonly utilize northern mesic hardwood forest include predators such as fox, lynx, and raccoons (*Procyon lotor*), or large ungulates such as moose (*Alces alces*) and deer (*Odocoileus virginianus*). Many deer were observed at the West Range Site and deer browse lines were evident. A moose skeleton was also observed on the site. Beaver (*Castor canadensis*) activity was prevalent, especially within the eastern half of the site. During the June 2005 field reconnaissance a gray wolf was observed preying on a deer fawn.

The northern wet-mesic boreal hardwood-conifer forest is patchy and discontinuous at the West Range Site due to the presence of other habitat types (wetlands), and forestry management activities. The wildlife using this habitat type is anticipated to be common to second growth forests and the varying upland habitats found in northern Minnesota. The northern wet-mesic boreal hardwood-conifer forest provides similar wildlife habitat as the northern mesic hardwood forest community. The well-defined shrub layer and older tree canopy present at the site increases the available wildlife habitat.

Wildlife diversity within the aspen forest cover type is expected to be less than the northern mesic hardwood forests because of a simpler wildlife habitat structure and a decrease in plant diversity. This may be especially applicable to the younger stands of aspen. However, aspen communities can provide habitat for specialty species that are not found in other habitats and have preferences exclusive to aspen forests. Quaking aspens are often considered keystone species for which other forms of plants and animals are dependent on for food, shelter, or reproduction. Aspens are an important part of the northern woods food web for many levels of life ranging from microscopic insects to beaver and moose. A significant portion of the forest area consists of monotypic communities of poplar and aspen trees, and has limited cover type diversity. Trees in the area have den cavities, and thus provide shelter and nesting habitat for a variety of birds and wildlife.

Many of the wetland areas present at the site can be characterized as vernal pools and provide wildlife with a source of drinking water during early spring and summer.

Numerous mammal species often take advantage of the open grassy corridors found within utility ROWs and other forest edge habitats. Predator and scavenger mammal species utilize this habitat to locate and capture food. Deer and other mammals also use this habitat for food.

Birds

As birds are often more transient than mammals, they can be observed in a variety of habitats; however, they often nest in a particular habitat type. Wooded, shrub-swamp, marsh, and bog wetlands provide nesting and forging habitat for songbirds, raptors, wading birds, rails, and waterfowl. Avifauna generally partition habitat by occupying different vertical layers within a habitat. For example, the limbs and branches in the upper part of the forest canopy provide song and roosting perches and support for nests, while overhanging vegetation can provide concealment from predators (Bartoldus et al., 1994). Field investigations at the West Range Site indicate that the project area has wetlands with a light to moderately dense shrub layer. Consequently, the structure and habitat complexity of wetlands and uplands varies throughout the project area, qualifying the project area as moderate wildlife habitat.

Several migratory bird species use wetlands, including peatlands, during the spring and summer as part of their life cycles. Typical migratory birds using peatlands include species such as the alder flycatcher (*Empidanox alnorum*), swamp sparrow (*Melospiza georgiana*), common yellowthroat (*Geothlypis trichas*), and LeConte's sparrow (*Ammodramus leconteii*). Table 3.8-**4** summarizes the migratory bird species that may be found in peatlands (MNDNR, 2006f).

The West Range Site contains breeding bird habitat in uplands as well as wetlands, as evidenced by songbirds engaged in territorial behaviors and calls during the June and July 2005 field surveys. These activities were assumed to be from nesting birds. Raptor nesting was assumed to occur throughout the site as well, although no raptor nesting was observed. Two adult unidentifiable Accipiters (forest dwelling hawks) and a barred owl (*Strix varia*) were observed. Of the three potential Accipiters found utilizing forested areas, the northern goshawk is the only Accipiter considered rare and is a designated sensitive species in Minnesota by the USDA Forest Service. Goshawks tend to prefer mature, undisturbed conifer forests, which are present throughout the region, including the West Range Site and IGCC facility footprint area. The MNDNR is currently upgrading the status of this species to special concern. There is no Federal designation as threatened or endangered for this species under the Endangered Species Act of 1973. The MNDNR may ultimately request or require surveys for the northern goshawk. Ruffed grouse (*Bonasa umbellus*) were commonly observed especially in the second growth aspen forest.

Table 3.8-4. Avifauna Potentially Utilizing Wetland Habitat (West Range Site)

Scientific Name	Common Name
Dendroica petechia	yellow warbler
Passerculus sandwichensis	Savannah sparrow
Dolichonix orzivorous	bobolink
Empidanox alnorum	alder flycatcher
Melospiza georgiana	swamp sparrow
Geothlypis trichas	common yellowthroat
Ammodramus leconteii	LeConte's sparrow
Oporornis agilis	Connecticut warbler
Dendroica coronata	yellow-rumped warbler
Vermivora ruficapilla	Nashville warbler
Dendroica palmarum	palm warbler
Catharus guttatus	hermit thrush
Empidonax flaviventris	yellow-bellied flycatcher
Junco hyemalis	dark-eyed junco
Spizella passerina	chipping sparrow

Source: MNDNR, 2006f

Certain avian species take advantage of the open grassy forest edge areas created by roadways and utilities. Predatory birds such as hawks and eagles utilize these corridors for increased line of sight of prey species. Grasslands in Minnesota can provide habitat for a variety of bird species, which include, but are not limited to grasshopper sparrows (*Ammodramus savannarum*), Henslow's sparrows (*A. henslowii*), Baird's sparrows (*A. bairdii*), chestnut-collared longspurs (*Calcarius ornatus*), and Sprague's pipit (*Anthus spragueii*). Grasslands can also provide habitat for numerous species of mammals such as Plain's pocket mice (*Pergonathus flavescens*), prairie voles (*Microtus ochrogaster*), and Richardson's ground squirrels (*Spermophilus richardsonii*), and herptile species such as western hognose snakes (*Heterodon nasicus*) (MNDNR, 2006g).

No colonial migratory birds were observed within the West Range Site at the time of the field investigation; however, no specific survey targeting migratory birds was conducted. It is assumed that colonial migratory birds utilize habitats on site during the songbird nesting season, which occurs from approximately April 15 through August 15. Colonial migratory birds include species such as nesting swallow colonies, heron and egret nests, or other colonial nesting species.

The MNDNR NHIS database lists no bald eagle nesting areas within the West Range Site, nor within a 2-mile radius of the project area or the transportation and utility corridors.

Reptiles and Amphibians

Wetlands provide habitat for a variety of wildlife species common throughout the West Range Site. Bog habitat is the most unique onsite habitat, which is generally considered potential habitat for rare species of herpetofauna (reptiles and amphibians) (MNDNR, 2006f). Isolated wetlands (wetlands not hydrologically connected to interstate waters via a surface connection, such as a channel) function as reproductive habitat for herpetofauna. Adult anurans (frogs) were observed during the field reconnaissance and included American toad (*Bufo americanus*), gray treefrog (*Hyla versicolor*), northern leopard frog (*Rana pipiens*), and wood frog (*Rana sylvatica*). Potential habitats were also observed for the spring peeper (*Pseudacris crucifer*), western chorus frog (*P. triserata*), green frog (*Rana clamitans*), and mink frog (*R. septentrionalis*), all species common to the area. The mink frog is common to lakes and lake-fringe wetlands and could occur at the site. Onsite wetlands also provide potential habitat for the eastern newt (*Notopthalmus viridescens*) and the blue-spotted salamander (*Ambystoma laterale*), which are common to northern Minnesota.

Wildlife Protected Areas

No designated Federal Wildlife Refuges, Waterfowl Production Areas, or National Preserves are within or immediately adjacent to the West Range Site boundary. No MNDNR Wildlife Management Areas, Wildlife Refuges, State Natural Areas, designated Game Lakes, or Designated Trout Streams occur within or immediately adjacent to the West Range Site or any of the associated utility or transportation corridors. **Pickerel Creek, which is a** designated trout stream that drains into Swan Lake (east of Pengilly), is located 2,500 feet east of one of the HVTL corridors proposed for the West Range Site.

3.8.1.2 East Range Site

Habitats for the East Range Site were first identified through a review of aerial and satellite imagery. Vegetation cover types were characterized through the use of LandSat-Based Land Use-Land Cover data, which is Raster-based land cover data derived from 30-meter resolution Thematic Mapper satellite imagery (MNDNR, 2006d). The terrestrial (upland) habitats described below are based on field surveys conducted during October 2004, and wetland surveys performed in September through October 2005. Observations of specific flora and fauna during field surveys are also discussed.

Floral and faunal communities could not be determined for some segments of the utility corridors during the field surveys because permission to access these corridors was not granted by the various landowners and/or easement holders. For these utility corridors, vegetation cover types were characterized through the use of aerial imagery. Although the source imagery dates range from June 1995 to June 1996, overall land use in this area has not dramatically changed; therefore, the dataset was considered appropriate for evaluation.

Physiography

The geology is comprised of a thin mantle of Pleistocene glacial till over Precambrian bedrock amidst areas that are exposed bedrock. The glacial till (surface geology) is a ground moraine within the Nashwauk Moraine Association of the Rainy Lobe glacial advance. Deposits of peat and bedrock outcrops occur within the till. The site topography is comprised of flat areas within the larger wetland basins and gently undulating hills elsewhere. The large ridges associated with the Iron Range occur approximately one mile to the north of the site. Large spoil and overburden piles surround the northern and western sides of the site. Flat areas are often peat deposits (wetlands), which are described in Section 3.7, Wetlands.

Flora (Vegetation)

Timber harvesting is the primary land use for the site. A portion of the uplands within the East Range Site were recently clear-cut (within the previous five years). Timber harvesting has influenced the composition and dynamics of the forest cover on the site. Large areas are virtually devoid of tree cover due to recent clear-cutting.

The following descriptions of the vegetative communities found on the East Range Site were derived from the *Field Guide to the Native Plant Communities of Minnesota: The Laurentian Mixed Forest Province* (MNDNR, 2003), a vegetation classification system for north central and northeastern Minnesota. The wetland communities on the site are discussed in Section 3.7. State- and Federally protected flora and fauna species are addressed in Section 3.8.3.

The forested terrestrial (upland) habitats at the East Range Site consist of northern mesic mixed forest, further classified as the native plant community type aspen-birch forest (balsam fir subtype) (MNDNR Code FDn43b1). This mixed forest is typically on loamy soils over bedrock in scoured bedrock uplands or on loamy, rocky, or sandy soils on glacial moraines, till plains, and outwash plains. This plant community association is dominated in the ground layer by wild sarsaparilla, large-leaved aster, bluebead lily, and bunchberry (*Cornus canadensis*). The shrub layer consists of beaked hazel, fly honeysuckle, and mountain maple. Canopy composition is mixed and includes paper birch, quaking aspen, white pine, balsam fir, white spruce, red pine, and white cedar (*Thuja occidentalis*). The presence of balsam fir in either the shrub layer or the subcanopy is an indicator of the northern mesic mixed forest.

The northern mesic mixed forest habitat at the East Range Site contained a wide range of trees. From field observations, it was obvious that timber logging had occurred historically and in recent years. The entire site has undergone several iterations of clear-cuts based upon tree age and plant community dominance. Quaking aspen stands were perpetuated through clear-cutting activities, as evidenced by the stands of evenly aged aspens observed on the site. The most mature trees in many areas were in an early- to mid-successional stage with ages of less than 50 years. The landscape setting for this area was mostly scoured bedrock terrain. The soils in this natural community consisted of shallow parent material, mostly sands and loams, over bedrock.

Invasive species observed on the East Range Site consist of reed canary grass and smooth brome, which were identified in maintained utility ROWs. Other invasive species not observed onsite, but are known to occur within the Arrowhead Region include plant species such as: purple loosestrife, typically located within disturbed emergent wetlands; buckthorn, honeysuckle, and black locust, typically located within disturbed forests and along forest edges; and garlic mustard and crown vetch, located in herbaceous layers (MNDNR, 1999).

LandSat Vegetative Cover Types

For utility and transportation corridors that were not accessible during the 2004 or 2005 surveys, use of the LandSat-Based Land Use-Land Cover (Raster) data were used to characterize vegetative coverage along these corridors (MNDNR, 2006d). A summary of each terrestrial vegetative land cover encountered within utility and transportation corridors is provided in Table 3.8-**5** (refer to Table 3.8-**2** for descriptions of the land cover types). The National Wetlands Inventory (Cowardin et al., 1979) and USFWS Circular 39 (Shaw and Fredine, 1956) classifications were used to characterize wetland or aquatic habitats within the utility and transportation corridors that were not field surveyed.

Table 3.8-5. Terrestrial Land Cover Types Encountered within the Utility and Transportation Corridor ROWs (East Range Site)

Utility or Transportation Corridor	Land Cover Types from LandSat-Based Land Use-Land Cover					
	Coniferous Forest	Deciduous Forest	Grassland	Mixed-Wood Forest	Regeneration/Young Forest	Shrubby Grassland
HVTLs	X	X	X	X	X	X
Gas Pipeline	X	X	X	X	X	X
Process Water Pipelines		X	X	X	X	X
Railroad Alternatives	X			X	X	X
Potable Water and Sewer Lines		X	X	X	X	
Access Roads	X	X		X	X	X

Source: MNDNR, 2006d

Fauna (Wildlife)

Fauna present at the East Range Site would include species typical to northern Minnesota. The following discussion describes the wildlife habitats as related to the wetland habitats (described in Section 3.7) and the terrestrial vegetative communities described above, and faunal assemblages that are expected to occur within each community. Fauna observed during the field investigations are also addressed. State- and Federally protected fauna are addressed in Section 3.8.3.

The quality of the wildlife habitat varies throughout the site. The majority of the site could be characterized as having medium quality habitat based upon the plant species composition, wildlife habitat structure, vegetation interspersion and wildlife utilization. Wetlands were the highest quality habitat on site and the bog wetlands would rank as high quality due to their uniqueness and lack of disturbance. Emergent wetlands also occur in areas where organic material forms the dominant substrate. There appears to be a high degree of vegetative cover type interspersion and an irregular shoreline in areas where emergent wetlands exist. The occurrence of emergent vegetation along shorelines creates favorable habitat for fisheries. Disturbed habitat from recent clear-cutting was widespread, and was the primary reason for the diminished quality in wildlife habitat.

The East Range Site upland habitats have been widely impacted by recent clear-cutting. All of the uplands are classified as northern mesic mixed forest, aspen birch forest (balsam fir subtype) (MNDNR Code FDn43B1). Most of the un-harvested stands of this habitat are located in the eastern third of the site. Clear-cuts dominate elsewhere and wildlife habitat has been modified and qualitatively reduced in these areas. Avifauna diversity is highest within the un-harvested stands compared to the clear-cut areas. This includes nesting and foraging habitats for songbirds and raptors. The same also applies to suitable habitats for reptiles, amphibians, and mammals where clear-cutting has diminished habitat quality and complexity for these faunal groups.

Wetland habitats for fauna are relatively diverse and common on the East Range Site. Bog habitat is the most unique habitat and is potential habitat for rare species of fauna, primarily birds and small mammals, but is not the most common or abundant wetland type within the East Range Site.

Mammals

The list of mammals that potentially utilize this site is comprehensive and includes predators, such as bears, and large ungulates, such as moose and deer. A moose calf was observed during the wetland assessments in 2004 and evidence of moose was widespread throughout the East Range Site. Gray wolf tracks and scat were also observed occasionally throughout the site. Deer were observed frequently, and a family of otters (*Lutra canadensis*) was observed on the eastern side of the project site. Evidence of beaver foraging for food was widespread. Many of the wetlands within the project area contained beaver lodges and dams. Habitat for fisher (*Martes pennanti*) and pine martin (*M. americana*) was confined to the forested wetlands where clear-cutting has not occurred. Snowshoe hare habitat is also mostly confined to the forested wetlands for the same reason. This species is the primary prey item for the Federally threatened Canada lynx (discussed in Section 3.8.3). Lastly, the American black bear (*Ursus americana*) is relatively common in the area and could be expected to utilize the habitat resources in the area.

Numerous mammal species often take advantage of the open grassy corridors found within utility ROWs and other forest edge habitats. Predator and scavenger mammal species utilize this habitat to locate and capture food. Deer and other mammals also use this habitat for food.

Birds

No raptor nests were observed during the 2004 and 2005 habitat characterizations and wetland surveys. An adult merlin (*Falco columbaris*) was observed in flight exhibiting territorial behaviors. A great horned owl (*Bubo virginianus*) was observed as well. Habitat for the red-shouldered hawk (*Buteo* ***lineatus***) and northern goshawk was absent within the East Range Site, which is probably attributable to forest management activities. Probable habitats and improved habitat quality for these two rare species increases east and south of the project area, especially when entering the USDA Forest Service property. No breeding concentrations of colonial migratory birds (i.e., nesting swallow colonies, waterbird colonies, heron and egret nests, or other colonial nesting species) were observed within the East Range

Site. Migratory birds that may be found near the East Range Site would be comparable to those listed in Table 3.8-**4** for the West Range Site.

No bald eagle nests were observed within or immediately adjacent to the project site and the MNDNR NHIS database shows no nesting areas within the East Range Site or within a 2-mile radius of the East Range Site project area. The NHIS has documented five bald eagle nesting areas within a one-mile radius of the various proposed and existing utility and transportation corridors.

Wooded and shrub wetlands also provide nesting and foraging habitat for songbirds and raptors. Marsh wetlands provide foraging habitats for wading birds, rails, and waterfowl.

Grasslands in Minnesota can provide habitat for a variety of bird species, which include, but are not limited to grasshopper sparrows, Henslow's sparrows, Baird's sparrows, chestnut-collared longspurs, and Sprague's pipit. Grasslands can also provide habitat for numerous species of mammals such as Plain's pocket mice, prairie voles, and Richardson's ground squirrels; as well as herptile species such as western hognose snakes (MNDNR, 2006g).

Reptiles and Amphibians

Many of the wetlands on the East Range Site appear to be isolated and provide habitat for herpetofauna. Herpetofauna observed utilizing isolated wetlands include adult anurans and included species such as the American toad, gray treefrog, northern leopard frog, and wood frog. Potential habitats were also observed for the spring peeper, western chorus frog, and green frog all species common to the area. These wetlands also provide potential habitat for the eastern newt and the blue-spotted salamander. Several of these species require upland habitats for some portion of their life. In some cases, timber harvesting may have provided upland habitats for herpetofaunal species that require open upland habitats on sandy soils. For other herpetofaunal species, clear-cutting may instead reduce favorable habitat.

Wildlife Protected Areas

No designated Federal Wildlife Refuges, Waterfowl Production Areas, nor National Preserves are within or immediately adjacent to the East Range Site boundary. No MNDNR Wildlife Management Areas, Wildlife Refuges, State Natural Areas, designated Game Lakes, nor Designated Trout Streams occur within or immediately adjacent to the East Range Site or any of the associated utility or transportation corridors.

3.8.2 Aquatic Communities

The following sections provide information regarding aquatic habitats and associated fisheries located on or adjacent to the West Range Site, East Range Site, and associated utility and transportation corridors.

3.8.2.1 West Range Site

There are no bodies of water within the West Range Site. There are several streams and rivers, and one body of water, Ox Hide Lake, located along the utility corridors associated with the West Range Site. These surface waters can generally be broken down into three basic categories: small ephemeral/perennial streams, rivers, and lakes. These three basic classifications all have somewhat unique fisheries components, and will be discussed in general terms. In addition, many former iron mine pits have filled with water via groundwater infiltration and surface water runoff following the cessation of mining operations. Where pits are hydrologically connected to streams and rivers, as in the case of the Lind Mine Pit and Prairie River, aquatic communities have populated the pits.

There are no waterways designated as trout streams within the area of the West Range Site or proposed utility and transportation corridors, although it is possible that trout are occasionally present in some of the area waterways not designated. **With the exception of the CMP, which has developed a self-sustaining population of lake trout (*Salvelinus namaycush*) due to MNDNR stocking in past**

years, none of the waterways or water bodies in the area is considered to be cold water due to the lack of naturally reproducing trout populations and significant groundwater source hydrology.

Small streams are typically less than three feet across, tend to be very shallow, have low discharge, are often vegetated with emergent marsh species, and tend to function as conveyance systems between the multiple wetlands and water bodies located in the project vicinity. These small waterways are also highly prone to hydrologic alteration due to the abundance of beaver and associated beaver dams. The fisheries habitat in these small streams is limited due to the lack of space and cover and drawdown during dry periods. While beaver dams can obstruct fish passage, they can also create small ponds that benefit some species. These smaller streams can be important for allowing fish to move between more permanent suitable habitats, but are generally not primary fisheries resources. If fish species are present in these small stream systems, they would likely be dominated by small non-game species such as Cyprinids (minnows, dace, and creek chub) and Percids (darters).

The rivers, primarily the Swan River, Prairie River, and their tributaries, support more fish populations than the smaller streams. Both of these river systems discharge into the Mississippi River and serve to connect many of the lakes in the region including Trout Lake, Holman Lake, Twin Lake, and Swan Lake. **Pickerel Creek** flows into Swan Lake in the vicinity of the HVTL ROW at the West Range Site. **The target management fish species for Pickerel Creek is brook trout (*Salvelinus fontinalis*), which are currently stocked every other year by the MNDNR, but population surveys also indicate that low amounts of brook trout natural reproduction is occurring (Minnesota Steel, 2007).**

In recent years, Trout Lake has provided a quality northern pike (*Esox lucius*) and walleye (*Sander vitreus*) fishery and these species are the primary species of management, with black crappie (*Pomoxis nigromaculatus*) as the secondary species. A 2004 survey indicated that lake fish populations were dominated by yellow perch (*Perca flavescens*), followed by rock bass (*Ambloplites rupestris*), walleye, and bluegill sunfish (*Lepomis macrochirus*). Other species present in the lake included pumpkinseed sunfish (*Lepomis gibbosus*), northern pike, largemouth bass (*Micropterus salmoides*), and black crappie (MNDNR, 2004c).

Holman Lake has a fairly simple fish community and supports a modest fishery for panfish. Northern pike are the dominant predator. A 2002 survey revealed bluegill sunfish and northern pike as being the most abundant species, and largemouth bass are also fairly abundant. Bluegill sunfish and black crappie catch rates have typically been below the lake class average. Yellow perch abundance has typically been very low in Holman Lake. Other species sampled in the 2002 assessment included black and yellow bullhead (*Ameiurus* spp.), rock bass, pumpkinseed sunfish, bigmouth buffalo (*Ictiobus cyprinellus*), and bowfin (*Amia calva*) (MNDNR, 2002).

Upper and Lower Panasa Lakes are connected through an inlet, and both are affected by mining activities in the watershed. Lower Panasa Lake is managed primarily for walleye, northern pike and panfish (MNDNR, 1998a). Walleye fry are stocked in Lower Panasa Lake and are thought to migrate to Upper Panasa Lake, which is fished for walleye, northern pike, and black crappie (MNDNR 1998b).

The primary management species for Swan Lake are walleye and northern pike, with black crappie as the secondary species. Tullibee (*Coregonus tullibee*), rock bass, and bluegill sunfish are also present (MNDNR, 2005b).

Because of the interconnectedness of these rivers and lakes, the fish assemblages are likely to be similar in most of these rivers. The rivers would support prime game fish species such as northern pike, largemouth bass, bluegill sunfish, and possibly walleye. Non-game species likely include bowfin, many minnows and shiners (Cyprinidae), white sucker (*Catostomus commersoni*), redhorse (*Moxostoma* spp.), bullhead, and darters (Percidae). Ox Hide Lake, like many of the lakes in the region, supports northern pike, largemouth bass, panfish, and yellow perch.

In past years the Canisteo Pit was stocked with lake trout, and the population has become self-sustaining. Lake trout is a swift, torpedo-shaped game fish of deep, cold waters, which is eagerly sought by commercial, sport, and subsistence fishermen. Young lake trout generally feed on plankton, insects, freshwater shrimp, and other aquatic invertebrates; whereas larger trout tend to prey on smaller fish. They spawn over large cobble and boulder substrates (BWCAW, 2007).

Rainbow smelt (*Osmerus mordax*) is a small, slender, cylindrical-shaped fish with a large mouth and lower protruding jaw with teeth on both mandibles. Found naturally in coastal inshore areas between Newfoundland and Virginia, the species has been introduced into freshwater systems throughout the northeastern and central U.S., including the Canisteo Mine Pit, where it now has a self-sustaining population. This introduced species poses a potential threat to the fishes of northern lakes, as it is a voracious feeder on the young of native fish, including walleye and lake trout (BWCAW, 2007).

Invertebrate populations in streams around the project area, e.g. Pickerel Creek, generally indicate moderate to good water quality. Genera that are typically representative of good water quality include caddisflies (Family Tricoptera), mayflies (Ephemeroptera), and stoneflies (Plecoptera), which are relatively abundant in most nearby waterways (MNDNR and USACE, 2007).

3.8.2.2 East Range Site

Several small streams and one lake are located near the East Range Site and the proposed utility or transportation corridors. Onsite fish habitats are restricted to an unnamed creek and deeper wetlands that occur within the central portion of the site. Small fish (Notropids) were observed in these open water habitats. Based on the field observations, small fish are most likely the only fish assemblages present. There are no lakes or larger water bodies that could support game fish habitat at the East Range Site. Beaver dams are widespread in the area and could function as barriers restricting the migration of larger fish, such as spring spawning migrations of northern pike into the upstream segments of surface waters. The emergent vegetation bordering open waters provides shelter and reproductive habitat for non-game fish species. The wetland fringe bordering open water, along with floating vascular emergents, provides habitat for macroinvertebrates, which in turn acts as a food source for waterfowl, herpetofauna, and other water-dependent avifauna. Wetlands characterized by deep-water marshes or border open water systems (e.g., type 5 wetlands) frequently tend to have a diverse littoral plant community, which attracts different invertebrates, thereby diversifying the nutritional requirements for a variety of species (Bartoldus et al., 1994).

The small streams that are proposed to be crossed by the utility or transportation corridors are typically less than three feet across, tend to be very shallow, have low discharge, are often associated with wetlands, and tend to act as conveyance systems between the multiple wetlands and water bodies located in the project vicinity. These small waterways are highly prone to hydrologic alteration due to the abundance of beavers and associated beaver dams. The fisheries habitat in these small streams is limited due to the lack of space and cover and occasional lack of water during dry periods. Beaver dams can block fish passage, but can also create small ponds suitable for some species to thrive. These smaller streams can be important for allowing fish to move between more permanent suitable habitats, but are generally not primary fisheries resources. If fish species are present in these small stream systems, they would likely tend to be dominated by small non-game species such as Cyprinids and Percids.

Colby Lake, a 539-acre lake that has inlets from the Partridge River, Wyman Creek, and Whitewater Lake is located just south of the proposed footprint of the Mesaba Generating Station. A fish survey completed in **2005** identified Colby Lake as being generally below average in terms of fish abundance as compared to other lakes in the region**, but also showed a recent increase in bluegill sunfish and channel catfish (*Ictalurus punctatus*) numbers**. Fish populations in **2005** were dominated by bluegill sunfish**,** followed by **black crappie,** northern pike, **channel catfish,** yellow perch, and white sucker.

Other species were present in low numbers, including walleye, yellow bullhead (*Ameiurus natalis*), rock bass**, and largemouth bass** (MNDNR, 2006h).

Mine pits in the East Range vicinity are all located on **former** CE property that is not open to the public. Since these pits have been associated with more recent mining activities, and they are located on private property, information about aquatic communities in these pits is not available.

Invertebrate populations in streams around the project area generally indicate moderate to good water quality. Genera that are typically representative of good water quality include caddisflies (Family Tricoptera), mayflies (Ephemeroptera), and stoneflies (Pliecoptera), which are relatively abundant in most nearby waterways (MNDNR and USACE, 2007).

3.8.3 Protected Species and Habitats

3.8.3.1 Federally Protected Species

The Federal Endangered Species Act is regulated by the USFWS, and both the West Range Site and the East Range Site (including the associated utility and transportation corridors) are within USFWS Region 3. Currently, population studies are being conducted for the Canada lynx (threatened Federal status) in conjunction with a formal consultation that has been initiated for other projects in the area (i.e., the proposed PolyMet mine expansion, the Minnesota Steel Industry facility, and the IPSAT Mine Expansion). In a telephone conversation with the USFWS Region 3 Endangered Species Biologist (October 10, 2005), the USFWS invited Excelsior to participate in this comprehensive formal consultation process and expand these surveys to include the West Range Site and the East Range Site, which are both in close proximity to the other projects that are currently under consultation (USFWS, 2005).

The Federal protection status of the gray wolf in the western Great Lakes region has been affected by recent actions and is yet uncertain. In March 2007, the USFWS removed the gray wolf from the endangered species list. But, in September 2008, the U.S. District Court for the District of Columbia overturned that decision, and the USFWS issued a rule in December 2008 to comply with court orders reinstating regulatory protections for the gray wolf in the western Great Lakes and northern Rocky Mountains. The rule reinstated the listing of the gray wolf in Minnesota as threatened and reinstated the former designated critical habitat for gray wolf in Minnesota. Subsequently, on January 14, 2009, the Department of the Interior announced the removal of the gray wolf in the western Great Lakes and portions of the Northern Rocky Mountains from protection under the Endangered Species Act. However, that decision was not published in the *Federal Register* before it was placed under review by the new Presidential administration on January 20, 2009 (USFWS, 2009). On June 29, 2009, the USFWS announced they had reached a settlement agreement with plaintiffs in a lawsuit challenging the removal of Endangered Species Act protections from gray wolves in the western Great Lakes. The agreement provides additional opportunity for public comment on the de-listing to ensure compliance with the Administrative Procedures Act. Therefore, to comply with the court-approved settlement, at this time, gray wolves are afforded the full protection of the Endangered Species Act with threatened status. Should the USFWS choose to de-list again, they will be required to hold a 60-day public comment period prior to the de-listing (USFWS, 2009a; USFWS, 2009b).

One Federally listed species in northern Minnesota **has** been delisted **– the** bald eagle. Consultation with the USFWS is not required for delisted species. Therefore, Canada lynx **and gray wolf are** the only Federally protected species of interest in the areas of the alternative sites.

Preliminary discussions between DOE and USFWS on listed species began in September 2005, and subsequent discussions have been held. DOE initiated formal consultation with USFWS in accordance with Section 7 of the Federal Endangered Species Act in a letter dated December 18, 2006 (Appendix E), which requested a biological opinion regarding potential impacts and

mitigation for listed species on both sites. In a letter dated March 6, 2007 (Appendix E), the USFWS agreed to consult with DOE on the West Range Site. USFWS concurred with DOE's determination that the Proposed Action may affect the Canada lynx and expressed concerns that the vulnerability of lynx to vehicle collisions when crossing roads would be the most pressing challenge. USFWS stated that activities resulting in new roads, new road alignments, widened ROWs, or increased vehicle speeds in habitat occupied by the Canada lynx might affect this species.

On August 15, 2008, DOE submitted a biological assessment (BA) for the Canada lynx and a determination that the proposed action may affect, but is unlikely to adversely affect, Canada lynx or their critical habitat. In subsequent discussions, the USFWS requested that, due to uncertainty over the listing of the gray wolf, the BA be revised to include potential effects on the gray wolf. On February 25, 2009, DOE submitted the revised BA addressing impacts to both the Canada lynx and the gray wolf. As stated in this version of the BA (ENSR, 2009) (see Appendix E), "impacts associated with project habitat loss and disturbance, and collisions with vehicles and trains, could impact lynx and gray wolf. Using worst case assumptions, 618 acres of wildlife habitat would be lost within the West Range Site and associated utility and transportation corridors; 929 acres of habitat would be lost within the East Range Site and its associated corridors. Noise, light, and glare from the generating facility could cause lynx and wolves to avoid either area. Lynx and gray wolf could be hit by vehicles or trains. Other potential impacts include human encroachment in the backcountry, and increased interspecific competition facilitated by snow compaction." However, the BA concluded that given the large amount of similar habitat in the region and the low predicted density of Canada lynx and gray wolf in the area, these species and their critical habitat may be affected, but are unlikely to be adversely affected by the Mesaba Energy Project. In a letter sent on May 1, 2009, the USFWS concurred with DOE's conclusion that the proposed action may affect, but is unlikely to adversely affect, Canada lynx, gray wolf or their critical habitat at the West Range Site (Appendix E). In the event that the East Range would be selected for the Proposed Action, DOE would resubmit the BA for USFWS concurrence at the East Range site.

West Range Site

The value of habitats for Canada lynx and gray wolf are discussed in detail in the BA (see Appendix E).

The USFWS Region 3 list of Federally protected species describes Itasca County, Minnesota as occurring within the range of the Canada lynx (threatened). There are no Federally protected plant species identified by the USFWS as occurring within the West Range Site or any of the proposed utility or transportation corridors.

According to the MNDNR data (MNDNR, 2005**c**), there have been both "verified without evidence of breeding" and "unverified" sightings of Canada lynx within Itasca County during 2005. Potential Canada lynx habitat and prey species were observed on and around the West Range Site during the field reconnaissance. However, in a letter concerning impacts to Federally protected species resulting from the development of the proposed Minnesota Steel Industries project in Nashwauk, USFWS determined that the project would be located near the southwestern edge of the Canada lynx's range. USFWS determined that the proposed mine may affect lynx moving through the area, but it was unlikely to result in reduced survival or reproduction of any lynx, partly because the site would be located far from areas of high lynx densities, and an intensive survey did not find any indications of lynx present in the area of the potential mine site (Sullins, 2007). The West Range Site is approximately 9 miles west of the proposed Minnesota Steel Industries mine; therefore, it is even further toward the edge of the lynx's range.

The International Wolf Center posts on their website a database summary of wolf observations. Of the over 9,300 records in the monitoring database, no radio collared wolves were recorded within 10 miles of the West Range Site, although this may be due to a limited amount of wolf

tracking that occurs in the central portion of Minnesota (Appendix E). During field studies of the West Range Site in 2005, a grey wolf was observed preying on a deer fawn.

East Range Site

The value of habitats for Canada lynx and gray wolf are discussed in detail in the BA (see Appendix E).

The USFWS Region 3 list of Federally protected species describes St. Louis County, Minnesota as occurring within the range of the Canada lynx.

Suitable snowshoe hare habitat (the primary prey item for Canada lynx) was present, but was relatively poor or marginal due to the extensive and recent timber harvesting. According to the MNDNR data (MNDNR, 2005a), there have been "verified with evidence of breeding," "verified without evidence of breeding," and "unverified" sightings of Canada lynx within St. Louis County through 2005. Many more verified records of Canada lynx have been recorded in the general area of the East Range Site since 2000 as compared to the West Range Site (Sullins, 2007).

The International Wolf Center database shows 32 records involving 10 wolves that have been recorded within about 10 miles of the East Range Site. Except for a single record in December 2006 and two records in 2001, all other records of wolves near the East Range Site were recorded between 1994 and 1997 (Appendix E). During field studies of the East Range Site in 2004, gray wolf tracks and scat were observed occasionally throughout the site.

3.8.3.2 Minnesota Protected Species

Minnesota's Endangered Species Statute authorizes the MNDNR to adopt rules designating species meeting the statutory definition of endangered, threatened, or species of special concern. Minnesota Rules Chapter 6134 provides the "List of Endangered, Threatened, and Special Concern Species." The Endangered Species Statute authorizes the MNDNR to adopt rules to regulate the treatment of species designated as endangered and threatened, which are codified as Minnesota Rules 6212.1800 to 6212.2300. As such, species of special concern or non-status (tracked) species are not protected by Minnesota's Endangered Species Statute or the associated Rules.

Species designated as endangered, threatened, or species of special concern are defined as follows:

- Endangered – the species is threatened with extinction throughout all or a significant portion of its range within Minnesota.
- Threatened – the species is likely to become endangered within the foreseeable future throughout all or a significant portion of its range within Minnesota.
- Species of Special Concern – although the species is not endangered or threatened, it is extremely uncommon in Minnesota, or has unique or highly specific habitat requirements and deserves careful monitoring of its status. Species on the periphery of their range that are not listed as threatened may be included in the category along with those species that were once threatened or endangered but now have increasing or stable, protected populations.

A non-status (or tracked) species is one that has been identified by the MNDNR as a rare species that has not received a legal status, but needs further monitoring to determine its status.

The MNDNR NHIS database contains documented occurrences of non-status (tracked), special concern, threatened, and endangered species; sensitive ecological and natural resources; and results of the Minnesota County Biological Survey. State-listed threatened or endangered species are protected under the Minnesota Endangered Species Statute (Minnesota Statutes § 84.0895). The MNDNR was contacted to request a review of the NHIS for occurrences within the East Range Site boundaries and associated utility and transportation corridors. At the request of the MNDNR, the specific locations of these occurrences are not provided in this report to protect the integrity of rare or protected species.

West Range Site

Mesaba Generating Station

According to the MNDNR NHIS, a total of 8 plant species (17 occurrences) have been recorded in the general vicinity of the Nashwauk, Taconite, and Bovey areas. However, none of these 17 occurrences are recorded within the West Range Site boundaries. A list of the species that were identified by the MNDNR NHIS is provided in Table 3.8-**6**.

There are three records of moonworts (*Botrychium campestre*, *B. matricariifolium*, and *B. simplex*) listed in the MNDNR NHIS database and within one mile of the project site. The three records of moonworts (*Botrychium* spp.) listed in the MNDNR NHIS database are associated with mine spoil areas or disturbed soils. *B. campestre* and *B. simplex* are listed as species of special concern. *B. matricariifolium* has no formal protection status in Minnesota, but has been identified as a species that may be monitored due to its potential rarity or other factors that may affect this species or its habitat in the state.

Table 3.8-6. MNDNR NHIS Plant Species Occurrences Near the West Range Site

Scientific Name	Common Name	Protection Status	Records in Area	Associated Habitat Near Project Area
Botrychium campestre	Prairie moonwort	Special Concern	2	High iron content and gravel soils
Botrychium simplex	Least moonwort	Special Concern	6	Mine tailings basin, disturbed utility ROW
Botrychium matricariifolium	Matricary grapefern	Non-status	2	Grassy opening, near mine area
Liparis lilifolia	Lilia-leaved twayblade	Non-status	2	Tailings basin
Myriophyllum tenellum	Leafless water milfoil	Non-status	1	Lake shoreline
Platanthera flava var. *herbiola*	Tubercled rein-orchid	Endangered	2	Tailings basin
Spiranthes casei	Case's ladies'-tresses	Non-status	1	Tailings basin
Torreyochloa pallida	Torrey's manna grass	Special Concern	1	Shallow marsh in mixed hardwood forest

Source: Excelsior, 2006b

Since the West Range Site may not have been surveyed by the MNDNR, potential habitats for flora listed by NHIS were investigated during the June 2005 field reconnaissance and the summer 2005 wetland surveys. Preliminary investigations for potential habitats for *Botrychium* spp. were performed during field investigations in 2005. No disturbed soil or mine spoil conditions are found within the West Range Site. However, habitat for these species or other *Botrychium* spp. may occur within the northern mesic hardwood forest. During the field reconnaissance in June 2005, a plant species that closely resembled *B. minganense*, a state-listed species of special concern, was observed in the northern mesic hardwood forest. Only one individual was observed, and no voucher specimens were collected.

Most of the other plant species occurrences recorded by the MNDNR NHIS are associated with mine spoil, tailings, or disturbed soil conditions. No mine areas are found within the West Range Site. If recruitment of these rare or otherwise protected species appears to be associated with mine spoil or disturbed soil conditions from mining activities, it is unlikely that the West Range Site would provide this type of habitat.

Two plant species records from the NHIS database that are of interest for the project area are *Myriophyllum tenellum* and *Torreyochloa pallida*. *M. tenellum*, a non-status species, is associated with aquatic environments along shorelines. Dunning Lake, located along the eastern edge of the site, is the only likely habitat that may be suitable for this species. *T. pallida*, a species of special concern, is associated with shallow marsh habitats in mixed hardwood forests. This type of habitat is abundant throughout the West Range Site, although this species was not observed during the field reconnaissance for habitat or during the wetland surveys.

Transportation and Utility Corridors

Since access was not available for nearly all of the transportation and utility corridors during the field surveys, potential occurrences of habitat for state-listed species could only be assessed through a review of species locations within approximately 1 mile of the corridors.

No NHIS occurrences occur within one mile of the transportation or utility corridors. Since access to the transportation and utility corridors was not available during the 2005 field season, it is possible that some areas would be suitable habitat for state-listed species. At the request of the MNDNR, the element occurrence identification numbers for known records of state-listed or otherwise rare natural features are not provided graphically to protect the integrity of the species, populations, or respective habitats.

In addition to the NHIS occurrences provided in the original data request from MNDNR, the MNDNR provided a supplemental report completed in November 2005 by Critical Connections Ecological Services, Inc. (CCESR, 2005), that described six populations of previously undocumented occurrences of state-listed or tracked plant species (*B. pallidum*, *B. campestre*, *B. simplex*, and *B. matricariifolium*).

According to the 2005 Critical Connections Ecological Services report, the six populations of *Botrychium* spp. were observed “within mine tailings along the Canisteo Pit to Prairie River outflow route.” This outflow route appears to include the Lind Pit and West Hill Pit, which are located between the Prairie River and the west end of the Canisteo Pit. The Lind Pit and Canisteo Pit are both identified as a potential source for process water to serve the Mesaba Generating Station at the West Range Site. The maps that accompany the Critical Connections Ecological Services report identify these six populations of *Botrychium* spp. as occurring within the immediate vicinity of the Lind Pit and the West Hill Pit.

A summary of potential habitats for state-listed species that could be within the project area for the West Range Site utility and transportation corridors is provided in Table 3.8-**7**. Species with “yes” marked in the far-right column of Table 3.8-**7** may require further investigation if the West Range Site is chosen as the preferred location. Portions of the area have not been surveyed through the County Biological Survey program; therefore, there is a potential that other state- or Federally listed species not identified in the MNDNR NHIS database exist within the area.

Table 3.8-7. MNDNR NHIS Species Occurrences within 1 Mile of Transportation or Utility Corridors (West Range Site)

Common Name	Scientific Name	State Protection Status	Field Investigation for Potential Habitats Recommended? (yes/no)
West Range HVTL Alternative Corridors			
Tubercled-rein orchid	*Platanthera flava* var. *herbiola*	Endangered	Yes; occurs in fringe wetland habitats. Site records also within mine spoil areas.
Case's ladies'-tresses	*Spiranthes casei*	Non-status	Yes; occurs in fringe wetland habitats. Site records also within mine spoil areas.
Least moonwort	*Botrychium simplex*	Special Concern	No; site record is within mine spoil areas.
Matricary grapefern	*Botrychium matricariifolium*	Non-status	No; site record is within mine spoil areas.
Species of moonwort	*Botrychium michiganense*	Non-status	No; site record is within mine spoil areas.
Pale moonwort	*Botrychium pallidum*	Special Concern	No; site record is within mine spoil areas.
Prairie moonwort	*Botrychium campestre*	Special Concern	No; site record is within mine spoil areas.
Lilia-leaved twayblade	*Liparis lilifolia*	Special Concern	Yes; occurs in fringe wetland habitats. Site records also within mine spoil areas.
Northern goshawk	*Accipiter gentiles*	Non-status	Yes; review habitats if new alignments are proposed within mature conifer forest habitat.
Lapland buttercup	*Ranunculus laponnicus*	Special Concern	Yes; species is found in wetland habitats.
West Range Gas Pipeline Alternative Corridors			
Leafless water milfoil	*Myriophyllum tenellum*	Non-status	No; species is found in lakes.
American bittern	*Botaurus lentiginosus*	Non-status	No; secretive species with low population density. Nests are difficult to survey.
Tubercled-rein orchid	*Platanthera flava* var. *herbiola*	Endangered	Yes; occurs in fringe wetland habitats. Site records also within mine spoil areas.
Case's ladies'-tresses	*Spiranthes casei*	Non-status	Yes; occurs in fringe wetland habitats. Site records also within mine spoil areas.
Least moonwort	*Botrychium simplex*	Special Concern	No; site record is within mine spoil areas.
Matricary grapefern	*Botrychium matricariifolium*	Non-status	No; site record is within mine spoil areas.
Species of moonwort	*Botrychium michiganense*	Non-status	No; site record is within mine spoil areas.

Table 3.8-7. MNDNR NHIS Species Occurrences within 1 Mile of Transportation or Utility Corridors (West Range Site)

Common Name	Scientific Name	State Protection Status	Field Investigation for Potential Habitats Recommended? (yes/no)
West Range Process Water Supply Pipelines			
Prairie moonwort	*Botrychium campestre*	Special Concern	Yes; observed in mine tailings near Lind Pit and West Hill Pit.
Matricary grapefern	*Botrychium matricariifolium*	Non-status	Yes; observed in mine tailings near Lind Pit and West Hill Pit.
Pale moonwart	*Botrychium pallidum*	Endangered	Yes; observed in mine tailings near Lind Pit and West Hill Pit.
Least moonwart	*Botrychium simplex*	Special Concern	Yes; observed in mine tailings near Lind Pit and West Hill Pit.
St. Lawrence grapefern	*Botrychium rugulosum*	Threatened	Yes; site record within mine tailings basin among aspen.

Source: Excelsior, 2006b

East Range Site

Mesaba Generating Station

According to the MNDNR NHIS, there are no known occurrences of state-listed protected, rare, or otherwise unique natural features within the immediate vicinity of the East Range Site. The closest recorded occurrence of a NHIS feature is 2.5 miles or greater distance from the East Range Site. Although the MNDNR NHIS is the most comprehensive database for known occurrences of rare natural features in the state, it does not preclude the discovery of undocumented occurrences within the East Range Site.

Transportation and Utility Corridors

Because access was not available for nearly all the transportation and utility corridors during the 2004 and 2005 field surveys, the potential for state-listed species to occur was assessed through a review of MNDNR information on species locations within approximately one mile of the proposed corridors.

According to the MNDNR NHIS, a total of nine listed species (27 occurrences) have been recorded in the general vicinity of Aurora, Biwabik, Eveleth, and Virginia, within one mile of a proposed transportation or utility corridor (Table 3.8-**8**). The closest occurrence would be for the wood turtle (*Clemmys insculpta*), located more than 2 miles from any of the corridors. At the request of the MNDNR, these locations of occurrences are not provided graphically to protect these rare species.

Table 3.8-8. MNDNR NHIS Species Occurrences within 1 Mile of Transportation or Utility Corridors Associated (East Range Site)

Scientific Name	Common Name	Protection Status	NHIS Records in Area	Associated Habitat near Project Area
Arethusa bulbosa	Dragon's mouth	Non-status	1	Creek shoreline
Caltha natans	Floating marsh-marigold	Endangered	1	Pond outlet
Poa sylvenstris	Woodland bluegrass	Non-status	1	Mixed hardwood forest
Waldsteinia fragarioides	Barren strawberry	Special Concern	3	Jack pine forest
Botrychium matricariifolium	Matricary grapefern	Non-status	1	Mine tailings
Botrychium simplex	Least moonwart	Special Concern	2	Mine tailings
Clemmys insculpta	Wood turtle	Threatened	13	Partridge and St. Louis Rivers
Haliaeetus leucocephalus	Bald eagle	Special Concern	4	Various nesting areas, some in management areas
Ligumia recta	Black sandshell mussel	Special Concern	1	Lake shoreline

Source Excelsior, 2006b

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3.9 CULTURAL RESOURCES

3.9.1 Regional Setting

National Historic Preservation Act Sections 106 and 110 (16 USC 470 *et seq*.) and NEPA regulations require all construction receiving Federal funding to identify the potential prehistoric, historic, and Native American cultural resources in an area. The regulations also state the need to determine what potential negative impacts could occur if the Proposed Action or its alternatives were completed. Compliance with Section 106 is guided by 36 CFR Part 800. Compliance requires consultation with the Minnesota State Historic Preservation Office (SHPO), associated Federal agencies, and Federally recognized Native American tribal groups.

The affected environment for cultural resources is identified through determination of the area of potential effect (APE). The APE is defined as the geographic region that may be impacted as a result of the construction and operation of the Proposed Action or alternatives. For the purposes of this EIS, the APE is considered to be equal to the region of influence. This includes all areas impacted from the construction and operation of the facility site itself, as well as its associated transportation systems, HVTL, natural gas pipelines, and other associated upgraded utilities. The APE surrounding the HVTL corridor includes the area **potentially** affected by construction, which**, at this time,** is represented as a 0.5-mile wide corridor centered on the transmission lines.

3.9.1.1 Methodology

Cultural resource assessments were performed on the West Range Site and its associated corridors in July 2005, and on the East Range Site and its associated corridors in September 2005. These assessment reports identified previous archaeological sites and cultural assessment surveys within one mile of the facilities and corridors. In addition, an archaeological site model was developed for each location to identify the potential for unknown cultural resources. All known cultural resources within a 10-mile radius around the site locations were used to refine the results. The results of the model present the areas with the highest potential for undiscovered cultural affiliations, archaeological artifacts, and architectural sites. The model guidelines are further described in Section 4.9, Cultural Resources (Environmental Consequences).

3.9.1.2 Historical Setting

Precontact (12,000 years before present [B.P.] to Circa 1700 A.D.)

Habitation in northeastern Minnesota began 12,000 years ago, after the retreat of the glaciers, when small nomadic groups followed big game animals into Minnesota and Canada. Minnesotan precontact cultural traditions have been categorized into general stages by their material culture (e.g., tools and ceramics), subsistence adaptations (e.g., hunting, gathering, and horticulture), and to a lesser extent, other sources, such as oral traditions or language evolution. These traditions are analyzed and categorized into stages, which generate a sequential picture of North American cultural history before European contact. Each stage, Paleoindian, Archaic, Woodland, and Ceramic/Mound, is based on one or more particular developmental themes, and encompasses a variety of subgroups. More information on these stages is available in the cultural resource assessments and statewide cultural source documents (106 Group, 2005; Dobbs, 1989).

Post Contact (Circa 1700 A.D. to present)

The Santee Dakota historically occupied eastern Minnesota when the European traders first made contact. The loosely confederated tribes lived in semi-permanent and permanent villages, and possessed an economy based on game animals, fish, wild rice gathering, and some agricultural production. Several Dakota village and cemetery sites have been found along the Minnesota and Mississippi river systems.

The French fur traders made initial contact in the area, but were replaced by the British in the late 1700s. The British traders transported furs from Canada and northern Minnesota to the Great Lakes by traveling through the border lakes. The United States established sovereignty on lands from the Atlantic to the Rockies in 1803, and formally denied trading licenses to British Traders in 1812.

The initial United States presence consisted of traders and military mapping expeditions. As the beaver fur trade collapsed, settlers and an increased military presence began to encroach on the Native American land, which eventually was abandoned by the local tribes. Treaties signed at Traverse des Sioux and Mendota in 1851 set aside a 10-mile-wide reservation on both sides of the Minnesota River from Lake Traverse to Little Rock Creek in western Nicollet County. Leech Lake Reservation was established by treaties on February 22, 1855, and is currently located in the Chippewa National Forest.

In the mid-1800s, as additional settlers moved into the area for the flourishing logging and mining industries, homesteads and farmsteads were built. Small communities and towns grew up around the ore deposits and logging centers. There are a limited number of residential structures from this time period, and little architectural information about the earliest mining groups in the area is available. Archaeological properties would include logging camps and transportation routes, rather than historically cleared areas.

3.9.2 Archaeological Resources

3.9.2.1 West Range Site and Corridors

Archaeological artifacts are common around water sources in northern Minnesota. The 2005 cultural resources report identified 71 archaeological sites located within a 10-mile radius of the West Range Site. Of these sites, 54 have been confirmed, and 17 have been reported but not field checked. Seven of the 17 unconfirmed sites lack sufficient evidence and archaeological integrity to be considered further. Of the 64 remaining sites, all are located within proximity to water (106 Group, 2005).

There are no archaeological sites recorded on the West Range Site or its corridors. Within the surrounding area, three archaeological surveys have been conducted. In 1981, Vernon Helmen conducted a Phase I archaeological survey south of Nashwauk, prior to the construction of a proposed wastewater lagoon. Fieldwork included both surface inspection and sub-surface shovel testing. The fieldwork most likely occurred during the spring, because the report described “water-logged land surface with an extremely high water table, even on the higher elevations.” Although shovel testing was concentrated along all rises, all of the tests had significant seepage and standing water throughout excavation. No signs of any occupation were located within the survey area (Helmen, 1980).

In 1985, as part of the Minnesota Trunk Highway Archaeological Reconnaissance Survey, a preliminary archaeological assessment was performed along the proposed TH 169 (US 169) alternative corridors. The survey studied an 18-mile section of US 169 between Grand Rapids and Pengilly, which crosses south of the proposed West Range Site and alongside the proposed Natural Gas Pipeline Alternative 3. The field review consisted of drive-over reconnaissance with pedestrian reconnaissance of the most undisturbed segments at approximately 100-foot intervals. The study found that only 40 percent of the surveyed area was in its natural state, as mining operations (30 percent) and road construction (30 percent) had previously disturbed the topsoil. No significant archaeological sites were located by the preliminary surface reconnaissance or historical record search (Peterson, 1985).

In 1998, the Minnesota Historical Society conducted an archaeological assessment prior to the installation of a proposed floating fishing pier in Holman Lake, located south of the current proposed plant site. The survey was located on the northeastern shoreline of the lake, approximately 2 miles south of the power plant, and within 0.25 miles of Blowdown Pipeline Alternative 1. The assessment determined the nature of the soils within a 10-foot-wide by 100-foot-long development corridor located on a small segment of shoreline. Pedestrian examination of the area confirmed that the area had been cleared and denuded of all organic surface soils. Cores were used to confirm the distinctly truncated nature of the surface sediments exposed within the sparsely vegetated parcel. Given the findings, intensive archaeological field survey was not recommended (Skaar, 1998).

3.9.2.2 East Range Site and Corridors

The September 2005 study identified 85 archaeological sites within a 10-mile radius of the East Range Site and corridors, 21 of which are confirmed. The remaining 64 sites have been reported, however they lack sufficient evidence of archaeological integrity to be included in the analysis. Nineteen of the 21 confirmed sites are within proximity to water; the two remaining sites are located on topographically prominent areas that command a wide view of the surrounding landscape (106 Group, 2005).

In the preliminary cultural resources report performed by the 106 Group, four confirmed archaeological sites were identified within the construction buffer zone around the East Range Site and potential corridors (Table 3.9-1). Site 21SL0843 is located approximately 0.5 miles directly west of the 38L corridor. The archaeological Site 21SL0836 is located along the 34L HVTL Route, which was removed from consideration as an alternative in this project. There are no unconfirmed sites located around the site or its corridors.

Table 3.9-1. Archaeological Sites Previously Identified Within the Study Area

Site No.	Description
21SL0009	Mounds
21SL0390	Mound
21SL0836	Historic Depressions and Artifact Scatter
21SL0843	Lithic Scatter

Source: 106 Group, 2005

Both sites 21SL0009 and 21SL0390 consist of mounds found on the southern shore of Eshquaguma Lake. The SHPO documentation for the mound groupings in the area is incomplete, with vague locations and descriptions of the mounds. A series of mounds resembling the site descriptions are located in a sandy plain surrounded by trees, and may be partially disturbed by the construction of the Eshquaguma golf course (106 Group, 2005). The St. Louis County Historical Society has marked site 21SL0009 with an archaeological interpretation sign. Site 21SL0390 is located 3,500 feet east of Site 21SL0009, and has similar characteristics.

In April 1999, a group from the University of Minnesota at Duluth conducted a Phase I archaeological reconnaissance survey on a parcel near the Syl Laskin Energy Center in Hoyt Lakes. The East Range HVTL corridors would cross between the Syl Laskin plant and Colby Lake. The surveyed parcel was designed to be the site of a proposed containment pond for ash residue from the energy center approximately 33 acres in size. The survey consisted of both pedestrian survey and shovel testing in areas with poor ground visibility. Most of the parcel was disturbed prior to the survey; however, a relatively undisturbed portion in the northwestern corner was surveyed using shovel tests. Lithic scatter was recovered from five shovel tests, resulting in Site 21SL0843. Minnesota Power engineers modified the engineering designs to exclude the site area from construction disturbance. No other cultural resources were recorded in the remainder of the project area (Mulholland et al., 1999).

In 1976, the Minnesota Historical Society conducted a reconnaissance survey prior to the construction of the Pike Mountain access road in Superior National Forest. The access road is approximately 5.3 miles northeast of Virginia and approximately 2 miles north of the HVTL 37L/39L alternative corridor. The only culturally-related material found in the course of the Pike Mountain survey consisted of an abandoned mineshaft. The mine age was tentatively dated to between 1915 and 1929.

In 1996, a Phase I archaeological reconnaissance survey was conducted on a 7.8-mile segment of County State Aid Highway (CSAH) 4 south of Biwabik. CSAH 4 crosses the 38L and 37L/39L HVTL corridors as well as the proposed natural gas pipeline ROW. A visual walking survey and shovel testing were performed on approximately 190 acres along both sides of CSAH 4. The investigation did not find any new archaeological materials in the impact corridor, but did identify the remains of a twentieth-century railroad grade, assigned number SL-BIT-003 (Thompson et al., 1996).

3.9.3 Historic Resources

3.9.3.1 West Range Site and Corridors

Many of the documented architectural history resources within the vicinity of the West Range Site and corridors were recorded during the countywide survey in 1980. This survey focused on buildings within the communities of Coleraine, Taconite, Marble, Calumet and Nashwauk. As a result of this work, several properties were listed on or determined to be eligible for the National Register of Historic Places (NRHP). Later studies looked beyond the standing structures found within the village limits and included the Hill Annex Mine, located just north of Calumet and listed on the NRHP in 1986.

Table 3.9-2 lists 11 architectural history properties within the recommended APE that have been previously recorded in SHPO records. Two properties, the Great Northern Railway Nashwauk-Gunn Line, and the Duluth, Missabe, and Northern Railway Alborn Branch have been determined eligible for listing on the NRHP. Two previously recorded properties are no longer extant.

Table 3.9-2. Historic Properties Within the West Range Site APE

Property Name	Inventory No.	Location	NRHP Status	Description
Great Northern Railway Nashwauk-Gunn Line	IC-IRT-009	Iron Range Twp.	Eligible	Abandoned 1909 rail line that provided service to the western end of Mesabi Iron Range.
Duluth, Missabe & Northern Railway Alborn Branch	IC-IRT-010	Iron Range Twp.	Eligible	1906 rail line serving the western Mesabi Iron Range from Alborn to Pengilly, and on to the Canisteo District near Coleraine
Rhude Media Plant	IC-IRT-016	US 169	Not Eligible	Ca. 1955 industrial complex used for iron ore separation concentration; not extant
House	IC-IRT-017	6670 US 169	Not Eligible	Ca. 1930 front-gabled house
House	IC-IRT-018	6708 US 169	Not Eligible	Ca. 1930 front-gabled house
Bridge L3811	IC-TCC-005	BN Railroad over CSAH 7	Not Eligible	1916 steel beam span railroad bridge
Log Cabin and barn	IC-TLT-004	Off Co. Hwy. 70, Trout Lake Twp.	Not Evaluated	Abandoned farmstead
Jacob Edward Johnson Farmstead	IC-TLT-005	Off Co. Hwy. 70, Trout Lake Twp.	Not Evaluated	Ca. 1910 group of Finnish log farm structures

Table 3.9-2. Historic Properties Within the West Range Site APE

Property Name	Inventory No.	Location	NRHP Status	Description
Finnish Log Barn and Building	IC-TLT-009	Off Co. Hwy. 10, Trout Lake Twp.	Not Evaluated	Finish log barn and other log building; Not extant
Trout Lake Apostolic Lutheran Church	IC-TLT-010	24062 North Road	Not Evaluated	N/A
School and Teacherage	IC-TLT-011	24032 North Road	Not Evaluated	N/A

N/A = Not Available
Source: 106 Group, 2005

The 1985 cultural resources study for TH 169 summarized in *The Minnesota Trunk Highway Archaeological Reconnaissance Survey Annual Report – 1985* (Peterson, 1985) identified no known historic or archaeological sites within the study corridors that would affect the selection of a preferred alignment. An updated study, *The Minnesota Trunk Highway Archaeological Reconnaissance Study Annual Report – 1993* (Peterson et al., 1993) identified and evaluated several architectural history properties in Nashwauk as part of a resurfacing, gutter, curb and sidewalks project for TH 65. The properties either were previously destroyed, declared ineligible, or are located outside of the reconnaissance study's APE.

A cultural resources survey was performed along US 169 from Coleraine to 0.3 miles east of CR 7 for the Minnesota Department of Transportation (Mn/DOT) (Bradley et al., 2003). The survey recorded 142 properties in the study area, including buildings, railroad-related resources, and mine dumps. Two railroad properties that pass through portions of TH 169 project area, the Great Northern Railway line from Nashwauk to Gunn and the Duluth, Missabe, and Northern Railway's Alborn Branch Line, were determined eligible for listing on the NRHP. Based on this report, Mn/DOT determined that the individual components of the project area should be viewed as components of a large mining district inclusive of a mining landscape, associated towns, and railroad related properties organized in a multiple property format. The name of this multiple property is Historic and Architectural Resources of the Western Mesabi Iron Range, Itasca County, Minnesota. The multiple property listing is further broken into four contexts, one being the Mesabi Iron Range Early Mining Landscape District of the Coleraine, Bovey, Taconite, and Holman communities. This district also includes a large area that encompasses mines and mine dumps which is located immediately west of the West Range APE.

The *Mesabi Iron Range Historic Contexts, Itasca and St. Louis Counties, Minnesota: Phase III Mitigation Study for the TH 169 Project in Bovey, Minnesota*, commissioned by the Minnesota Department of Transportation, **was completed in 2005**. The final report consist**s** of historical contexts for the entire Mesabi Iron Range, with brief histories of each community and a chronology of each mine. The document also provide**d** registration considerations and suggestions for resources and landscapes on the Mesabi Iron Range. Communities from Grand Rapids through Hoyt Lakes **were** considered.

3.9.3.2 East Range Site and Corridors

Many of the documented architectural history resources within the vicinity of the East Range Site and corridors were recorded during the countywide survey in 1987 (Roberts and Roberts, 1987). This survey focused on buildings within the towns, including the communities of Virginia, Eveleth, Aurora, and Biwabik, which are located within or near the APE. As a result of this work, several properties were listed on, or determined eligible for, the NRHP, including a number of civic and community buildings such as churches, schools, recreation halls, and hotels. Since that time, very few architectural history studies have been conducted in the project area.

In 2000, a Phase II study of the Duluth, Winnipeg, and Pacific Railway and of Bridge 5195, located several miles north of Virginia, was completed for the Minnesota Department of Transportation (Henning, 2000). This report provides historical contexts for the development of the lumbering industry around Virginia, the role of logging railroads, railroad construction, and the State's trunk highway system. Henning concluded that the Duluth, Winnipeg, and Pacific Railway was eligible for listing on the NRHP, although Bridge 5195 did not contribute to the railroad's significance. When completed, the ongoing *Mesabi Iron Range Historic Contexts, Itasca and St. Louis Counties, Minnesota, Phase III Mitigation Study for the US 169 Project in Bovey, Minnesota*, commissioned by the Mn/DOT, will also provide historical context for the entire Mesabi Iron Range, including Hoyt Lakes and Eveleth.

Table 3.9-3 shows 20 previously recorded architectural history properties, most of which are in Eveleth, located within the recommended APE. Although most of these inventoried properties have not been formally evaluated for NRHP eligibility, four have been listed on, or determined to be eligible for, the NRHP.

The Eveleth City Hall (SL-EVC-008) was determined to meet the criteria for NRHP eligibility by the SHPO in 2002, although the SHPO does not specify how the property meets the criteria. Little historical information on the building is provided in the SHPO files on this property, except that the building bears a 1908 date block. The building is still used as the city hall.

The Eveleth Recreation Building (SL-EVC-021) was listed on the NRHP in 1980. Funded by the significant tax revenues afforded to local governments by the mining industry, the 1918 building was constructed during the Progressive Era to provide a recreational facility for working-class citizens to improve their physical development. In the 1930s, the city made the building available for a shirt manufacturing facility in order to provide employment opportunities for women.

The E. J. Longyear First Diamond Drill site is a NRHP-listed site located to the east of CR 666. The site includes a 0.25-mile wilderness trail from the road to the location of the 1890 drill site. The historic site is generally underdeveloped, and little documentation about the site is available.

Table 3.9-3. Historic Properties Within the East Range Site APE

Property Name	Inventory No.	Location	NRHP Status	Description
Biwabik Township				
Railroad grade	SL-BIT-003	Off County Highway 4	Not eligible	Remnants of an abandoned railroad grade of an unidentified rail line
Eveleth				
Commercial building	SL-EVC-005	SE corner of Grant Avenue and Monroe Street	Not evaluated	Circa-1920 two-story
Commercial building	SL-EVC-006	Grant Avenue	Not evaluated	1923 two-story commercial building
Commercial buildings	SL-EVC-007	Grant Avenue	Not evaluated	Series of early twentieth century commercial buildings
Eveleth City Hall	SL-EVC-008	413 Pierce Street	Eligible	1906 City Hall with Classical detailing
Commercial buildings	SL-EVC-009	Grant Avenue	Not evaluated	Series of early twentieth century commercial buildings

Table 3.9-3. Historic Properties Within the East Range Site APE

Property Name	Inventory No.	Location	NRHP Status	Description
Commercial buildings	SL-EVC-010	Grant Avenue	Not evaluated	Series of early twentieth century commercial buildings
Miners National Bank	SL-EVC-011	NE corner Grant Ave. and Jones Street	Not evaluated	Circa-1920 bank building
Commercial buildings	SL-EVC-012	Grant Avenue	Not evaluated	Series of early twentieth century commercial buildings
Eveleth Post Office	SL-EVC-014	421 Jones Street	Not eligible	1936 post office in the “Starved Classicism” style
Auditorium	SL-EVC-015	015 419-423 Jackson Street	Not evaluated	Circa-1930 municipal auditorium
Eveleth Recreation Building	SL-EVC-021	Garfield Street and Adams Avenue	Listed	1918 public facility for the physical development of workers
Slovenian Meeting Hall	SL-EVC-024	420 Grant Street	Not eligible	Circa-1905 saloon
Uranian Hall	SL-EVC-025	520 Grant Street	Not eligible	Site of union organizing and social gathering place in a circa-1900 building; substantially altered
Eveleth Hippodrome	SL-EVC-026	SW corner Hayes Street and Douglas Avenue	Not eligible	WPA building and home to Eveleth hockey teams
Bridge L08537	SL-EVC-027	Adams Avenue over a small stream	Not eligible	Single-span, concrete-slab highway bridge constructed in 1921
Hoyt Lakes				
E. J. Longyear First Diamond Drill Site	Not assigned	Off County Road 666	Listed	Site of 1890 drilling exploration for ore deposits on the Mesabi Iron Range
McDavitt Township				
Evangelical Church	SL-MCD-012	Off Minnesota Highway 16	Not evaluated	Circa-1900 church, clad with metal siding (as of 1987)
Unorganized Township				
Bridge 7674	SL-UOG-078	CSAH 20 over Embarrass River	Not eligible	Steel deck girder highway bridge built in 1934
Multiple Townships				
Duluth, Winnipeg & Pacific Railway Company	Not assigned	From Duluth to Virginia, to the Canadian border	Eligible	Railroad providing a pivotal link to the lumbering industry in Virginia (1901-1912)

Source: 106 Group, 2005

The fourth NRHP property in the APE is the Duluth, Winnipeg, and Pacific Railway, which began construction in 1901 as the Duluth, Virginia, and Rainy Lake Railway as a permanent line between

Duluth and Canada, by way of Virginia, Minnesota. A line from Virginia to Cook was completed by 1903, and later met the Canadian border and Fort Frances, Ontario. Around 1912, the line was extended southward to Duluth; was renamed the Duluth, Winnipeg, and Pacific Railway Company; and became associated with the Canadian rail system. The completed line connected Duluth with Canada and made Virginia an important hub. The line was pivotal in supporting the region's lumber industry, and later went on to provide transportation of freight and passengers along its route following the demise of lumbering in northern Minnesota (Henning, 2000). The proposed HVTL corridor appears to cross the Duluth, Winnipeg, and Pacific Railway in multiple locations.

3.9.4 Native American Resources

Sections 1.6.1.3 and 1.8 summarize the activities DOE conducted for outreach to Native American tribes during preparation of this EIS. Appendix E includes copies of correspondence received from tribal representatives. To reduce duplication, information presented in the Draft EIS was removed from this section.

The closest tribal land to the West Range Site is the Leech Lake Reservation, located about 20 miles to the West of the West Range Site, which is outside of ceded lands. The closest tribal land to the East Range Site is the Vermillion Reservation, as part of the Boise Forte tribal lands, located approximately 20 miles northwest. The Fond du Lac Reservation,is located about 55 miles to the south of the East Range Site, which lies within the 1854 Ceded Territories to which the Fon du Lac Band of Lake Superior is a signatory and has usufructuary rights (i.e., the legal right to use something belonging to another). In addition, other Native American tribes (e.g., the Boise Forte Band and Grand Portage Band of Lake Superior Chippewa and the Leech Lake Band of Ojibwe) continue to exercise guaranteed rights to hunt, fish, and gather under Treaty with the United States. The tribes believe that resources must be available and safe to use for the exercise of these rights.

3.10 LAND USE

This section describes land uses that may be affected by the Proposed Action and alternatives.

3.10.1 Existing Land Use

Existing land uses in the Iron Range were characterized based on the land use categories and definitions provided by the 1996 Land Use/Land Cover Map completed by the Manitoba Remote Sensing Centre and obtained through the MNDNR Data Deli (MNDNR, 2006b). Similar categories were combined to arrive at the following land use groupings:

- Forest Land – Includes land covers defined as coniferous, deciduous, and mixed wood forests, as well as regeneration/young forests where commercial timber has been removed.
- Grassland – Includes areas covered by grasslands and herbaceous plants that are often found between agricultural land and more heavily wooded areas, along ROWs and streams.
- Wetland – Includes bogs, marshes, and fens characterized by high water table, standing or slow-moving water, and hydrophytic vegetation.
- Open Water – Includes permanent water bodies such as lakes, rivers, reservoirs, stock ponds, ditches, and permanent and intermittently exposed palustrine open water areas. Note: May not include mine pits that have filled with water subsequent to 1996.
- Cultivated Land – Includes those areas under intensive cropping or rotation, including fallow fields and fields seeded to forage or cover crops.
- Mined Land – Includes areas stripped of top soil revealing exposed substrate, mine pits and tailings piles, gravel quarry operations, borrow pits, rock quarries, and rock outcrops. Note: Mine pits may have filled with water since 1996.
- Developed Land – Includes urban areas (defined as "cities") as well as rural developments, including farmsteads, rural commercial and industrial facilities, cultural and recreational facilities, and other structures and developed uses.

3.10.1.1 Regional Conditions

The Iron Range is characterized by land uses traditionally associated with mineral mining (mainly iron ore), timber harvesting, hunting and fishing, and outdoor recreation. Commercial, industrial, and residential uses are scattered in the small cities and communities along the principal thoroughfares and rail lines that link Grand Rapids with Hibbing and Virginia from west to east across the Iron Range. The land cover on and adjacent to the project sites and ROW corridors consists mainly of forest land and mined land. There are also areas of open water, wetlands, and scattered areas of grassland.

3.10.1.2 West Range Site and Corridors

Figure 3.10-1 shows the land use/land cover within and adjacent to the West Range Site. Figure 3.10-2 shows the land use/land cover in the wider vicinity of the West Range Site and potential utility corridors. There are no residential, commercial, or industrial buildings within the West Range Site boundary; the site consists of forest land, wetland, and grassland.

Residential Areas

The locations of residential properties near the West Range Site and corridors are illustrated in Figures 3.2-6 and 3.2-7 in Section 3.2, Aesthetics, and the distances from the station footprint and centerlines of corridors are based on recent aerial photography (Excelsior, 2006b). The residential neighborhoods in the City of Taconite, which is the closest community, are located more than 1.5 miles south of the proposed West Range Site boundary (Figure 3.10-1). The nearest residential properties to the West Range Site are located along CR 7 west of the site boundary and along the north shore of Big

Diamond Lake and southeast shore of Dunning Lake to the south of the site as illustrated previously in Figure 3.2-7. These properties consist of year-round residences and farmsteads, mainly along CR 7, and seasonal residences, mainly along the lake shores. Fewer than a dozen of these residences are located within 1,000 feet of the West Range Site boundary based on aerial photography completed in 2003. The closest residence to the proposed Mesaba Generating Station footprint is located about 0.7 mile to the southwest. The closest residences to the southeast, east, and northwest are located approximately 0.7 to 0.8 mile away. In total, approximately 50 residences would be located within one mile of the proposed power station footprint.

As many as 16 residences are located within 0.5 mile of a potential rail alignment for the West Range Site. The nearest residences to potential rail alignments are located on the north shore of Big Diamond Lake and the southeast shore of Dunning Lake. Depending upon the alignment taken, the nearest residence would be **approximately 470** feet from the centerline of the track, and nine other residences could be located between 800 feet and 0.25 mile away. Approximately 10 residences **on Diamond Lake Road** are located within 0.25 mile of **the potential realignment of CR 7 (proposed Access Road 1** for the West Range Site**)**, the closest of which would be between 100 and 300 feet away. **The closest residence to proposed Access Road 2 would be more than 0.5 mile away. Access Road 3 would be located approximately 1,000 feet away from two residences located on CR 7 near the southwestern corner of the property boundary for the West Range Site.**

Potential process water pipelines for the West Range Site could be located within 0.5 mile of 104 residential properties. However, only seven residences are located within 500 feet, and none is within 100 feet of the potential alignments. **Potential blowdown water discharge pipelines described in the Draft EIS would be eliminated by the proposed use of an enhanced ZLD system.**

Potential potable water and sanitary wastewater pipelines could be located within 0.5 mile of 114 residential properties. The closest would be at least 50 feet away, and three others would be between 100 and 300 feet away.

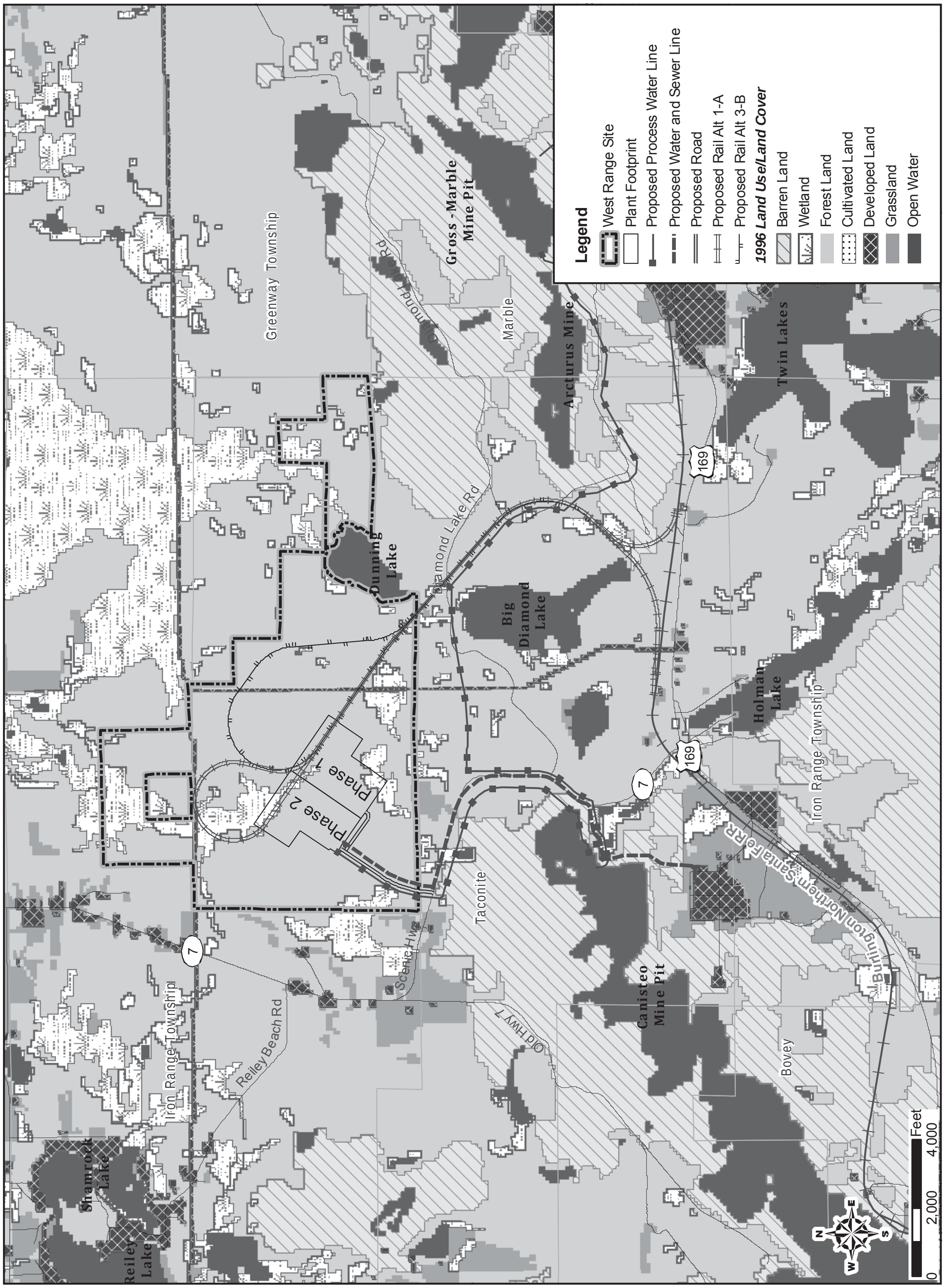
Depending upon the alignment selected, a natural gas pipeline could pass within 0.5 mile of 935 residences. As many as five residences could be located within 50 feet of the alignment and 24 others may be within 300 feet.

Potential HVTL corridors could be located within 0.5 mile of 280 residences. None would be closer than 100 feet from the centerline of the corridor, and as many as 10 would be between 100 and 300 feet from the centerline.

Industrial Areas

Existing and planned industries near the West Range Site and corridors include (Excelsior, 2006b):

- Solid Waste Transfer Station (and closed landfill) adjoining the southern boundary of the site;
- Mineral extraction operations on the west side of Holman Lake 2 miles south of the site;
- Mineral extraction operations near Loon Lake approximately 4.5 miles southeast of the site; and
- Proposed Minnesota Steel Industries plant to be located approximately two to three miles east of the West Range Site.



Fgure 3.10-1. West Range Site Land Use/Land Cover

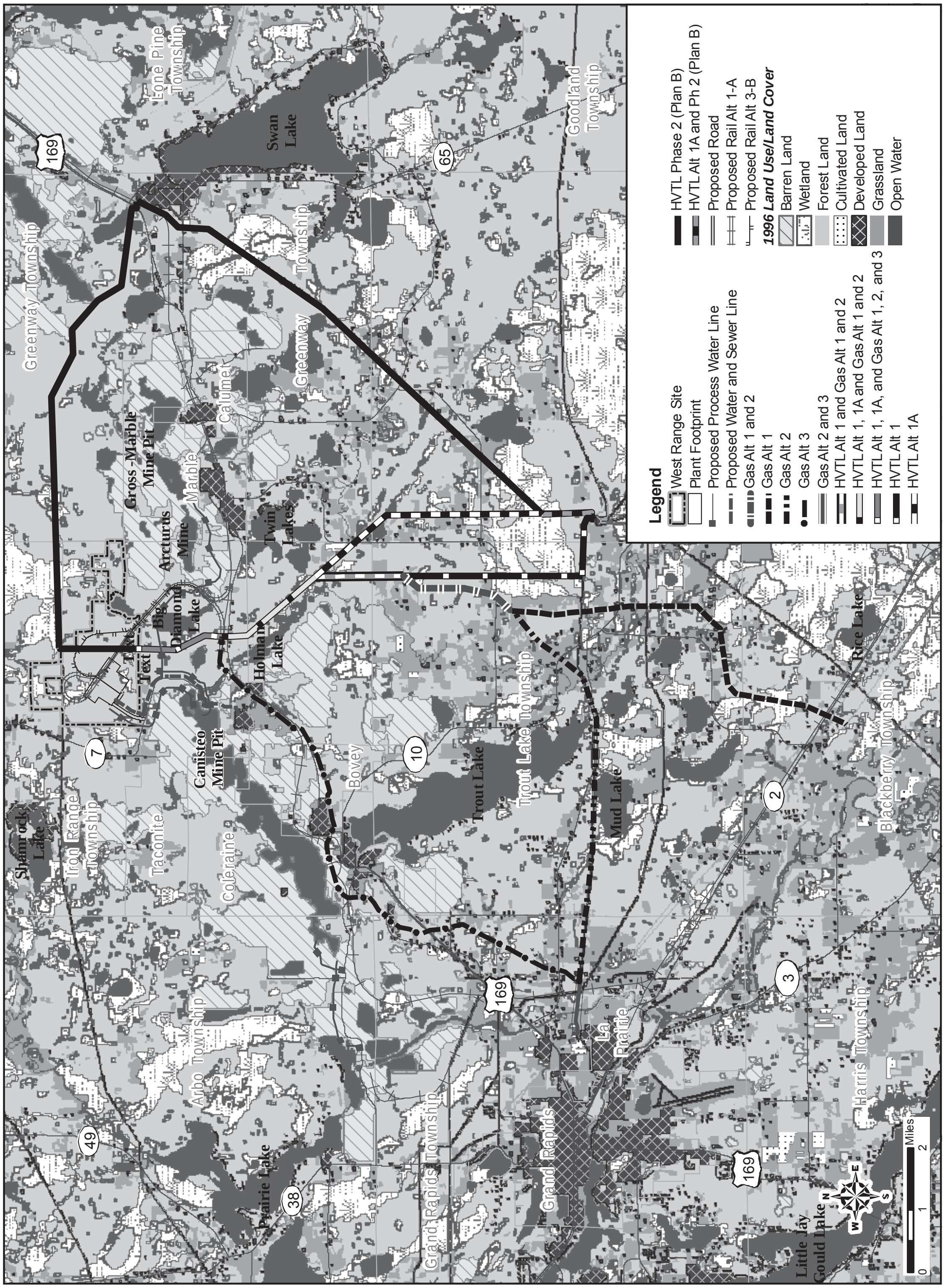


Figure 3.10-2 West Range Corridors and Land Use/Land Cover

Publicly Owned Lands

No publicly owned lands are located within the West Range Site boundary; however, parcels of publicly owned lands are located in the vicinity of the West Range Site and proposed corridors. Itasca County owns several parcels of land adjacent to the West Range Site. The largest parcel is located southeast of the site boundary, east of Dunning Lake and Big Diamond Lake, and consists primarily of old mine pits, forest land, and shrubby grassland. This area would be traversed by the potential rail alignment, a process water pipeline, and the relocated CR 7 alignment providing site access. A smaller parcel of county land is located directly south of the West Range Site, which would be traversed by potential utility alignments. Parcels of state-owned land located farther from the site also could be traversed by potential utility corridors. Excelsior has estimated that approximately 169 acres of publicly owned land could be traversed by potential corridors associated with the West Range Site, 60 percent of which would be Itasca County land and 34 percent of which would be state land (Excelsior, 2006b).

Farmland

None of the land within the West Range Site is actively cultivated as farmland. Although timber has been harvested from this area historically, the land that would be taken out of service to construct the power plant is not uniquely suited for such use. However, the site has soils that classify some of the land as prime farmland or prime farmland if drained (see Section 3.4). Several residents living along CR 7 own horses and grow hay for feed. At least one resident, located about 1.6 miles north-northeast of the West Range Site, raises beef cattle and feeds them from crops grown on the property. No crops are currently known to be cultivated on properties that would be crossed by the proposed access road, rail line, process water supply pipeline, or process water discharge pipeline easements associated with the West Range Site. HVTL and natural gas pipeline ROW corridors would cross open lands that may be used for farming purposes. The Land Cover Map indicates the presence of cultivated lands about two miles to the north-northwest and south of the Mesaba power plant footprint.

3.10.1.3 East Range Site and Corridors

Figure 3.10-3 shows the land use/land cover within and adjacent to the East Range Site. Figure 3.10-4 shows the land use/land cover within the wider vicinity of the East Range Site and potential utility corridors. There are no residential, commercial, or industrial buildings within the East Range Site boundary; the site consists of forest land, wetland, and grassland.

Residential Areas

The locations of residential properties near the East Range Site and corridors are illustrated in Figures 3.2-9 and 3.2-10 in Section 3.2, Aesthetics, and the distances from the station footprint and centerlines of corridors are based on recent aerial photography (Excelsior, 2006b). The residential neighborhoods in the City of Hoyt Lakes are located more than a mile south of the East Range Site. The nearest residential properties to the East Range Site are located along the southeastern shore of Colby Lake directly south of the site (Figure 3.10-3). These properties consist mainly of year-round residences. No residences are located within 1,000 feet of the East Range Site boundary based on the aerial photography, and the closest residence to the proposed Mesaba Generating Station footprint is located about 1.2 miles to the south. Many residences in Hoyt Lakes are located within two miles of the proposed power plant footprint.

No residences are located within 0.5 mile of a potential new rail alignment for the East Range Site. The nearest residences to potential rail alignments are located on the southeastern shore of Colby Lake approximately 0.7 mile away. No residential properties are located within 1.5 miles of the potential new access road alignments for the East Range Site.

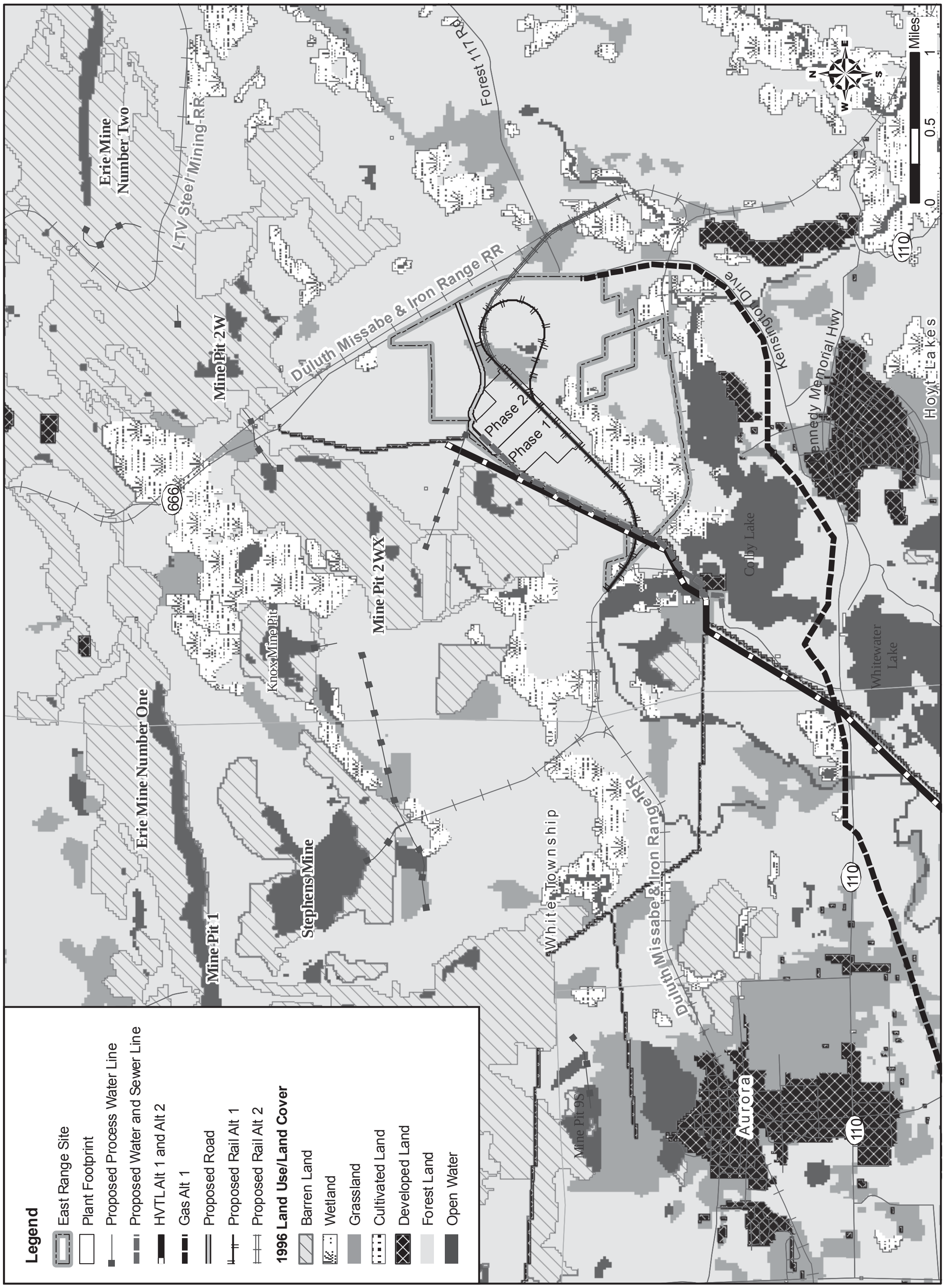


Figure 3.10-3. East Range Site Land Use/Land Cover

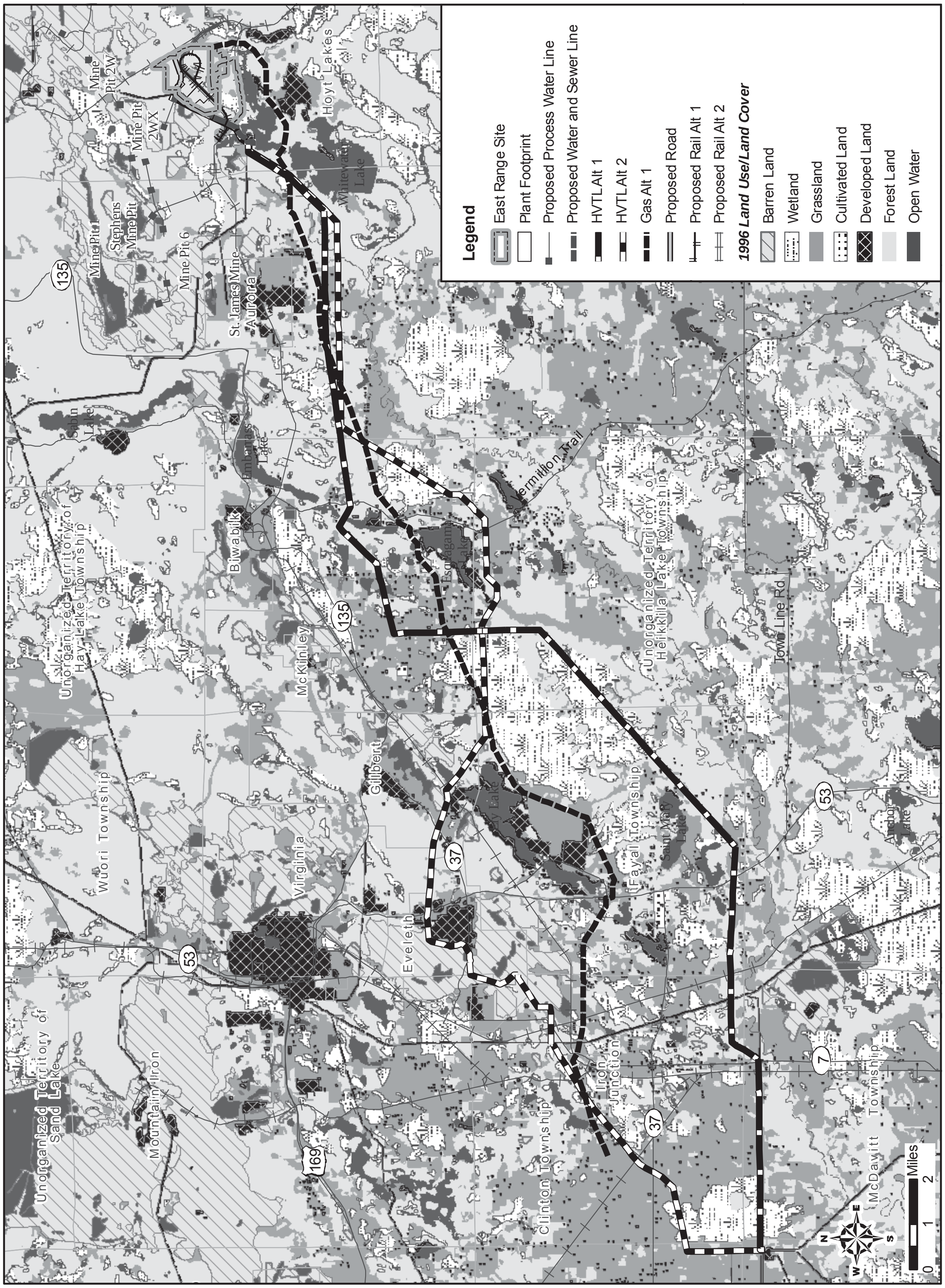


Figure 3.10-4. East Range Corridor Land Use/Land Cover

No residences are located within 0.5 mile of potential process water pipelines, potable water pipelines, or sanitary sewers for the East Range Site.

The potential natural gas pipeline could pass within 0.5 mile of 856 residences. As many as two residences could be located within 50 feet of the alignment and 44 others may be within 300 feet.

Potential HVTL corridors could be located within 0.5 mile of 1,233 residences. No residences would be closer than 50 feet from the centerline of the corridor, although three could be located within 100 feet. As many as 24 other residences would be between 100 and 300 feet from the centerline.

Industrial Areas

The entire land area north and west of the East Range Site was part of a large mining complex**, formerly** owned by CE, which **contains** a mineral extraction and sales business (decorative and other specialty rock). Existing and planned industries near the East Range Site and corridors include:

- Minnesota Power's Syl Laskin Energy Center, which is a coal-fired, steam turbine electric generating plant located approximately one mile southwest of the East Range Site;
- Laskin Energy Park located approximately two miles southwest of the East Range Site;
- Mesabi Nugget **I**, a planned taconite processing facility permitted for development on **the former** CE property**,** approximately 3 miles northwest of the East Range Site;
- **Mesabi Nugget II, a taconite mining complex, which would supply taconite for Mesabi Nugget I, also located northwest of the East Range Site;** and
- PolyMet Mining Corporation, a precious metals mining operation planned for development on the **former** CE property**,** approximately 3 miles north of the East Range Site.

Publicly Owned Lands

Publicly owned lands near the East Range Site include Superior National Forest land, MNDNR lands, St. Louis County tax forfeit lands, and municipal property in the City of Hoyt Lakes.

Farmland

None of the land designated for the East Range Site is actively cultivated as farmland. As in the case of the West Range Site, timber has been harvested historically from the East Range Site. No crops are currently known to be cultivated on properties where the process water supply pipeline corridor, potable water and sewer pipeline corridor, rail alignments, or access road corridor easements would be required. Land is known to be cultivated for crops south of Aurora, and HVTL and natural gas pipeline infrastructure are proposed to traverse this area. Section 3.4 addresses the status of prime farmland determinations near the East Range Site.

3.10.2 Zoning Ordinances

3.10.2.1 West Range Site and Corridors

The West Range Site is located entirely within an area zoned for industrial use (I district) by Itasca County. The purpose of the I district is to separate heavy industrial uses that may conflict with uses in other zoning districts (Itasca County, 2005).

3.10.2.2 East Range Site and Corridors

The East Range Site is located entirely within an area zoned as a MD by the City of Hoyt Lakes. The purpose of the MD district is to identify areas of existing and potential mineral mining, processing, storage and loading, tailings and waste disposal, and accessory and support activities required for proper operation of mining activities, and to ensure the compatibility of these uses with other uses within the City of Hoyt Lakes (Excelsior, 2006b).

3.10.3 Land Use Planning

3.10.3.1 West Range Site and Corridors

Among the stated goals and objectives of the Comprehensive Land Use Plan for Itasca County that are most relevant to the Mesaba Energy Project are the following (Biko Associates and BRW, Inc., 2000):

- Natural resources goal to promote land and water uses that result in the sustainable use of natural resources, including objectives to maintain or improve air quality and to maintain high water quality in the county's abundant lakes, wetlands, and waterways and to develop mitigation efforts for lakes and waterways at risk of degradation. The plan also recommends the use of tax incentives to encourage private lakeshore owners not to develop, subdivide, or plat undeveloped lakeshore or environmentally sensitive areas.
- Commercial/industrial goal to encourage a sound and diverse economy that meets the needs of Itasca County residents and visitors for employment and services, including an objective to support the continuation and expansion of the mining industry and another to target economic development efforts toward the development of value-added industries. The plan also recommends contingencies for increased housing and commercial development related to a substantial resurgence of mining activity in the Western Mesabi Range.
- Transportation goal to maintain and enhance a system that meets the local and regional access needs of Itasca County residents, industries, and visitors, including an objective to improve transportation access to regional commercial and industrial markets for businesses.

3.10.3.2 East Range Site and Corridors

Although not included in a comprehensive planning area of the St. Louis County Planning Commission, the City of Hoyt Lakes is located near the East Range Planning Area of the county. Among the stated goals and policies of the East Range Plan most relevant to the Mesaba Energy Project are the following (St. Louis County, 1981):

- Encourage a variety of industrial activities at the most appropriate sites to establish a diversified economic base, including policies to expand existing industrial activities and encourage industry to locate in the county.
- Allow for development of the copper-nickel mining industry in a manner, which safeguards private property rights and the public's health, safety, and general welfare, including a policy to buffer mining activities from conflicting uses.
- Restrict residential growth in the East Range planning area but not by using large lot sizes as the planning tool to accomplish this restriction; encouraging high-density residential development near existing cities.
- Support development of recreational facilities that meet the needs of local residents, including policies to support development of community recreational facilities and to encourage development of tourist-oriented recreation by private industry.

Due to the limited extent of its jurisdiction, the City of Hoyt Lakes uses the zoning ordinance as its principal land-use planning tool.

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3.11 SOCIOECONOMICS

The region evaluated for the Mesaba Energy Project includes Aitkin, Carlton, Cook, Itasca, Koochiching, Lake, and St. Louis Counties. This region is defined by the Minnesota Department of Employment and Economic Development (DEED, 2006a) as the Northeast or Arrowhead Region (Economic Development Region 3) (Figure 3.11-1). The Taconite Tax Relief Area, as defined in Minnesota Statutes § 216B.1694, is a subset of this region that excludes the City of Duluth; all of Aitkin and Carlton Counties; and portions of Koochiching, Itasca, and St. Louis Counties (see Figure 2.1-1).

Figure 3.11-1. Arrowhead Region

Locally, socioeconomic conditions were evaluated for the West Range Site based on data for Census Tract 9810, which includes Iron Range Township, the City of Taconite, and several other jurisdictions in Itasca County. The socioeconomic conditions for the East Range Site were based on data for the City of Hoyt Lakes (Census Tract 140) in St. Louis County. These are the areas in which social and economic activities may be affected more directly by the Proposed Action and alternatives. Baseline socioeconomic conditions for selected communities located in Itasca and St. Louis counties are presented in this section.

3.11.1 Demographics

3.11.1.1 Regional Conditions

After gaining population in the 1970s, the Arrowhead Region experienced a decade-long population decline during the 1980s, in part due to a downturn in the national steel industry affecting the local taconite industry. The regional population declined by about 9 percent between 1980 and 1990. St. Louis and Lake Counties, in the heart of the Arrowhead, suffered the largest drop (11 percent and 20 percent, respectively). Beginning in 1991, the population began to gradually increase, and by 2000, the population had recovered to nearly the level recorded in 1970. In comparison, over the same 30 years, the population of the State of Minnesota increased by 29 percent to 4.9 million. Based on the 2000 census, there were 322,073 people living in 132,152 housing units in the Arrowhead Region with a population density of 18 persons per square mile (MDOA, 2006).

Table 3.11-1 presents the regional population trends by county. On a percentage basis, Cook County is the fastest growing in the region, but it has the smallest population and lowest density. Itasca County (West Range Site) has a population slightly greater than it had in 1980 and the population of St. Louis County (East Range Site) has declined by 10 percent since 1980.

Table 3.11-1. Population Trends by County for Arrowhead Region

				% Change	
County	**1980**	**1990**	**2000**	**1980–2000**	**1990–2000**
Aitkin	13,404	12,425	15,301	14.2	23.1
Carlton	29,936	29,259	31,671	5.8	8.2
Cook	4,092	3,868	5,168	26.3	33.6
Itasca	43,069	40,863	43,992	2.1	7.7
Koochiching	17,571	16,299	14,355	-18.3	-11.9
Lake	13,043	10,415	11,058	-15.2	6.2
St. Louis	222,229	198,213	200,528	-9.8	1.2
Arrowhead Region	343,344	311,342	322,073	-6.2	3.4

Source: MDOA, 2006

The populations of the 10 largest municipal districts in the Arrowhead Region are provided in Table 3.11-2. There are 278 cities and townships in the Arrowhead region. As shown in Table 3.11-2, approximately one-quarter of the regional population lives in the City of Duluth.

Table 3.11-2. The 10 Largest Municipalities in Northeast Minnesota (2002)

City	2002 Population
Duluth	86,044
Hibbing	16,968
Cloquet	11,378
Virginia	9,108
Hermantown	8,178
Grand Rapids	7,829
International Falls	6,554
Chisholm	4,872
Thomson Township (Carlton County)	4,361
Rice Lake Township (St. Louis Township)	4,190

Source: MDOA, 2006

The Minnesota State Demographic Center predicts that the Arrowhead Region will increase in population by 15 percent between 2000 and 2030. The Center expects the population of St. Louis County to increase by about 9 percent and that of Itasca County to increase by about 22 percent between 2000 and 2030 (MSDC, 2002).

3.11.1.2 West Range Site and Corridors

The West Range Site is located within the city limits of Taconite in Census Tract 9810 of Itasca County. Itasca County is the third largest county in Minnesota occupying approximately 3,000 square miles (7,770 square kilometers). The county has a population of approximately 44,000, and the county seat is located in Grand Rapids.

Census Tract 9810 (Figure 3.11-2) includes Taconite and Iron Range Township, as well as several other small communities along US 169 between the eastern outskirts of Grand Rapids and Nashwauk. As indicated in Table 3.11-3, the population of Iron Range Township grew at a higher rate during the 1990s than the larger census units. However, the population in the City of Taconite has remained relatively constant since 1980, as indicated in Table 3.11-4. The smallest census unit in which the West Range Site is located (Block Group 3, Block 3083) had a population of 86 in the last census.

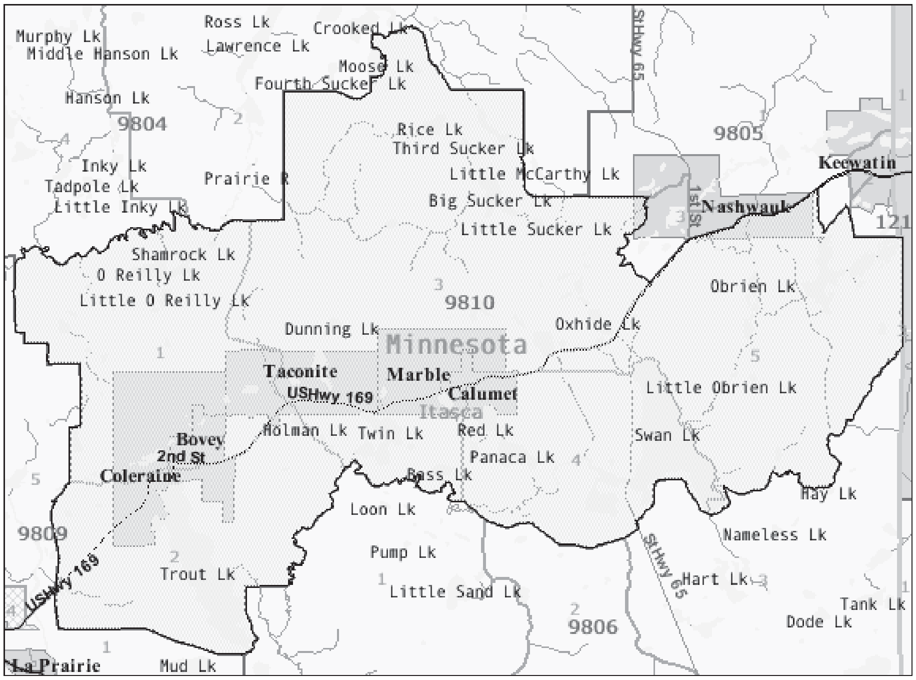

Figure 3.11-2. Census Tract 9810 in Itasca County

The area near Taconite experiences a seasonal increase in population primarily consisting of visitors to lake cabins, resorts, and campgrounds during the summer. These seasonal increases are not reflected in census data but should be considered when evaluating housing availability, transportation, and the capacity of local government services to meet local needs.

Table 3.11-3. Local Population Change, West Range (1990 to 2000)

Unit	1990	2000	% Change
Taconite	310	315	1.6
Iron Range Township	590	651	10.3
Census Tract 9810, Block Group 3	1,324	1,448	9.4
Census Tract 9810	5,597	5,938	6.1

Source: U.S. Census Bureau, 2006

Table 3.11-4. Population Trend in Taconite (1980 to 2004)

Municipality	1980	1990	2000	2004
Taconite	331	310	315	323

Source: MDOA, 2006

3.11.1.3 East Range Site and Corridors

The East Range Site is located in the City of Hoyt Lakes (Census Tract 140) in St. Louis County (Figure 3.11-3). St. Louis County is the largest county in Minnesota, occupying approximately 6,860 square miles (17,800 square kilometers). The county has a population of approximately 200,000 including the City of Duluth, which is the county seat and most populous city in the Arrowhead Region.

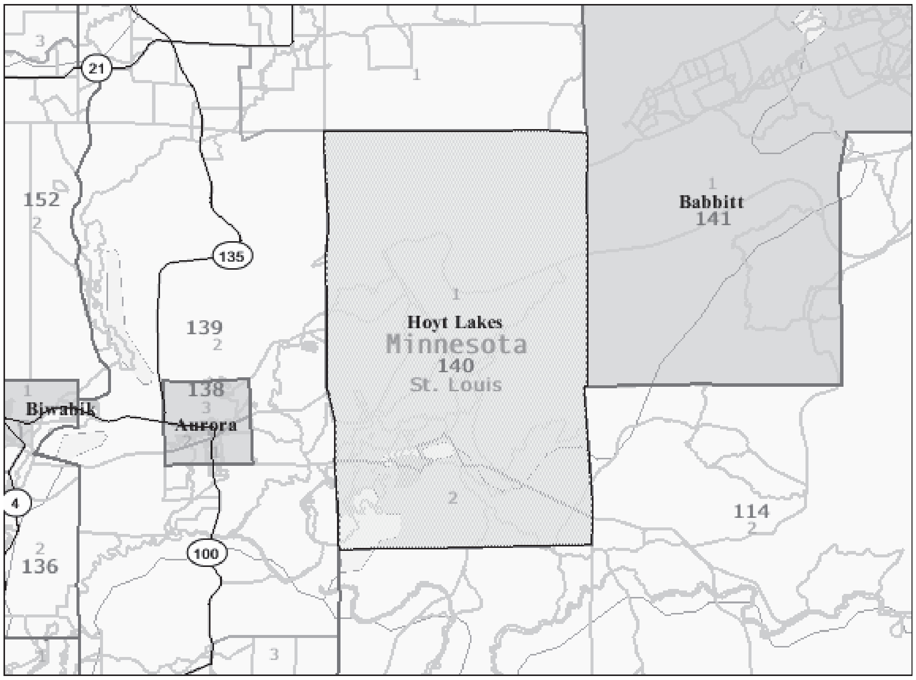

Figure 3.11-3. Hoyt Lakes (Census Tract 140) in St. Louis County

Table 3.11-5 illustrates the steady decline in population experienced by Hoyt Lakes since 1980. The smallest census unit in which the East Range Site is located (Census Tract 140, Block Group 1, Block 1008) had no recorded population in the last census.

Table 3.11-5. Population Trend in Hoyt Lakes (1980 to 2004)

Municipality	1980	1990	2000	2004
Hoyt Lakes	3,186	2,348	2,082	1,961

Source: MDOA, 2006

Hoyt Lakes, like much of the region, gets a large influx of temporary residents and visitors at lake cabins, resorts and campgrounds during the summer that affect the capacity of local government services to meet local needs. However, these temporary residents are not counted in these population statistics.

3.11.2 Housing

3.11.2.1 Regional Conditions

Based on 2000 census data, there were about 35,300 vacant housing units in the Arrowhead Region. Over 27,600 (78 percent) of these were for seasonal, recreational, or occasional use, leaving approximately 7,700 year-round vacant housing units (U.S. Census Bureau, 2006).

3.11.2.2 West Range Site and Corridors

Table 3.11-6 presents housing characteristics in Itasca County. In the 2000 census, there were 24,528 housing units in Itasca County of which 27 percent were vacant, and most of the vacant units were considered seasonal units. Approximately 12 percent of all housing units were renter-occupied. The number of housing units countywide grew by 9 percent over the prior decade, and the vacancy rate declined, while the percentage of rental units remained relatively stable. The median value of owner-occupied housing in Itasca County ($81,700) remained substantially below the median values in Minnesota ($122,400) and the United States ($119,600) in 2000. However, the median home value in the county increased at a substantially higher rate (84 percent) during the decade compared to the rates of increase for the state (65 percent) and nation (51 percent).

As of the 2000 census, Iron Range Township, including the City of Taconite, had 314 housing units, of which 11 percent were renter-occupied and 18 percent were vacant during the last census. Taconite had approximately 150 housing units, of which 21 percent were renter-occupied and 9 percent were vacant. Census Block 3083, in which the West Range Site is located, had 33 housing units (including one renter-occupied and three vacant seasonal units). The township added 35 housing units (13 percent increase) during the prior decade; Taconite added 11 new units (8 percent increase). Both Iron Range Township and Taconite have generally older housing than the county and state. The median house values in Iron Range Township ($61,400) and Taconite ($40,400) were substantially lower than the median value in the county, but median values in both jurisdictions grew by much higher rates than the county during the decade (163 and 122 percent, respectively).

Table 3.11-6. Itasca County Housing Characteristics (2000)

General Housing Data	2000 Census	% of 2000 Total	1990 Census	% of 1990 Total	Change from 1990 to 2000
Total Housing Units	24,528		22,494		9.0%
Occupied	17,789	72.5%	15,461	68.7%	15.1%
Vacant	6,739	27.5%	7,033	31.3%	-4.2%
Vacant Seasonal	5,747	23.4%	5,302	23.6%	8.4%
Owner-Occupied	14,768	83.0%	12,855	83.1%	14.9%
Renter-Occupied	3,021	17.0%	2,606	16.9%	15.9%
Mobile Home	2,815	11.5%	2,739	12.2%	2.8%
Median Value of Owner-Occupied Units	$81,700		$44,300		84.4%
Median Gross Rent	$406		$297		36.7%

Source: U.S. Census Bureau, 2006

3.11.2.3 East Range Site and Corridors

Table 3.11-7 presents housing characteristics in St. Louis County. In the 2000 census, there were 95,800 housing units in St. Louis County of which 14 percent were vacant, and most of the vacant units were considered seasonal units. Approximately 22 percent of all housing units were renter-occupied. The number of housing units countywide remained relatively constant over the prior decade, and the vacancy rate declined, while the percentage of rental units remained relatively stable. The median value of owner-occupied housing in St. Louis County remained substantially below the median values in the state and nation in 2000. However, the median home value in the county increased at a noticeably higher rate (78 percent) during the decade compared to the rates of increase for Minnesota and the nation.

As of the 2000 census, Hoyt Lakes had approximately 995 housing units, of which 8 percent were renter-occupied and 8 percent were vacant. Hoyt Lakes added 33 new housing units (a 3 percent increase) during the prior decade, which was a small, but higher rate of increase than the county. Hoyt Lakes and St. Louis County in general have older housing stock than Minnesota as a whole, but new homes are currently being constructed in the Hoyt Lakes area on lakeshore property owned by Minnesota Power. The median house value in Hoyt Lakes ($39,100) was substantially lower than the median value in the county and grew at a slower rate (47 percent) than the county during the decade.

Table 3.11-7. St. Louis County Housing Characteristics (2000)

General Housing Data	2000 Census	% of 2000 Total	1990 Census	% of 1990 Total	Change from 1990 to 2000
Total Housing Units	95,800		95,403		0.4%
Occupied	82,619	86.2%	78,901	82.7%	4.7%
Vacant	13,181	13.7%	16,502	17.3%	-20.1%
Vacant Seasonal	8,896	9.3%	11,046	11.6%	-19.5%
Owner-Occupied	61,683	74.7%	58,541	74.2%	5.4%
Renter-Occupied	20,936	25.3%	20,360	25.8%	2.8%
Mobile Home	5,090	5.3%	5,052	5.3%	0.7%
Median Value of Owner-Occupied Units	$75,000		$42,200		77.7%
Median Gross Rent	415		291		42.6%

Source: U.S. Census Bureau, 2006

3.11.3 Employment and Income

3.11.3.1 Regional Conditions

Northeastern Minnesota has relied on the mining and forestry industries historically for well-paying jobs and economic base. However, between 2000 and 2003, jobs in mining declined by 36 percent, and mining and agriculture, forestry, fishing, and hunting now comprise 4 percent of the region's jobs. Increased foreign competition and improved technological efficiencies have resulted in the slow decline in employment. However, increasing global iron ore demand and the steady fall of the U.S. dollar have temporarily reduced stress in the industry. This has increased the value of many local products and has created a rebounding demand for skilled workers. Mining still provides 5 percent of wages in the region, which are paid at hourly rates significantly higher than most service-oriented jobs. In comparison, 39 percent of jobs in the region paid less than $10 per hour in 2002 (DEED, 2006b).

Employment in the service sector also is an increasingly large percentage of total employment in the Arrowhead Region, which reflects a nationwide trend. Three sectors – healthcare and social assistance, retail, and accommodation and food services – account for more than half of all regional employment. The health care industry is now the top employing industry in northeast Minnesota, representing 20.7 percent of the total private employment in the region, which is well above the 12.7 percent statewide and the 10.1 percent in the Twin Cities (Schoeppner, 2006). The regional occupations expected to increase the most through 2012 include Community and Social Services Occupations (35 percent), Healthcare Support Occupations (31 percent), and Computer and Mathematical Occupations (26 percent).

The median ages of the populations in Itasca County (41 years) and St. Louis County (39 years) were both considerably higher than the statewide median (35 years) in the 2000 census. Therefore, the aging of the regional workforce is a growing concern in the Arrowhead Region as the Baby Boom generation begins to retire. Minnesota Department of Employment and Economic Development expects this trend to significantly slow the labor force growth over the next two decades (DEED, 2006b).

Unemployment is generally higher in most of the Arrowhead Region compared to Minnesota as a whole. The unemployment rate in the seven-county region averaged 5.2 percent for 2005, but dropped to 4.5 percent in May 2006 (DEED, 2006a). Unemployment in the region has gradually declined over the last several years, due to a slow recovery from the 2001 recession. As shown in Figure 3.11-4, the unemployment rate in the Arrowhead Region was consistently 2 percent or more higher than the state average through the 1980s and 1990s, and about 1 percent higher than the state average for the last four years.

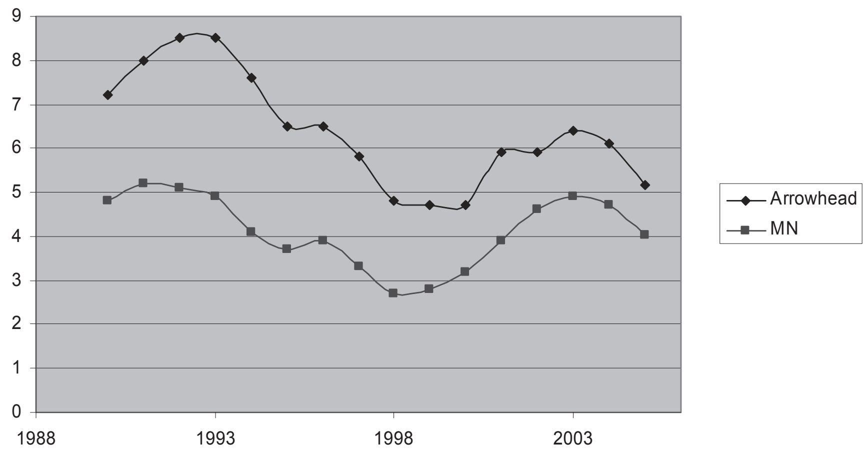

Figure 3.11-4. Annual Unemployment Rate (Percent), Arrowhead Region vs. Statewide Average

Since publication of the Draft EIS, the United States economy entered a recession in 2008. As a result, in January 2009 the national and state unemployment rates both reached 8.5 percent, while the unemployment rate in the Arrowhead Region reached 10.8 percent (DEED, 2009). These rates are not seasonally adjusted.

3.11.3.2 West Range Site and Corridors

In the 2000 census, the median incomes in Itasca County were $44,025 for a family, $36,234 for a household, and $17,717 per capita. Locally, the median incomes in Iron Range Township were $46,750 for a family, $35,000 for a household, and $16,384 per capita. In comparison, median incomes statewide ($56,874 family, $47,111 household, and $23,198 per capita) were substantially higher.

Many local residents travel long distances to work. Approximately 17 percent of workers in Iron Range Township, including Taconite, commuted at least 40 minutes to their places of employment in 2000, compared to 12 percent for both Itasca County and the state (U.S. Census Bureau, 2006). The use of public transport is negligible and more than 80 percent of local workers drive to work alone.

Unemployment in Itasca County has been comparable to the Arrowhead Region but higher than the state as a whole. The unemployment rate in May 2006 for Itasca County was 4.7 percent, and the annual unemployment rate has ranged between 4 and 6 percent since 1995, after having reached rates as high as 8 percent in the early 1990s (DEED, 2006a). **Since publication of the Draft EIS, the unemployment rate in Itasca County reached 12.7 percent (not seasonally adjusted) in January 2009 (DEED, 2009).** The median age of the population in Iron Range Township (37 years) was lower than the county median in 2000 but slightly higher than the statewide median, pointing to potential workforce aging.

Itasca County is a Federally designated HUBZone, defined as a historically underutilized business zone, because of high unemployment and low wages. HUBZones receive preferential

treatment in the awarding of Federal contracts administered by the U.S. Small Business Administration (SBA, 2008).

3.11.3.3 East Range Site and Corridors

The median incomes in St. Louis County in 2000 were $47,134 for a family, $36,306 for a household, and $18,982 per capita. Locally, the median incomes in Hoyt Lakes were $45,603 for a family, $39,493 for a household, and $18,882 per capita. These median incomes were substantially lower than those of the state as a whole were.

Many local residents travel long distances to work. Approximately 15 percent of workers in Hoyt Lakes commuted at least 40 minutes to their places of employment in 2000, compared to 9 percent for the county and 12 percent for the state (U.S. Census Bureau, 2006). The use of public transport is negligible and nearly 80 percent of local workers drive to work alone.

Unemployment in St. Louis County has been generally comparable to the Arrowhead Region but higher than the state as a whole. The unemployment rate in May 2006 for St. Louis County was 4.4 percent, and the annual unemployment rate has ranged between 4 and 6 percent since 1995 after having reached rates exceeding 8 percent in the early 1990s (DEED, 2006a). **Since publication of the Draft EIS, the unemployment rate in St. Louis County reached 10.2 percent (not seasonally adjusted) in January 2009 (DEED, 2009).** The median age of the population in Hoyt Lakes (over 45 years) was even higher than the county median in 2000, pointing to an aging local workforce.

3.11.4 Business and Economy

3.11.4.1 Regional Conditions

The Arrowhead Region, including the Iron Range, has relied on a natural resource-based economy for more than 100 years. Minnesota's economy has been driven by the development of its varied natural resources including iron ore, used in the making of steel through iron mining and ore processing; timber, used in papermaking and fiberboard; and, tourism. Of all these industries, the mining industry, which now accounts for a very small percentage of the annual gross state product in Minnesota, is viewed as the industry that drew many of the ancestors of current residents to settle in this region of Minnesota. However, global competition and increased production efficiency in the mining industry following the general economic crisis of the 1980s and earlier this decade, have forced the region to adopt economic diversification as a long-term strategy (Excelsior, 2006b).

The Arrowhead Region is evolving into a service- and commercial-oriented economy. Like the rest of rural Minnesota, the Arrowhead Region depends on smaller businesses. However, business development appears to be lagging in the Arrowhead Region. From 1998 to 2001, the state saw a 4.7 percent increase in the total number of establishments, while the Arrowhead Region saw only a 1 percent increase. Among the smallest businesses, those employing one to nine people, the Arrowhead Region saw no growth, staying virtually steady (0.6 percent) while the rest of rural Minnesota increased its number of establishments by 2.7 percent and the state as a whole grew by 4.2 percent.

Various state and regional organizations have been established with the objective of promoting economic stability and growth in the Arrowhead Region. Representative organizations include:

- Iron Range Resources– Located in Eveleth, this state agency is responsible to help stabilize the economy and advance regional growth and diversity in the Taconite Assistance Area (the Taconite Tax Relief Area). The agency focuses its development efforts on four key industries: secondary wood products manufacturing, industrial machinery manufacturing, high-end customer service centers, and electronics manufacturing.

- Itasca **Economic** Development Corporation – This corporation, located in Grand Rapids, provides services including business development assistance and counseling, loan packaging, and site location assistance, and hosts a Minnesota Small Business Development Center.
- Arrowhead Regional Development Commission in Duluth.
- Northland Foundation in Duluth.
- The Northspan Group, Inc. in Duluth.

3.11.4.2 West Range Site and Corridors

Key businesses in Itasca County include the UPM Blandin Paper Mill in Grand Rapids **(which reduced its workforce from 800 to 500 in 2003)** and Grand Itasca Clinic and Hospital, as well as numerous small and medium-sized businesses in Grand Rapids and other local communities. **The Ainsworth Grand Rapids OSB Plant was closed in September 2006 with a loss of 135 jobs. In January 2009, two other Ainsworth Lumber Plants (Bemidji and Cook) were also permanently closed, eliminating approximately 280 jobs.** Near the West Range Site, **Minnesota Steel, LLC, now named Essar Steel Minnesota, is developing an integrated facility for ore processing, direct reduced iron production, and steel making based on reactivation of the Butler Taconite mine and tailing basin near Nashwauk. The facility is scheduled to be completed in 2012 and would employ an estimated 700 workers (MNDNR and USACE, 2007). S**maller commercial businesses are located along US 169 and other local roads in Taconite, Bovey, Holman, Marble, Pengilly, and nearby communities.

3.11.4.3 East Range Site and Corridors

Key businesses in St. Louis County near the East Range Site include Cliffs-Erie, LLC, PolyMet Mining Corp., and Cliffs Natural Stone, as well as commercial businesses located along CR 110, CR 100 and other local roads in Hoyt Lakes, Aurora, Biwabik, and surrounding communities.

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3.12 ENVIRONMENTAL JUSTICE

Environmental justice, in the context of this document, refers to the potential for minority and low-income populations to bear a disproportionate share of high and adverse environmental impacts from activities within the project area and the municipalities nearest to the two main sites under consideration: Taconite and Iron Range Township (West Range Site) and Hoyt Lakes (East Range Site). The general population for demographic analysis and comparison includes the counties of Aitkin, Carlton, Cook, Itasca, Koochiching, Lake, and St. Louis, which are defined by the Minnesota Department of Employment and Economic Development as the Arrowhead Region.

3.12.1 Background and Definitions

Executive Order 12898 provides that "each Federal agency shall make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations" (The White House, 1994).

The U.S. Department of Energy (2006a) defines "environmental justice" as:

> *The fair treatment and meaningful involvement of all people—regardless of race, ethnicity, and income or education level—in environmental decision making. Environmental Justice programs promote the protection of human health and the environment, empowerment via public participation, and the dissemination of relevant information to inform and educate affected communities. Department of Energy Environmental Justice programs are designed to build and sustain community capacity for meaningful participation for all stakeholders in Department of Energy host communities.*

In its guidance for the consideration of environmental justice under NEPA, the CEQ defines a "minority" as an individual who is American Indian or Alaskan Native, Black or African American, Asian, Native Hawaiian or Pacific Islander, Hispanic or Latino. CEQ characterizes a "minority population" as existing in an affected area where the percentage of defined minorities exceeds 50 percent of the population, or where the percentage of defined minorities in the affected area is meaningfully greater than the percentage of defined minorities in the general population or other appropriate unit of geographic analysis. The CEQ guidance further recommends that low-income populations in an affected area should be identified using data on income and poverty from the U.S. Census Bureau (CEQ, 1997).

3.12.2 Minority Populations

3.12.2.1 Regional Conditions

Table 3.12-1 compares the distributions of regional population with those of the state and nation. The 2000 Census revealed a more racially and ethnically diverse population in Minnesota compared to the 1990 Census. In 2000, 11.8 percent of Minnesotans (582,000 people) identified themselves as non-white, up from 6.3 percent (274,000 people) in 1990. However, the state population is far less diverse than that of the nation, and the population in the Arrowhead Region is even less diverse, with low distributions of minorities. The largest minority concentrations in the region are in central Duluth and on tribal reservations relatively distant from either the West Range or East Range Sites.

Table 3.12-1. National and Regional Population Distributions (2000)

Area	White	American Indian or Alaskan Native	Black or African American	Hispanic or Latino (all races)	Other Minorities	Total Population (Number)
Arrowhead Region	94.3%	2.5%	0.7%	0.7%	1.8%	322,073
State of Minnesota	88.2%	1.1%	3.4%	2.9%	4.4%	4,919,479
United States	69.1%	0.7%	12.1%	12.5%	5.6%	281,421,906

Source: U.S. Census Bureau, 2006

3.12.2.2 West Range Site and Corridors

Table 3.12-2 compares the minority compositions of the census units surrounding the West Range Site with larger areas based on the 2000 Census. The proposed West Range Site is located in Census Tract 9810, Block Group 3, Block 3083, for which no minority population was recorded in 2000. Iron Range Township, which includes the population of the City of Taconite, had a minority population of nearly 3 percent, and the percentage of minorities generally increases as the census units grow larger. The proportions of the non-minority (white) populations in these smaller census units are generally higher than in Itasca County and are substantially higher than the state and nation. Since the population in the area surrounding the proposed site is far more homogeneous racially and ethnically than the general population of the region, state, and country, a “minority population” as characterized by CEQ does not exist in the potentially affected area of the Mesaba Energy Project.

Table 3.12-2. Population Profiles (2000): Percentage of Minorities, West Range

Area	White	American Indian or Alaskan Native	Black or African American	Hispanic or Latino (all races)	Other Minorities	Total Population (Number)
Tract 9810, BG3, Block 3083	100.0	0.0	0.0	0.0	0.0	86
Iron Range Township	97.2	0.2	0.0	0.2	2.4	651
Tract 9810, BG3	96.1	1.5	0.0	1.0	1.4	1,448
Tract 9810	96.9	1.0	0.1	0.6	1.4	5,938
Grand Rapids	95.1	1.9	0.3	0.9	1.8	7,764
Itasca County	94.3	3.3	0.2	0.6	1.6	43,992

Source: U.S. Census Bureau, 2006

3.12.2.3 East Range Site and Corridors

Table 3.12-3 compares the minority compositions of the census units surrounding the East Range Site with larger areas based on the 2000 Census. The East Range Site is located in Census Tract 140, Block Group 1, Block 1008, which had no population in the 2000 Census. The nearest populated census block to the East Range Site (Block 1023) had no minority population recorded in the 2000 Census, and the larger Block Group 1 and City of Hoyt Lakes (Census Tract 140) each had a minority population of 1 percent. The proportions of the non-minority (white) population in these smaller census units are generally higher than in St. Louis County and are substantially higher than in the state and country. Since the population in the area surrounding the proposed site is far more homogeneous racially and ethnically than the general population of the region, state, and country, a “minority population” as characterized by CEQ does not exist in the potentially affected area of the Mesaba Energy Project.

Table 3.12-3. Population Profiles (2000): Percentage of Minorities, East Range

Area	White	American Indian or Alaskan Native	Black or African American	Hispanic or Latino (all races)	Other Minorities	Total Population (Number)
Tract 140, BG1, Block 1008	0.0	0.0	0.0	0.0	0.0	0
Tract 140, BG1, Block 1023	100.0	0.0	0.0	0.0	0.0	84
Tract 140, BG1	99.3	0.2	0.0	0.2	0.3	1,060
Hoyt Lakes	99.0	0.2	0.3	0.2	0.3	2,082
Virginia	94.6	2.2	0.5	0.8	1.9	9,157
St. Louis County	94.4	2.0	0.8	0.8	2.0	200,528

Source: U.S. Census Bureau, 2006

3.12.3 Low Income Populations

3.12.3.1 Regional Conditions

Table 3.12-4 compares regional poverty rates for the Arrowhead Region, Minnesota, and the United States for the 2000 Census. The data indicate that the Arrowhead Region has poverty rates for individuals, families, and households that are closer in line with national poverty rates than those of the state, which are generally lower.

Table 3.12-4. Regional and National Poverty Rates

Percentage of Income in 1999 Below Poverty Level			
Area	**Families**	**Households**	**Individuals**
Arrowhead Region	7.2	11.6	11.2
State of Minnesota	5.1	7.9	7.9
United States	9.2	11.8	12.4

Source: U.S. Census Bureau, 2006

3.12.3.2 West Range Site and Corridors

Median incomes in the communities near the West Range Site as described in Section 3.11.3 are considerably lower than those of the state, but generally comparable to those in Itasca County. Table 3.12-5 compares the poverty rates for census units near the West Range Site with those in the larger community of Grand Rapids and in Itasca County from the 2000 Census. The table indicates that the county has a significantly higher percentage of families, households, and individuals with incomes below the poverty level than does the state as a whole but lower poverty rates than the nation.

The poverty rates in the smallest census unit encompassing the West Range Site (Census Tract 9810, Block Group 3), as well as in Taconite and Iron Range Township, are higher than the rates in the larger Census Tract 9810 and in the rest of the county. Poverty rate data are not available from the U.S. Census Bureau below the Block Group level, but the residential properties closest to the West Range Site include lakefront properties along Diamond Lake Road to the south and large-sized lots along CR 7 to the west. Therefore, it is reasonable to assume that the poverty rates in neighborhoods closest to the West Range Site are more comparable to those in Census Tract 9810 and the Arrowhead Region in general than to those in the City of Taconite.

Table 3.12-5. Population Profiles (2000): Local Poverty Rates, West Range

Percentage of Income in 1999 Below Poverty Level			
Area	**Families**	**Households**	**Individuals**
Taconite	14.9	13.1	17.1
Iron Range Township	9.7	10.9	15.0
Tract 9810, BG3	9.4	16.0	13.2
Tract 9810	7.9	11.7	11.3
Grand Rapids	7.9	10.2	10.5
Itasca County	7.7	10.6	10.6

Source: U.S. Census Bureau, 2006

3.12.3.3 East Range Site and Corridors

As described in Section 3.11.3, median incomes in the communities near the East Range Site are considerably lower than those of the state, but generally comparable to those in St. Louis County. Table 3.12-6 compares the poverty rates for census units near the East Range Site with those in the larger community of Virginia and in St. Louis County from the 2000 census. The table indicates that the county has a significantly higher percentage of families, households, and individuals with incomes below the poverty level than does the state as a whole but lower poverty rates than the nation.

Poverty rates in Hoyt Lakes are considerably lower than those in St. Louis County and the Arrowhead Region in general but more in line with those of Minnesota. Moreover, the poverty rates in the smallest census unit encompassing the East Range Site (Census Tract 140, Block Group 1), are substantially lower than those in Hoyt Lakes, the county and the state as a whole. Also, the residential properties closest to the East Range Site, consisting of lakefront and lake-view homes, are located about 1 mile south of the site. Therefore, it is reasonable to assume that the poverty rates in neighborhoods closest to the East Range Site are substantially lower than in the larger census units.

Table 3.12-6. Population Profiles (2000): Local Poverty Rates, East Range

Percentage of Income in 1999 Below Poverty Level			
Area	**Families**	**Households**	**Individuals**
Tract140, BG1	3.0	4.3	3.9
Hoyt Lakes	6.6	7.7	8.9
Virginia	10.6	17.3	15.9
St. Louis County	7.2	12.3	12.1

Source: U.S. Census Bureau, 2006

3.13 COMMUNITY SERVICES

This section describes the existing local government services for the Cities of Taconite (West Range Site) and Hoyt Lakes (East Range Site) that may be affected by the proposed project.

3.13.1 Law Enforcement

3.13.1.1 West Range Site and Corridors

The Itasca County Sheriff's Office provides law enforcement in Itasca County, including the City of Taconite and surrounding areas. The Sheriff's Office includes 64 employees working as deputies, jailers, dispatchers, and clerical support. The county has been divided into five patrol districts; deputies live and work within their assigned patrol districts to provide community policing. Taconite is in the East End patrol district. The office has employees with specialized training in D.A.R.E. (Drug Abuse Resistance Education), pre-employment background investigation, boat and water safety, snowmobile safety, drug task force, emergency response team, dive team, and special enforcement projects. Two supporting groups, the Itasca County Sheriff's Posse and the Itasca County Dive Team, are staffed by trained volunteers who contribute their time to search for lost persons, recover drowning victims, and provide time to community service work (Itasca County Sheriff, 2006).

3.13.1.2 East Range Site and Corridors

Hoyt Lakes Police Department serves the City of Hoyt Lakes with support from the St. Louis County Sheriff's Office, which has jurisdiction in surrounding areas. The Hoyt Lakes Police Department consists of five full-time and five part-time officers. The St. Louis County Sheriff's Office has 94 full-time and 23 part-time deputies on staff (Excelsior, 2006b). The patrol division is the largest division. In addition to their regular duty assignments, deputies also participate in activities such as background investigations of potential deputy sheriff candidates; field training officers for newly hired deputies; boat and water patrol; snowmobile patrol; Driving While Intoxicated saturation patrol; illegal drug investigation; arson investigation; and membership on the Emergency Response Team.

The county is divided into three major regional sheriff's offices in Duluth, Hibbing, and Virginia. The Virginia office serves the East Range vicinity. The St. Louis County Sheriff's Office also provides law enforcement services for the community of Aurora. The Aurora Sheriff's Office consists of a sergeant and five deputies who patrol within a 4-mile radius of Aurora. Deputies also provide immediate response to any emergency outside of Aurora, which may extend into the neighboring City of Hoyt Lakes (St. Louis County Sheriff, 2006).

3.13.2 Emergency Response

3.13.2.1 West Range Site and Corridors

The City of Taconite has seven Emergency Medical Technician (EMT) volunteers and 14 fire department volunteers. Ambulance services are dispatched from Nashwauk or Grand Rapids, depending on the location of the 911 caller. The City of Taconite also has a mutual aid agreement with nearby Cohasset and Grand Rapids (Excelsior, 2006b). Itasca County provides additional emergency response as needed. The Itasca County Sheriff is also the Itasca County Director of Emergency Management for the Minnesota Department of Public Safety and for coordination with the U.S. Department of Homeland Security (MDPS, 2006).

Itasca County is served by three hospitals and 12 outpatient clinics (Excelsior, 2006b). The nearest hospitals to Taconite are the Grand Itasca Clinic and Hospital in Grand Rapids (13 miles) which has 64 beds, and University Medical Center-Mesabi in Hibbing (27 miles) which has 175 beds (MDH, 2006).

3.13.2.2 East Range Site and Corridors

Hoyt Lakes operates a volunteer emergency response and fire department cooperatively with the surrounding communities of Aurora, Biwabik, and White Township, which contribute funds to cover administrative expenses and build up reserves for capital purchases. The cooperative service has 25 EMTs and fire fighters who are paid by service run. Hoyt Lakes also has mutual aid agreements with nearby communities for police, fire, and ambulance services.

St. Louis County assists its municipalities when emergency response demands exceed their local capabilities. The St. Louis County Sheriff's Office Emergency Management Division coordinates emergency management plans and has jurisdiction throughout the county outside of cities that establish their own emergency management organizations (Excelsior, 2006b). The St. Louis County Sheriff is also the St. Louis County Director of Emergency Management for the Minnesota Department of Public Safety and for coordination with the U.S. Department of Homeland Security (DPS, 2006). In an extreme emergency or disaster situation within the county, the Chairman of the Board of Commissioners, the County Administrator, or the Sheriff activates the St. Louis County Emergency Operations Center. Response activities are coordinated through the Emergency Operations Center to assure effective response and recovery.

St. Louis County is served by eight hospitals and 56 outpatient clinics (Excelsior, 2006b). The nearest hospitals to Hoyt Lakes are the White Community Hospital in Aurora (4 miles) which has 16 beds, and the Virginia Regional Medical Center in Virginia (25 miles) which has 83 beds (MDH, 2006).

3.13.3 Parks and Recreation

3.13.3.1 West Range Site and Corridors

Itasca County is known for its trails, resorts, and campgrounds. Residents and visitors enjoy outdoor activities year-round, including fishing, hiking, hunting, snowmobiling, cross-country skiing, and golf. The Forest History Center in Grand Rapids is a state historical park and interpretive center demonstrating the history of forestry in northern Minnesota. The Edge of the Wilderness National Scenic Byway extends north from Grand Rapids through the Chippewa National Forest. The closest boundary of the Chippewa National Forest is located less than 10 miles northwest of the West Range Site, and the closest boundary of George Washington State Forest is located less than 15 miles north of the site. Scenic State Park is located approximately 25 miles to the northwest. The West Range Site is also located within 65 miles southwest of the Boundary Waters Canoe Area and within 75 miles south of Voyageurs National Park.

Recreational areas near the West Range Site include the Hill-Annex State Park and Gibbs Park. The Hill-Annex State Park, which exhibits the history of iron ore mining on the Mesabi Range, is within 4 miles east of the West Range Site. Gibbs Park is a day park that provides a fishing pier and swimming beach located on Holman Lake about 2 miles south of the West Range Site. Numerous lakes and woodlands in the area, including the West Range Site property, provide recreational opportunities for area residents. Activities such as hiking, swimming, boating, fishing, bird watching, and similar activities are prevalent. Former mine pits that have filled with water, such as the Canisteo Pit, also provide opportunities for recreational boating and fishing. MNDNR has indicated that the CMP is used for recreational boating approximately 2,210 hours per year and for recreational fishing approximately 6,500 hours per year (Kavanaugh, 2007). **These estimates are based on data collected by MNDNR in summer 2001 and winter 2001-2002 at a time when the lake trout fishery was still developing. MNDNR believes that fishing pressure is increasing as the lake trout fishery matures. Although the pit has been stocked almost annually with lake trout since 1993, MNDNR concluded from survey results in 2005 that natural recruitment is occurring in the lake trout population. The survey also indicated that a bass fishery is developing.**

The Mesabi Trail is a multiuse trail (e.g., biking, hiking, snowmobiling, and wheelchair use) that will extend from Grand Rapids to Ely. When completed, the trail will traverse 132 miles and connect more than 25 communities. One segment of this trail is located about 1.5 miles south of the West Range Site along an abandoned rail grade situated parallel to and north of US 169.

3.13.3.2 East Range Site and Corridors

The East Range Site is located just west of the boundary of the Laurentian District of Superior National Forest, which provides opportunities for hiking, biking, hunting, bird watching, and similar recreational activities. The City of Hoyt Lakes is located on the Superior National Forest Scenic Byway, approximately 1.5 miles south of the site, which extends from Aurora to Silver Bay on Lake Superior. The East Range Site is located within 25 miles southwest of the Boundary Waters Canoe Area and within 60 miles south of Voyageurs National Park.

Approximately 1 mile south of the East Range Site is Birch Cove Park, which includes a playground, beach, and boat launch on Colby Lake. Numerous lakes and woodlands in the area also provide recreational opportunities for area residents. Activities such as hiking, swimming, boating, fishing, snowmobiling, bird watching, and others are prevalent.

3.13.4 School Systems

3.13.4.1 West Range Site and Corridors

School districts in Itasca County include Deer River, Grand Rapids, Greenway, and Nashwauk-Keewatin. The county maintains five private schools and 20 public schools. The City of Taconite is located within the Greenway school district and, according to the Minnesota Department of Education; the Greenway district maintains four public schools (i.e., two elementary schools, one middle school, and one senior high school.) Table 3.13-1 provides a summary of the district's educational statistics.

Table 3.13-1. Educational Statistics for Greenway School District in Itasca County

Enrollment	
Elementary	710
Secondary	571
Spending per Student	
Total	$9,285
Instructional	$4,236
Student Teacher Ratio	
Elementary (1:1)	14.96
Secondary (1:1)	15.32
Private Elementary School Enrollment	
Number of Schools	0
Total Enrollment	N/A
Private Secondary School Enrollment	
Number of Schools	0
Total Enrollment	N/A

Source: MDE, 2006

3.13.4.2 East Range Site and Corridors

St. Louis County is divided into 16 school districts, including Mesabi east district, which serves the City of Hoyt Lakes. The Mesabi east district maintains two public schools, Mesabi East Elementary School and Mesabi East Secondary School. Table 3.13-2 provides a summary of the district's educational statistics.

Table 3.13-2. Educational Statistics for Mesabi East School District in St. Louis County

Enrollment	
Elementary	495
Secondary	417
Spending per Student	
Total	$10,260
Instructional	$4,796
Student Teacher Ratio	
Elementary (1:1)	12.04
Secondary (1:1)	21.06
Private Elementary School Enrollment	
Number of Schools	0
Total Enrollment	N/A
Private Secondary School Enrollment	
Number of Schools	0
Total Enrollment	N/A

Source: MDE, 2006

3.14 UTILITY SYSTEMS

3.14.1 Potable Water Supply

This section discusses the existing potable water supplies potentially utilized by the Mesaba Energy Project.

3.14.1.1 West Range Site

The nearest potable water supplier to the West Range Site is in the City of Taconite, located 2.5 miles south of the proposed Mesaba Generating Station footprint. Taconite is permitted to use 20 million gallons a year (about 55,000 gallons per day) based on the current groundwater allocation permit and is currently using an average of 8 million gallons a year (about 22,000 gallons per day). This system currently serves approximately 330 residents (Excelsior, 2006b).

3.14.1.2 East Range Site

The City of Hoyt Lakes' potable water is supplied from a 1.5 million-gallon per day surface water treatment plant located at the north end of the city near Colby Lake, approximately 1 mile southwest of the proposed plant site. The plant was constructed in 1954. Raw water is supplied to the plant from two intakes located in Colby Lake. The intakes are set at different depths and the quality of the water dictates which intake is used to supply water to the treatment plant. Treated water is pumped to a 1.7 million gallon standpipe located in the center of town and to a 150,000 gallon elevated tower located west of the city in the Laskin Energy Park. A pumping station is located at the standpipe that can pump water to the elevated tower at a maximum rate of 1,200 gallons per minute. The elevated tower supplies water to the Industrial Park site and MP through a 12-inch distribution main. The average water use for the City of Hoyt Lakes is 275,000 gallons per day with a maximum daily demand of 700,000 gallons per day (255.5 million gallons per year). The treatment plant currently serves approximately 2,400 residents.

3.14.2 Sanitary Wastewater

3.14.2.1 West Range Site

The City of Taconite has a wastewater collection system that conveys wastewater to the joint Coleraine-Bovey-Taconite WWTF located on CR 10 in Bovey. The WWTF is roughly 4 miles southwest of the West Range site, but the City of Taconite's collection system is only about 2 miles from the site. This facility is a conventional activated sludge treatment plant designed to treat typical domestic wastewater. The NPDES permit (permit # MN0053341) for this facility allows a discharge of 499,000 gallons per day of treated effluent to the Swan River. The facility currently treats an average of 334,000 gallons per day (EPA, 2006b). While the WWTF is currently in compliance with all permit requirements (EPA, 2006b), the collection system within the City of Taconite does experience bypass events. During high groundwater or rainfall, the main wastewater pump station in Taconite cannot handle the additional flows, creating a need to bypass untreated wastewater into a natural pond system.

3.14.2.2 East Range Site

The City of Hoyt Lakes has a wastewater collection system that conveys wastewater to the Hoyt Lakes WWTF located in the city. Access to the WWTF collection system is near the Syl Laskin Energy Center, about a mile southwest of the East Range site. This Hoyt Lakes WWTF is a trickling filter design to treat domestic wastewater. The NPDES permit (permit # MN0020206) for the Hoyt Lakes facility allows a discharge of 680,000 gallons per day of treated effluent to Whitewater Lake (EPA, 2006c). This permit will require renewal in January 2010. The facility currently treats an average of 300,000 gallons per day of wastewater effluent.

3.14.3 Electricity

3.14.3.1 State Electricity Infrastructure

There are thousands of miles of transmission lines in Minnesota. The transmission system in Minnesota connects more than 175 electric generating plants, sized from a few megawatts to more than 1100 MW; including fossil fuel-fired (coal, natural gas, and oil), nuclear, wind, hydro, and biomass plants, located both within and outside the state, to serve the state's more than five million residents. The system is also connected to utilities in other states and Canada in all directions, including over 6,500 miles of 69-kilovolt (kV) lines, nearly 3,500 miles of 115-kV lines, 820 miles of 161-kV lines, approximately 1,500 miles of 230-kV lines, 870 miles of 345-kV lines, and 340 miles of 500-kV lines. In addition, there are almost 300 miles of direct current (DC) lines in Minnesota. A map of transmission lines in Minnesota 69 kV and larger can be found on the Public Utility Commission's webpage at: http://server.admin.state.mn.us/maps/ElecTran03.pdf (PUC, 2005).

In the spring of 2004, six utility companies initiated a concerted effort to ensure that the transmission system in Minnesota was adequate to serve a growing demand for electricity and to plan for major capital expenditures that would be required to construct major new transmission infrastructure in the near future. The utilities are Great River Energy, MP, Missouri River Energy Services, Otter Tail Power Company, Southern Minnesota Municipal Power Agency, and Xcel Energy. These utilities initiated an effort, under the name CapX2020 (Capital Expansion by the year 2020), using the individual utility load growth figures from the Mid-Continent Area Power Pool *2004 Load and Capability Report* (CapX2020, 2004) to estimate the demand for electricity in the future. Based on their assessment, electricity demand could increase by roughly 6,300 MW by 2020 in the region, including Minnesota and portions of the Dakotas, Iowa, and Wisconsin.

3.14.3.2 Regional Electrical Infrastructure

Current electricity providers in the Iron Range region include: Arrowhead Electric Cooperative, Inc.; Bigfork Valley Electric Service Company, Inc.; Crow Wing Cooperative Power & Light Co.; Lake Country Power; Mille Lacs Power Cooperative; Minnesota Power; North Itasca Electric Cooperative, Inc.; North Star Electric Cooperative, Inc.; and The Cooperative Light & Power Association of Lake County (Iron Range Resources, 2006).

Minnesota is divided geographically into the following six Transmission Planning Zones: Northwest; Northeast; West Central; Twin Cities; Southwest; and Southeast. Both project alternative locations would be located within the Northeast Zone. The Northeast Planning Zone covers the area north of the Twin Cities suburban area to the Canadian border and from Lake Superior west to the Walker and Verndale areas. The zone includes the counties of Aitkin, Carlton, Cass, Cook, Crow Wing, Hubbard, Isanti, Itasca, Kanabec, Koochiching, Lake, Mille Lacs, Morrison, Pine, St. Louis, Todd, and Wadena counties. The primary population centers in the Northeast Planning Zone include the cities of Brainerd, Cambridge, Cloquet, Duluth, Ely, Grand Rapids, Hermantown, Hibbing, International Falls, Little Falls, Long Prairie, Milaca, Park Rapids, Pine City, Princeton, Verndale, Virginia, and Walker.

The following utility companies own transmission facilities in the Northeast Planning Zone:

- American Transmission Company, LLC
- Great River Energy
- Minnesota Power
- Xcel Energy

The transmission system in the Northeast Planning Zone consists mainly of 230-kV, 138-kV, and 115-kV lines that serve lower voltage systems comprised of 69 kV, 46 kV, 34.5 kV, 23 kV, and 14 kV. A 345-kV line extends between Duluth, Minnesota, and Wausau, Wisconsin. The 345 kV and 230 kV system is used as an outlet for generation and to deliver power to the major load centers within the

Northeast Planning Zone. From the regional load centers, 115-kV lines carry power to lower voltage substations where it is distributed to outlying areas. In a few instances, 230-kV lines serve this purpose. A ± 250-kV DC line runs from North Dakota to Duluth and serves as a generator outlet for lignite-fired generation located in North Dakota. In addition, a 500-kV line and a 230-kV line provide interconnections with Manitoba and a 115-kV line interconnects with Ontario at International Falls. The interconnections with Canada provide for generation resource sharing as well as seasonal and economic power interchanges between Minnesota and Canada (PUC, 2005).

Figure 3.14-1 shows the transmission lines in the Northeast Planning Zone.

3.14.3.3 West Range Site

There are a number of HVTLs and power substations in Itasca County. The point of intersection for the HVTLs and substations in the area is the Blackberry Substation, an existing 230/115-kV substation owned and operated by MP, that serves as the major HVTL hub in the area. The Blackberry Substation is located at the intersection of Itasca CR 10 and CR 434, approximately 8.5 miles south-southeast of the West Range Site (Figure 3.14-2). **The HVTL corridor MP-14L in Figure 3.14-2 represents an existing utility corridor, however the transmission line has been removed from service.**

3.14.3.4 East Range Site

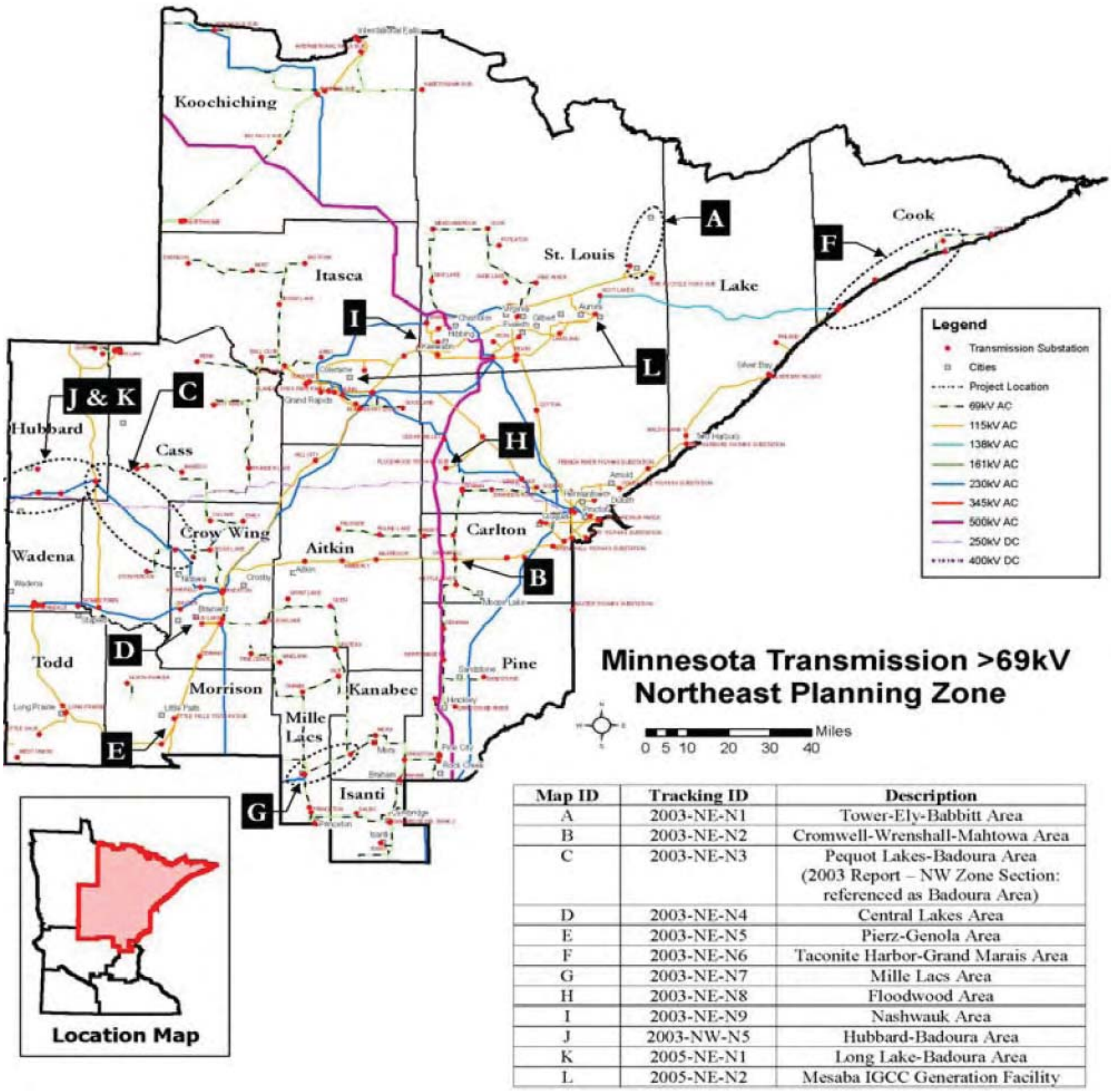
Current municipal utility providers in St. Louis County are: Hibbing Public Utilities; Northern Minnesota Utilities, Ltd.; Peoples Natural Gas Division; and Virginia Department of Public Utilities (Iron Range Resources, 2006).

The East Range Site is located approximately 3.5 miles south of a former taconite processing plant. Adjacent to this plant is an existing 138 kV substation that provides electric service to CE. Three 138-kV transmission lines traverse the **former** CE property to deliver power to this substation, two of which occupy the same corridor and line as the CE Substation to the coal fueled power plant at Taconite Harbor. A third 138-kV HVTL runs between a substation serving MP's Syl Laskin Energy Center (the "Laskin Substation") and the CE Substation (Figure 3.14-3). These facilities are part of the Minnesota Power transmission network known as the "North Shore Loop," which extends from the east end of the Iron Range, along the North Shore of Lake Superior, and into Duluth. The 115/138-kV transmission facilities that make up this "loop" are heavily loaded and currently operate with several special protection schemes involving generation reduction and/or unit tripping to avoid overloading the remaining transmission facilities during critical equipment outages. HVTL route designations shown on Figures 3.14-2 and 3.14-3, such as 39 Line or 39L, are based on the identification numbers provided by their respective electric companies.

3.14.4 Natural Gas

This section describes the natural gas pipeline infrastructure located in the vicinities of the West and East Range Sites.

Minnesota's Iron Range is served by two major natural gas pipeline transmission companies: GLG and NNG. GLG has been providing energy services to the U.S. and Canada since 1967. They transport more than 2.2 billion cubic feet of natural gas per day through 2,100 miles of pipelines (GLG, 2006). NNG operates an interstate natural gas pipeline that extends from the Permian Basin located in Texas and New Mexico to the upper Midwest. Their system includes 16,500 miles of pipeline, which provides 4.5 billion cubic feet per day of market area peak capacity. NNG also has five natural gas storage facilities with a 59 billion cubic foot capacity, which includes four billion cubic feet of liquefied natural gas (NNG, 2006). The GLG natural gas pipeline transmission system interconnects with NNG's natural gas pipeline system near Carlton, Minnesota.



Map ID	Tracking ID	Description
A	2003-NE-N1	Tower-Ely-Babbitt Area
B	2003-NE-N2	Cromwell-Wrenshall-Mahtowa Area
C	2003-NE-N3	Pequot Lakes-Badoura Area (2003 Report – NW Zone Section: referenced as Badoura Area)
D	2003-NE-N4	Central Lakes Area
E	2003-NE-N5	Pierz-Genola Area
F	2003-NE-N6	Taconite Harbor-Grand Marais Area
G	2003-NE-N7	Mille Lacs Area
H	2003-NE-N8	Floodwood Area
I	2003-NE-N9	Nashwauk Area
J	2003-NW-N5	Hubbard-Badoura Area
K	2005-NE-N1	Long Lake-Badoura Area
L	2005-NE-N2	Mesaba IGCC Generation Facility

Source: PUC, 2005.

Figure 3.14-1. Minnesota Transmission Lines, Northeast Planning Zone

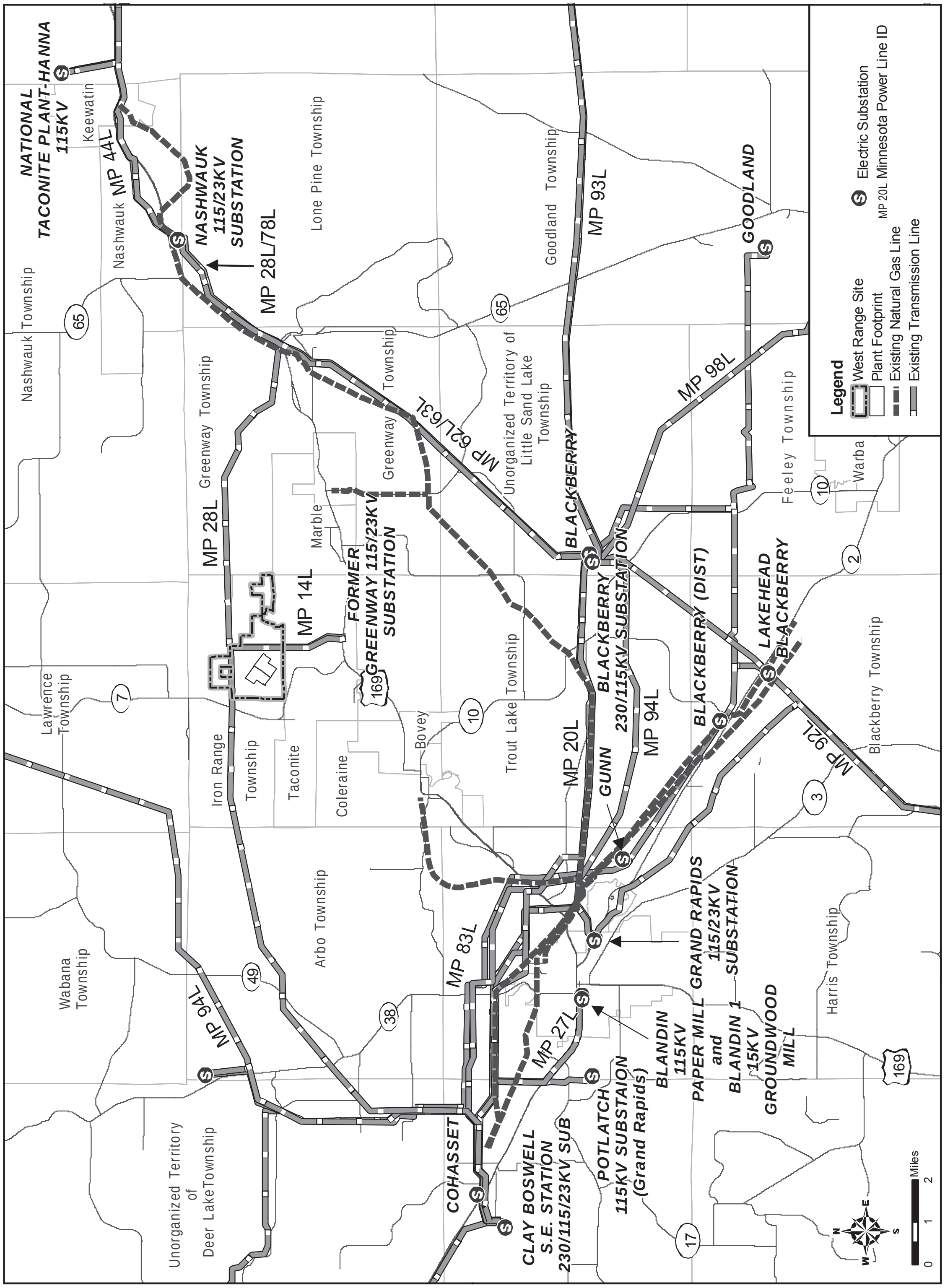


Figure 3.14-2. West Range Existing Utilities

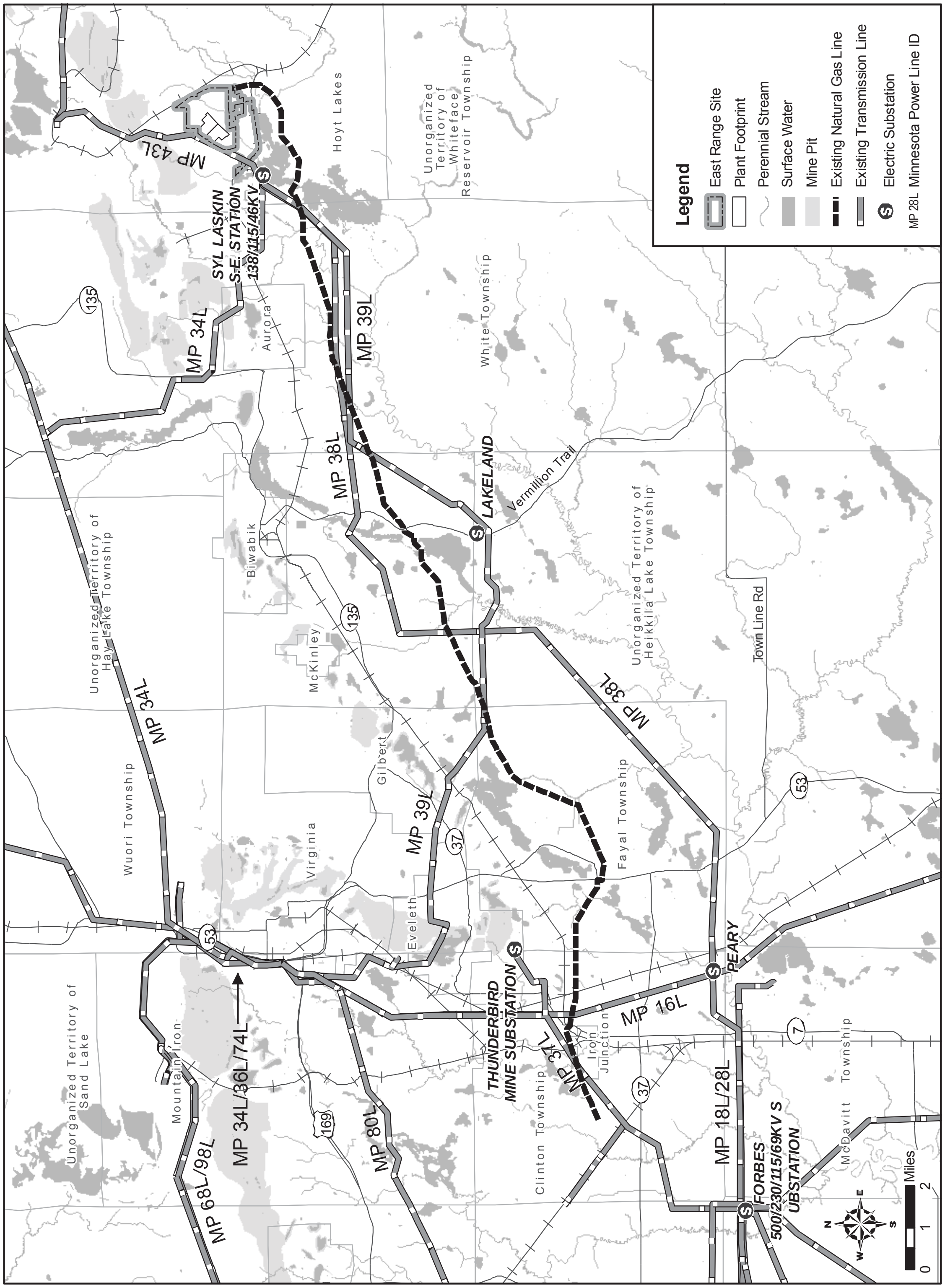


Figure 3.14-3. East Range Existing Utilities

3.14.4.1 West Range Site

Natural gas in the area of the West Range Site is supplied by either the GLG pipeline located about 12 miles due south of the West Range Site or from NNG's tapping point located in La Prairie, Minnesota, about 10 miles west-southwest of the West Range Site.

3.14.4.2 East Range Site

The NNG pipeline is the only natural gas pipeline serving the vicinity of the East Range Site. An existing branch pipeline (known as the Erie Branch line) from NNG's main pipeline (which originates at a tap of the GLG pipeline in Carlton, Minnesota), directly abuts the eastern boundary of the East Range Site.

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3.15 TRAFFIC AND TRANSPORTATION

This section describes the existing transportation infrastructure within the vicinity of the proposed Mesaba Energy Project (West Range and East Range Sites), including the regional railway system. Transportation safety issues, including traffic accidents and rail crossings, are presented in section 3.17, Health and Safety.

3.15.1 Regional Transportation System

Northeastern Minnesota's transportation system connects the region to the local, regional, and national transportation system through air, land, and water-based transport.

3.15.1.1 Modes of Transportation

Northern Minnesota's aviation infrastructure includes approximately 23 public-use airports. Scheduled commercial air passenger service is provided at **four** airports in northern Minnesota. These airports include Duluth International, Falls International, Chisholm-Hibbing, and Ely (seasonal) **[Grand Rapids deleted]**. All the airline services provided at these airports feed into networks of domestic and international services at Minnesota's major hub airport of Minneapolis-St. Paul International.

The structure of the region's current transit system is highly influenced by variables such as population, age, disabilities, population density, and employment characteristics. Transit service in the region's rural areas presents a challenge because of low population densities and the distance between destination points. The region has a number of transit options for the traveling public. Some of the service is limited to defined city boundaries, while much of the service is between cities, both within and outside of the region. The vast majority of travelers using transit service in the northeastern Minnesota region rely on public transit operated by public and private non-profit entities.

There are four major water ports in northeastern Minnesota: Duluth/Superior, Two Harbors, Silver Bay, and Taconite Harbor. Approximately 40 million metric tons of bulk and packaged general cargo pass through the Duluth-Superior Port on Lake Superior annually, which is ranked among the nation's top ports based upon tonnage. Outbound ships carry more than 17 million tons of taconite pellets and iron ore from Minnesota annually, along with millions of tons of other commodities destined for eastern U.S. markets and for eight ports via the Great Lakes and the St. Lawrence Seaway.

Railroads traverse the landscape of northeastern Minnesota, providing major hauling and shipping capacities for area manufacturers and industries. As a direct result of the region's wood products and iron ore industries, along with grain shipments to the Port of Duluth-Superior, most of the communities in northeastern Minnesota are served by four rail carriers: BNSF, CN, Canadian Pacific, and Union Pacific/Wisconsin Central (UP). BNSF and CN are the two rail lines that service the vicinity of the project and are discussed in greater detail in Section 3.15.3.

The highway network linking major communities in northeastern Minnesota ranges from two-lane roads to four-lane, divided highways. In this region, US 2, 53, and 169 are the major routes for U.S. and Canadian trucking companies, which move wood products, agricultural products, and other goods. These roads are part of a well-established highway network that provides access from the Canadian border to Duluth, Minneapolis/St. Paul, Wisconsin, North Dakota, and the rest of the country.

3.15.1.2 Transportation Trends and Planning

With respect to transportation planning, Itasca and St. Louis Counties are part of the Mn/DOT District 1, the Arrowhead Regional Development Commission, and the Northeast Minnesota Area Transportation Partnership planning areas. These transportation planning organizations support the transportation network of northeastern Minnesota, which includes the counties of Cook, Lake, St. Louis, Carlton, Pine, Aitkin, Itasca, and Koochiching.

Increased development and recreational travel within Itasca and St. Louis counties could have impacts on transportation needs and traffic volumes. However, because of northeastern Minnesota's mainly rural characteristics, there is limited traffic information in local transportation plans for each community. In conjunction with the Arrowhead Regional Development Commission, Mn/DOT District 1 has developed a transportation plan (Northeast Minnesota Long Range Transportation Plan Fiscal Years 2008-2030) that covers northeastern Minnesota. The transportation plan is the agency's instrument used to implement the plans resulting from the statewide and other regional planning organizations' transportation planning process. At this time, there are no scheduled improvement projects identified in this transportation plan that would be considered immediately significant to this project.

As stated in Section 3.11 (Socioeconomics), northeastern Minnesota has experienced a population decrease beginning in 1980 that was spurred by a decline in the national steel industry and the subsequent downturn in taconite mining operations on Minnesota's Iron Range. Beginning in 1991 the region reversed this trend and generally experienced slow, but steady growth throughout the 1990s. Seven of the eight counties started to gain back population, with only Koochiching County losing population in the 1990s. Several counties in the northeastern Minnesota region are projected to experience considerable growth through 2030, with Itasca and St. Louis Counties projected at approximately 22 percent and 9 percent projected growth rates, respectively (Mn/DOT, 2005a).

In addition to the permanent population identified as residents of northeastern Minnesota, recreational and seasonal visitors make up a population component that greatly affects the transportation system but is difficult to estimate. At various times during the year, substantial numbers of people visit the northeastern Minnesota region and reside on a part-time or weekend basis at recreational accommodations. While occupancy of these housing units varies seasonally, it is possible for all of the seasonal units to be occupied during peak summer and holiday periods, resulting in a substantial shift in population and accompanying traffic to northeastern Minnesota. Therefore, while this "temporary" population is not included in the census totals or population estimates, their presence often has major impacts on the transportation and infrastructure system of the region, particularly as it relates to potential traffic congestion and safety problems.

As manufacturing and mining activities decline there will be less heavy goods moving on the trunk highway system in northeastern Minnesota. This may lead to changes in pavement life and traffic patterns. Considering the importance of tourism to the region's economy, the needs of visitors and the businesses that serve them must be taken into account in the development, maintenance, and investment planning of the area's transportation system and infrastructure. The transportation needs of these commercial centers and larger communities will play an important role in the continuing development of the region's economy.

3.15.2 Roadway System and Local Traffic

Figures 2.3-1 and 2.3-5 illustrate the existing highway system in the West Range and East Range Sites, respectively. The significant roads that service the West Range Site include US 169 and CR 7. For the East Range Site, the significant roads include CR 666 and CR 110.

3.15.2.1 Load Limits

Minnesota roadways are generally categorized into two specific groups. One group consists of all state trunk highways, which includes all state, U.S., and interstate highways, and certain other routes designated by the commissioner of transportation. These are commonly referred to as 10-ton routes. All routes other than state trunk highways and designated routes are commonly referred to as 9-ton routes. Minnesota statutes provide for maximum loads, which may be carried upon any wheel, any single axle, any group of consecutive axles, and the gross vehicle weight (MN State Patrol, 2006).

In the spring of each year, county and town roads not paved with concrete are restricted to 10,000 pounds on single axles and 5/9 of the weight restrictions prescribed for two or more consecutive axles, unless otherwise posted. The starting and ending dates for these restrictions is determined by the commissioner of transportation for each of the frost zones in the state. Any road may be restricted at any other time by the appropriate jurisdiction when conditions threaten damage or deterioration. Bridges with rated capacities less than the maximums permitted on Minnesota highways will have restricted weights posted and all drivers must observe these restrictions.

3.15.2.2 Traffic

All references to level of service (LOS) of a road are defined by the Highway Capacity Manual, published by the Transportation Research Board, which is an industry standard for traffic engineering. LOS is a qualitative measure that is typically used to describe operational conditions within a traffic flow and the perception of these conditions by drivers or passengers. The Highway Capacity Manual defines six levels of service that reflect the level of traffic congestion and qualify the operating conditions of a roadway or intersection. The six levels are given letter designations ranging from A to F, with “A” representing the best operating conditions (free flow, little delay) and “F” the worst (congestion, long delays) (TRB, 2000). Various factors that influence the operation of a roadway or intersection include speed, delay, travel time, freedom to maneuver, traffic interruptions, comfort, convenience, and safety. The Highway Capacity Manual describes the levels of service as follows:

- LOS A describes completely free-flow conditions. Individual users are virtually unaffected by the presence of others in the traffic stream.
- LOS B also indicates free flow, but the presence of other vehicles becomes more noticeable. Freedom to select desired speeds is relatively unaffected, but there is a slight decline in the freedom to maneuver within the traffic stream from LOS A.
- LOS C is in the range of stable flow, but marks the beginning of the range of flow in which operation of individual users becomes significantly affected by interactions with others in the traffic stream. The selection of speed is now affected by others and maneuvering requires substantial vigilance on the part of the user.
- LOS D represents high density but stable flow. Speed and freedom to maneuver are severely restricted, and the driver experiences a generally poor level of comfort and convenience.
- LOS E represents operating conditions at or near capacity level. All speeds are reduced to a low but relatively uniform value.
- LOS F is used to define breakdown of traffic flow or stop and go traffic. This condition exists wherever the amount of traffic approaching a point exceeds the amount that can traverse the point. Queues form behind such locations. Operations within the queue are characterized by stop-and-go waves, and they are extremely unstable.

LOSs A, B, or C are typically considered good operating conditions in which minor or tolerable delays of service are experienced by motorists. Both the West Range and East Range Sites are located in low population density areas, which do not see significant traffic volumes on a daily basis. In general, Itasca and St. Louis Counties’ local traffic can be described as relatively slow due to the rural nature of the region, with insignificant traffic delays and low annual average accident rates. LOSs of the existing network of roads surrounding both project sites are generally operating at an LOS of C or better.

3.15.2.3 West Range Site and Corridors

Roadways

The existing roadway system in the area of the West Range Site is shown in Chapter 2, Figure 2.3-1. US 169 traverses east to west through Itasca County and **passes just south of** the West Range Site. US 169 is classified as a principal arterial road and is generally a four-lane highway extending across the Iron Range from Grand Rapids to Virginia, Minnesota; however, it is a two-lane roadway in the vicinity of the West Range Site. Many historical mining areas are located along US 169 between Virginia and Grand

Rapids. Mn/DOT has developed preliminary plans to expand US 169 to four lanes in the project area, but these plans are unfunded to date, and therefore, not yet scheduled. **Since publication of the Draft EIS, Mn/DOT realigned and expanded a portion of US 169 to four lanes between Coleraine and Taconite.** The posted speed limit on US 169 is 55 miles per hour and the legal load limit is 10 tons. US 169 is designated as a Trunk Highway and receives funding for construction and maintenance mainly from Federal funds (Itasca County, 2003).

The West Range Site is bordered on the west by CR 7. Though not officially designated as a state byway, CR 7 is locally referred to as Scenic Highway 7. CR 7 is a winding two-lane roadway stretching from Taconite to Bigfork. CR 7 is a 9-ton roadway except during spring load restrictions when it is posted at 7-tons/axle. The posted speed limit on CR 7 is 55 miles per hour. CR 7 is designated as a County State Aid Highway and receives funds from the state mainly for construction and maintenance (Itasca County, 2003).

Another existing road corridor in the project area is the Cross-Range Heavy Haul Road, which is a gravel road in place for generations as a way to allow heavy or slow loads to be transported between mines across the Iron Range; however, because of numerous winding and high gradient topography, Excelsior has not pursued the use of this road any further. In the West Range project area, the Cross-Range Heavy Haul Road **(named Diamond Lake Road)** also serves as access to a cluster of homes in the Big Diamond Lake/Dunning Lake area.

Traffic Volumes

Table 3.15-1 lists historical annual average daily traffic (AADT) volumes and the associated levels of service along US 169 and CR 7 near the West Range Site. **Since the Draft EIS, additional traffic data for the year 2006 has been added in Table 3.15-1 to provide more recent data.**

Table 3.15-1. Annual Average Daily Traffic Volumes and Levels of Service on US 169 and CR 7 (Itasca County, Minnesota)

Year	US 169		CR 7	
	West of CR 7	East of CR 7	North of Diamond Lake Road	South of Diamond Lake Road
2000	5,800 (C)	5,500 (C)	1,100 (A)	1,100 (A)
2002	6,500 (C)	5,800 (C)	N/A	N/A
2004	7,200 (C)	5,700 (C)	N/A	N/A
2006	**7,000 (C)**	**6,500 (C)**	**1,300 (A)**	**1,300 (A)**

N/A – data not available
Source: SEH, 2006a**, SEH, 2009**

During 2004, US 169 experienced between 5,700 to 7,200 vehicles per day near the West Range Site. According to Mn/DOT data for the year 2004, average volumes of commercial trucks on US 169 ranged between 300 and 599 heavy trucks per day (Mn/DOT, 2005b). For two-lane roads in fairly rural areas, these AADT levels on US 169 reflect relatively moderate traffic flow with an LOS of C. As Table 3.15-1 indicates, the traffic volumes on US 169 are heavier west of CR 7. The main reason for this can be attributed to the residential areas just northwest of the site near Riley Lake. Vehicles from this area most likely travel through CR 7 en route to Grand Rapids. Although not reflected in the table, these areas mainly influence traffic on a seasonal basis as these are mainly vacation homes.

Traffic volume data for CR 7 was available **for** the year 2000 at approximately 1,100 vehicles per day **and for 2006 at approximately 1,300 vehicles per day**. These volumes on CR 7 reflect relatively less than average daily traffic with an LOS of A.

3.15.2.4 East Range Site and Corridors

Roadways

The East Range Site is located approximately 2 miles north of Hoyt Lakes and is bordered on the south by Colby Lake, on the east by St. Louis CR 666, and on the north and west by various mine pits and operations. The existing roadway system near the East Range Site consists entirely of county roads with a load limit of 9 tons. The nearest state highway is US 135 that serves the western portion of Aurora, approximately 7 miles west of the project site. CR 666 begins at its intersection with CR 110 (also referred to as Kensington Drive near the East Range Site) that traverses east to west through Hoyt Lakes. Hampshire Drive is a short connector between CR 110 and CR 666.

The primary county road in the area is CR 110 (designated as a County State Aid Highway) which connects with US 135 in Aurora, then passes through Hoyt Lakes. The east to west section of CR 110 that runs through Hoyt Lakes parallels and is approximately 1.6 miles south of the southern border of the East Range Site. From Hoyt Lakes to Aurora, CR 110 forms the western terminus of the Superior National Forest Scenic Byway. This byway, also known as Forest Highway 11, has been recently constructed and serves to connect the North Shore of Lake Superior with the Mesabi Iron Range. The Superior National Forest Scenic Byway also provides access to a historical drilling site, known as the Longyear Drill Site. This historic site is located approximately 3 miles north of Hoyt Lakes on CR 666 (see Section 3.9, Cultural Resources).

There are no other roadways in the area of the proposed East Range Site. The existing roadway system in the area is shown in Chapter 2, Figure 2.3-5.

Public Law 109-59 was signed in August 2005 and $2.4 million was authorized for construction of a new highway from the bridge over the Partridge River on CR 565 in Hoyt Lakes to the intersection of Highways 21 and 70 in Babbitt. Currently, the only approach from the north (e.g., town of Babbitt) to Hoyt Lakes is a circuitous trip south on US 135. The new highway would create a feasible option for approaching the Hoyt Lakes area from the north.

Traffic Volumes

Table 3.15-2 lists the AADT volumes and the associated levels of service along CR 110 and CR 666 near the East Range Site. There is no AADT data available for Hampshire Drive.

Table 3.15-2. Annual Average Daily Traffic Volumes and Levels of Service on CR 110 and CR 666 (St. Louis County, Minnesota)

Year	CR 110		CR 666	
	West of CR 666	East of Hampshire Rd	North of CR 110	East of Hampshire Rd
1995	4,400 (B)	520 (A)	N/A	N/A
1999	2,950 (B)	650 (A)	930 (A)	830 (A)
2003	2,950 (B)	710 (A)	750 (A)	520 (A)

N/A – data not available
Source: SEH, 2006b

Table 3.15-2 reflects relatively low AADT volumes near the East Range site. The operating levels of these roads are currently at LOS A or B.

3.15.3 Rail System

The rail network in Minnesota is important for moving heavy bulk goods and a variety of commodities. Approximately 23 railroad companies and three private industries haul rail freight in Minnesota on approximately 4,500 miles of track.

Rail companies are divided into three classes (I, II, and III), established by the Federal Surface Transportation Board. These classes are based upon a railroad company's gross operating revenues and generally reflect the type of service provided: long haul, regional and local. In general, the higher the rail class, the more daily trains, the greater tonnage, and the longer the haul route. The Class I railroads in Minnesota provide service in corridors connecting the region with the Chicago rail hub and its connections with the eastern seaboard lines; south to Mexico through Texas; and west to the major California ports and the ports in the Pacific Northwest. Class I companies operate approximately 3,200 miles of rail lines in Minnesota and include:

- BNSF (1,600 miles);
- CN (450 miles);
- Canadian Pacific Railway (650 miles); and
- UP Railroad (500 miles).

3.15.3.1 Regional Rail Network

Northeastern Minnesota has an extensive system of rail lines serving the region and the Lake Superior ports. Taconite, coal, and grain are major commodities transported primarily by rail to the Duluth/Superior Port, a bulk transshipment port. There are nine railroads that provide services within the state's northeastern region, running nearly 1,000 miles of track. As shown in Figure 3.15-1, the BNSF and CN rail services are the two lines that service the vicinity of the project.

The BNSF is an important railway within northeastern Minnesota. The BNSF line operates two primary lines in the region and has track running through Itasca, Aitkin, Carlton, and St. Louis Counties. The northern line brings grain from Canada and the western U.S. to the ports of Duluth and Superior. The other, more southern line connects central Minnesota, South Dakota, and the coal mining areas of the western U.S. to the ports. In total, there are approximately 380 miles of BNSF tracks running through the northeastern region of the state. The bulk of this is located within the boundaries of St. Louis County, where the BNSF has 133 miles of track. Itasca County contains the second most with 87 miles.

The CN Railroad recently completed purchasing the Duluth, Missabe, and Iron Range (DMIR) line. The DMIR has been the main arterial for the transportation of taconite pellets from the Iron Range to the port cities Duluth and Two Harbors. The DMIR, soon to bear the CN name to reflect its new ownership, consists of two primary lines. The first is the western line, or Missabe, that connects the iron ore mines to the ore docks in Duluth. The Iron Range line is the eastern line and connects the mines to the loading docks in Two Harbors. The main cargos transported on the DMIR include taconite pellets, limestone, coal, and miscellaneous freight.

With the addition of DMIR's 254 miles of track and another 155 miles that CN added to its track inventory with the acquisition of the Duluth, Winnipeg, and Pacific Railroad, CN is the largest railroad in the northeastern Minnesota region. CN owns and operates 409 miles of track in the region; the most significant of which is a 209-mile stretch of DMIR track in St. Louis County. Lake County, containing the port of Two Harbors, has the second most miles of former DMIR track with 42 miles. The DMIR line runs through a small portion of both Itasca and Carlton counties with 3 miles and 0.6 miles of track, respectively.

The western Missabe line that serves the port of Duluth has an average volume of 13 trains per day. The eastern Iron Range line sees an average of approximately 12 trains a day. For both portions of the DMIR line, the track speed limit is 35 miles per hour (Mn/DOT, 2004b).

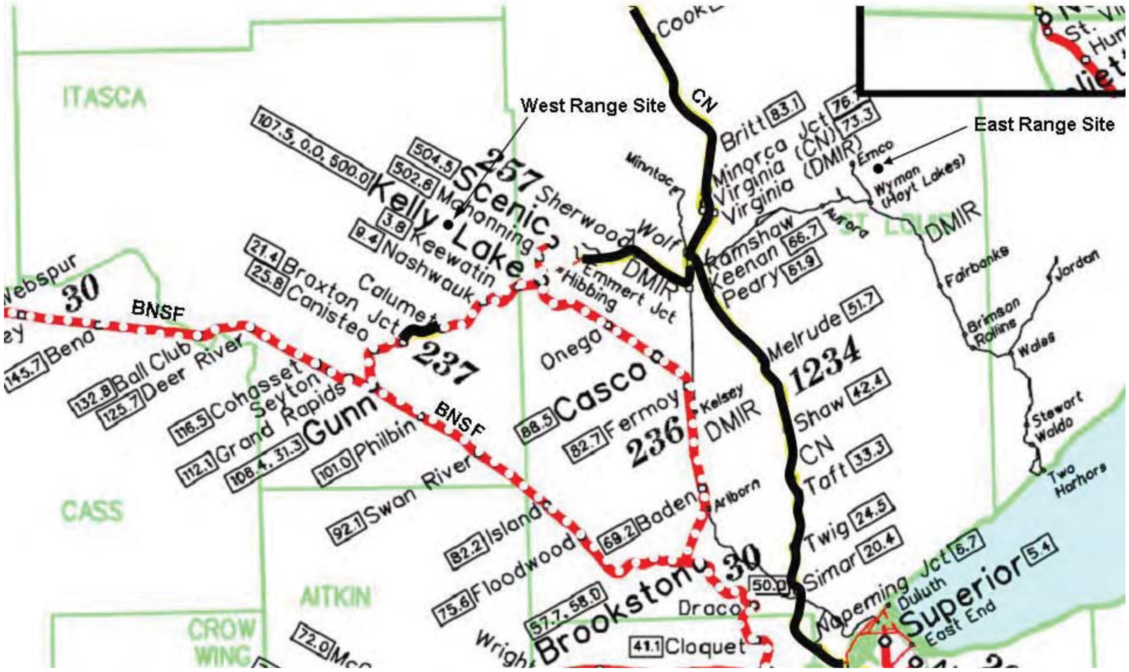

Figure 3.15-1. BNSF and CN Rail Lines in Vicinity of Project Sites (BNSF, 2005)

3.15.3.2 West Range Site and Corridors

The proposed West Range Site is located approximately 1.5 miles north of the mainline tracks of the BNSF and CN. The existing layout of the BNSF and CN trackage in the region are provided in Figure 3.15-1 and in Chapter 2, Figure 2.3-2.

Historically, the BNSF and CN railroads had their own mainline tracks throughout the area around Grand Rapids, Minnesota. In the 1960s, the BNSF and CN railroads combined their regional operations to a single track. The BNSF currently owns most of the 80-mile track from Gunn (an unincorporated "railroad town" located immediately east of La Prairie, Minnesota) to Brookston (near Carlton, Minnesota), except for approximately 4.5 miles of track, owned by CN, beginning about 0.5 miles east of CR 7 and west to Bovey. Since railroads are restricted from originating or delivering traffic from another railroad's line, even though many share each other's tracks, this short section of rail track owned by CN allows it direct access to the West Range Site.

The BNSF lines in the region have a wide range of daily train volume and speed limits. The existing railroad system in the area has generally handled between four and 10 trains per day when the taconite industry was producing. With the slump in taconite production the track has seen infrequent use between Keewatin and Gunn. The greatest volume of trains on the BNSF line occurs in the southeast corner of Carlton County and Pine County, where approximately 16 trains per day make use of the track. Between Grand Rapids and Cloquet, the BNSF line has a speed limit of 50 miles per hour and a volume of approximately nine trains per day, while the portion from Hibbing to Cloquet has a speed limit of 50 miles per hour and approximately four trains per day (Mn/DOT, 2005a). The BNSF line that runs between the cities of Grand Rapids and Hibbing has a speed limit of 35 miles per hour.

The shortest route for delivering coal from the Powder River Basin in Wyoming to the West Range Site is via the BNSF trackage across North Dakota. The preferred route would go through Fargo, North Dakota; north to Grand Forks, North Dakota; and across Minnesota through Grand Rapids to Gunn and then to Taconite. About six trains per day currently travel on the BNSF line through Grand Rapids at speeds up to 25 miles per hour (MEP, 2004).

The track from Gunn to the West Range site (approximately 12.5 miles in length) operates at speeds of 25 miles per hour, has traditionally carried 4 to 10 trains per day and has six public grade crossings. Currently, this segment of track is inoperable due to rising water levels in the CMP. The CMP is an approximately 300-foot deep mine pit, where no ore has been mined for over 20 years, but has continued filling with water at such a rate that it is projected to overflow into the towns of Bovey and Coleraine sometime in the next 7 to 14 years (MEP, 2004). The sloughing of bank material separating the track from the steep edge of the mine pit has decreased in distance from 100 feet to 50 feet and has therefore weakened the structural support along this section of track near Bovey. An alternative route to the West Range Site via BNSF tracks would be from Brookston northward to Kelly Lake and Keewatin and westward to the plant site.

The use of CN rail would be from the Superior, Wisconsin area northward to Virginia and then west past Hibbing and Keewatin to Taconite/Bovey for the West Range Site. The route from Superior to Virginia typically sees 13 trains per day and the route from Virginia to Hibbing sees approximately four trains per week (Mn/DOT, 2005a). The short length of CN track near the West Range Site (approximately 4 to 4.5 miles in length) is temporarily out of service because of rising water levels in the CMP.

Approximately six trains (i.e., three roundtrips) currently pass through the city of Grand Rapids in Itasca County each day. Ten at-grade crossings (i.e., when a road crosses a railroad track at the same level) are located within the city limits of Grand Rapids and La Prairie. Public roads that are crossed at-grade by the existing rail lines from Grand Rapids en route to the West Range site are listed in Table 3.15-3 and shown in Figure 3.15-2.

Table 3.15-3. Location of Railroad At-Grade Crossings – West Range Site

Map ID*	Road Crossed
1	County Road 63
2	NW 15th Ave
3	NW 11th Avenue
4	NW 2nd Avenue
5	NW 1st Avenue
6	Pokegama Avenue
7	NE 1st Avenue
8	NE 3rd Street
9	NE 5th Avenue
10	NE 7th Avenue
11	Brock Lane
12	County Route 21
13	County Route 61
14	unnamed gravel road
15	Hodgins Street

*See Figure 3.15-2

Based on 2004 annual average daily traffic volumes, the vehicular traffic at the crossings listed in Table 3.15-3 in La Prairie and Grand Rapids experience low to moderate volumes (e.g., from 4,250 to 12,500 vehicles per day) (Mn/DOT, 2005c).

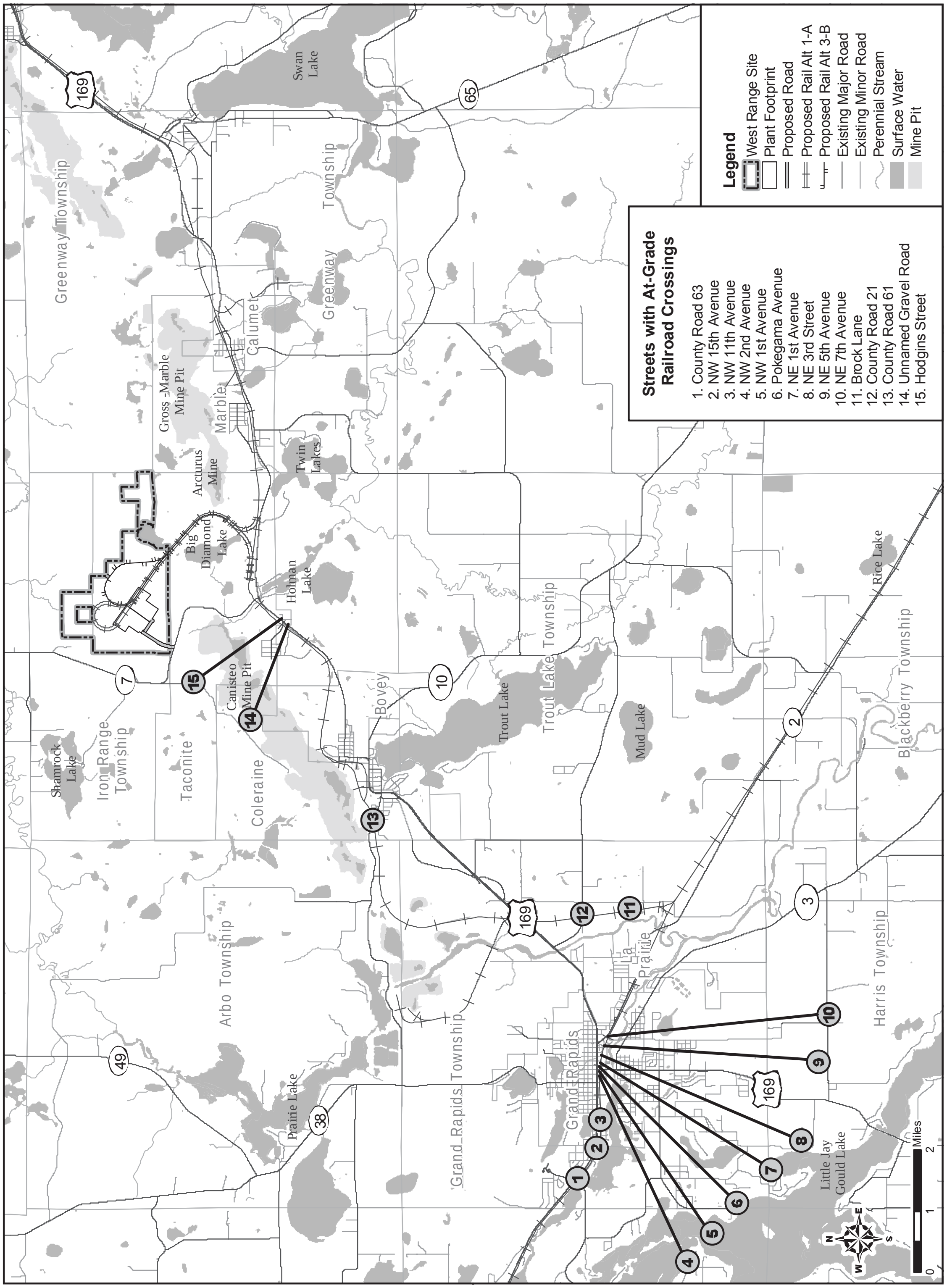

Figure 3.15-2. At-Grade Rail Crossings near the West Range

3.15.3.3 East Range Site and Corridors

The East Range Site is located approximately 1 mile north and 1 mile west of two CN tracks. The east-west track runs from Eveleth to Two Harbors. The north-south track connects with the east-west track southeast of the site and extends north to Embarrass. The north-south track connects with the east-west track at Wyman Junction (approximately 1.7 miles southeast of the East Range site) and extends northward to Embarrass. The CN track can be accessed by other railroads via Superior, WI and/or a railroad yard south of Eveleth. The nearest competitive rail provider is located at the BNSF Railway near Hibbing, approximately 40 miles west of the site. The CN rail system near the project is shown in Figure 2.3-6.

The CN operates daily on the track servicing the MP's Syl Laskin Generating Station, the former Erie Mining Taconite Plant and several existing and proposed industrial customers. The CN rail line near the East Range site sees approximately 12 trains daily (i.e., six roundtrips per day) (Excelsior, 2006c). The posted track speed is 35 miles per hour.

At-grade crossings located on the CN rail route between Clinton Township and Hoyt Lakes (East Range Site) are listed in Table 3.15-4 and shown in Figure 3.15-3.

Table 3.15-4. Location of Railroad At-Grade Crossings – East Range Site

Map ID*	Road Crossed
1	Keenan Road (CR 310)
2	Iron Junction Road (CR 452)
3	Main Street (CSAH 127)
4	County Highway 7 (CSAH 7)
5	Township Road 6718 (T 1248)
6	Sparta Road (CSAH 97)
7	Heritage Tr (CSAH 20)
8	N. Main Street W (CSAH 100)

*See Figure 3.15-3

Based on 2004 annual average daily traffic volumes, the vehicular traffic at the crossings listed in Table 3.15-4 experience low volumes (Mn/DOT, 2004a).

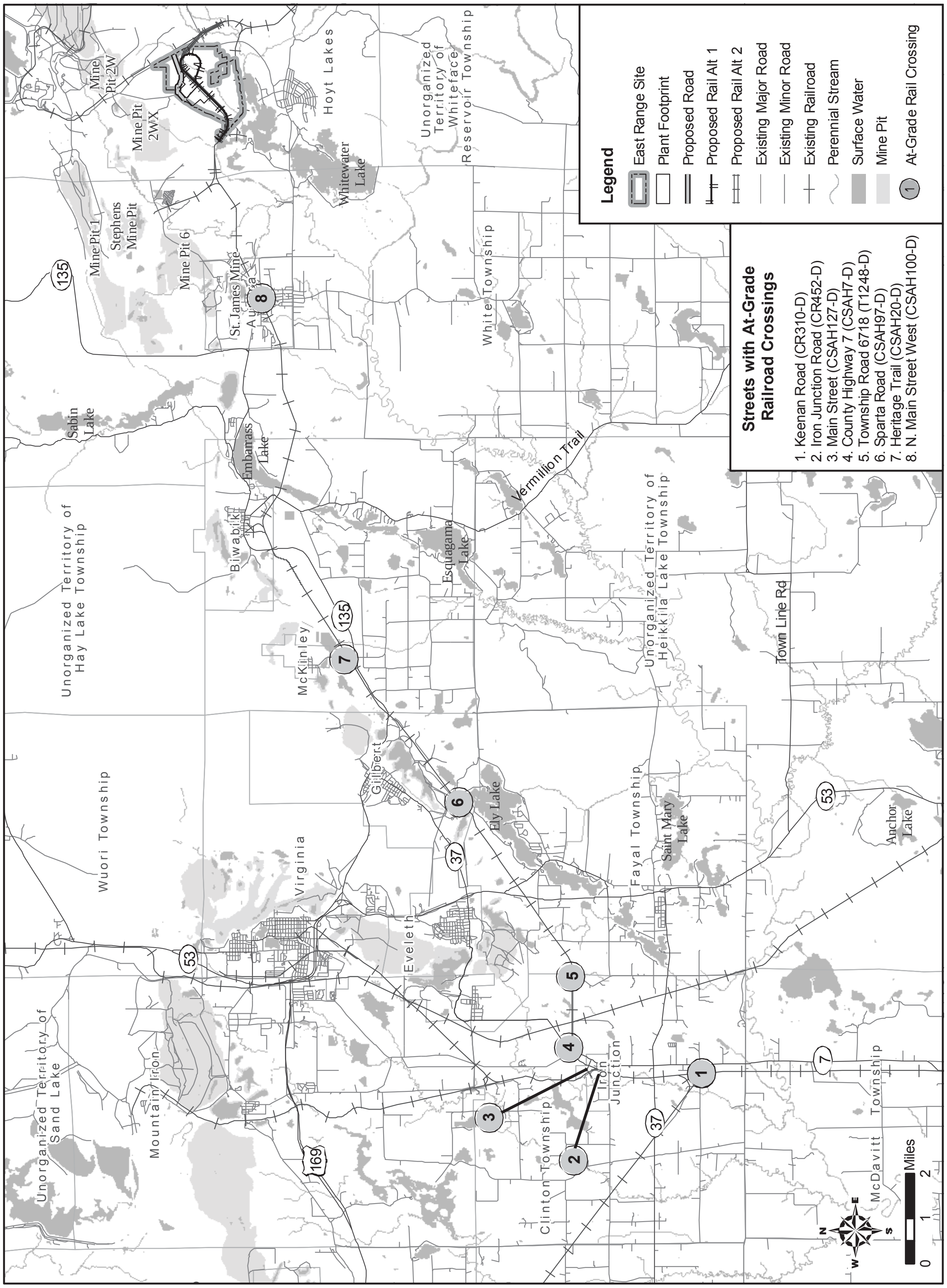

Figure 3.15-3. At-Grade Rail Crossings near the East Range Site

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3.16 MATERIALS AND WASTE MANAGEMENT

3.16.1 Regional and Local Conditions

3.16.1.1 Construction Materials and Suppliers

Common construction materials such as ready-mix concrete, wood, gravel fill, reinforcing steel fabrication, equipment rentals, and office supplies are available by in-state suppliers with out-of-state suppliers being used as necessary. In-state, national, or international suppliers provide materials, such as specialized operating equipment, to Minnesota companies. Construction water is provided to construction sites by pumping and treating surface waters or by connection to the local municipal water system. Construction materials in the Iron Range are delivered by either truck or rail, depending on a site's locality.

3.16.1.2 Fuels, Feedstocks, and Other Materials and Suppliers

Wyoming, Montana, and Canada are common suppliers of coal, petroleum coke, or feedstock. These materials are either shipped by truck or rail. As described in Chapter 2, the Duluth, Missabe, and Iron Range Railroad, recently acquired by the CN, and the BNSF Railway serve the area of the West Range Site. Rail service to the East Range Site would be provided by two CN rails located approximately one mile north and one mile west of the East Range Site in Eveleth, Minnesota. Local highways also connect the West Range and East Range Sites to interstate highways for truck deliveries. As described in Chapter 2, existing natural gas pipelines are present in the vicinities of both the West Range and the East Range Sites.

3.16.1.3 Hazardous Waste Management

The Minnesota Office of Environmental Assistance (currently part of the MPCA) compiled data on the quantity of hazardous waste generated from 1996 to 1999 in Minnesota in a report titled "Manifested Shipments of Hazardous Waste by Minnesota Generators (1996-1999)" (MOEA, 2001). Based on the 2001 report, 8,037 companies generated approximately 87,000 tons of hazardous waste in Minnesota in 1999; of this, 69 companies generated 109 tons of hazardous waste in Itasca County (West Range Site locale) and 422 companies generated 1,146 tons of hazardous waste in St. Louis County (East Range Site locale). Hazardous waste generated in the state is sent to both in-state and out-of-state treatment, storage, and disposal facilities. Table 3.16-1 summarizes the types of facilities that accepted hazardous waste for treatment or disposal in 1996 and 1999. There are at least 35 companies (not including company subsidiaries) both in state and out of state that accept hazardous waste from generators in Minnesota.

Table 3.16-1. Shipments of Manifested Waste from Minnesota Generators to Treatment, Storage or Disposal Facilities (1996 and 1999)[1]

Facility Type	Quantity of Hazardous Waste in 1996 (tons)	Quantity of Hazardous Waste in 1999 (tons)
Aqueous Treatment/Stabilization	5,354	5,654
Fuel Blending	3,737	4,636
Landfills	8,548	9,140
Metal Recovery	34,979	37,426
polychlorinated biphenyl (PCB) Treatment	767	620
Solvent Recovery	14,988	15,813

Table 3.16-1. Shipments of Manifested Waste from Minnesota Generators to Treatment, Storage or Disposal Facilities (1996 and 1999)[1]

Facility Type	Quantity of Hazardous Waste in 1996 (tons)	Quantity of Hazardous Waste in 1999 (tons)
Thermal Treatment	6,343	6,333
Transfer/Storage (In-State)	4,187	1,936
Transfer/Storage (Out-of-State)	993	5,133
Total	79,896	86,691

[1]Does not include waste manifested from cleanup sites
Source: MOEA, 2001

3.16.1.4 Non-Hazardous Waste Management and Recycling

In 1989, the Minnesota Legislature adopted comprehensive waste reduction and recycling legislation and adopted the Governor's Select Committee on Recycling and the Environment (SCORE), which is a program under Minnesota's Waste Management Act that provides counties with funding to develop effective waste reduction, recycling, and solid waste management programs. Annual SCORE reports present recycling and municipal solid waste (MSW) data for each county in Minnesota (MOEA, 2004). In addition, MPCA prepares a Solid Waste Policy Report in odd-numbered years, which presents trends in landfill use and recycling in Minnesota. The 2005 Solid Waste Policy Report (the most recent report available **for the Draft EIS**) identified MPCA's strategic plan to increase the statewide recycling rate from 43 percent (2005) to 50 percent by 2010, and to increase Minnesota's waste reduction goal from 2 percent (140,000 tons) in 2005 to 10 percent (750,000 tons) by 2010 (MPCA, 2006b). The 2005 Solid Waste Report also called for Minnesota to send 35 percent of its total waste to waste-to-energy and source-separated composting processing facilities by 2011. Currently, 21 percent of total waste is sent to such processing facilities.

Landfills

Minnesota generated approximately 6 million tons of solid waste in 2004. In 2004, waste remaining for disposal after recycling and reduction efforts totaled nearly 3.6 million tons, a decrease of 1.6 percent from 2003. Mixed MSW (i.e., garbage, refuse, and other solid waste from residential, commercial, industrial, and community activities that the generator of waste aggregates for collection) is sent to 33 MSW landfills located both in state (22) and out of state (11) (MPCA, 2006b). In 2005, out-of-state landfills accepted 840,000 tons (36 percent) of all Minnesota solid waste going to MSW landfills, an increase of 20 percent from 2004. The total landfill capacity for in-state and out-of-state landfills in 2005 was just below 65 million tons and is projected to decrease to approximately 55 million tons by 2010 (MPCA, 2006b).

West Range Site

In April 1994, the Itasca County Transfer Station was constructed, providing the county with a means to transport MSW out of the county and to close its landfill. Licensed haulers and individual self-haulers deliver most of the MSW to the Itasca County Transfer Station. The remainder goes to transfer stations in both Aitkin and Cass Counties. Waste delivered to the transfer stations is directed to the Elk River Landfill located in Elk River in Sherburne County (MOEA, 1999). In 2004, Itasca County sent 25,173 tons of MSW to the Elk River Sanitary Landfill (MOEA, 2004). According to the EPA, the Elk River Landfill has approximately 1.5 million tons of solid waste in place and will not reach capacity until 2042 (EPA, 2006d).

Based on information available from MPCA, there are two closed landfills in Itasca County: the Iron Range Sanitary Landfill and the Grand Rapids Landfill (MPCA, 2006c). The Iron Range Sanitary Landfill is located along the southern border of the West Range Site adjacent to the Itasca County Transfer Station, and the Grand Rapids Landfill is located approximately 10 miles southwest of the West Range Site. At the Iron Range Landfill, groundwater monitoring in 2002 to 2003 indicated that levels of total VOCs had decreased since 2001, but remained relatively stable with total VOCs measured at approximately 24 micrograms per liter. Exceedances of the Health Risk Limits maximum contaminant level were detected for arsenic, barium, and manganese in a monitoring well (W-3) that is hydraulically downgradient from the landfill. Monitoring well W-4 also had an exceedance of manganese in 2003. According to the MPCA, no potable water supply wells are at risk (MPCA, 2004a).

East Range Site

St. Louis County sent 54,560 tons of municipal solid waste to the St. Louis County Sanitary Landfill in 2004 (MOEA, 2004). MSW landfilled in the county increased from approximately 65,000 tons in 1991 to over 80,000 tons in 1998 (MOEA, 1999). The St. Louis County Solid Waste Landfill in Virginia, Minnesota, accepts the county's solid waste, and has the capacity to accept almost 1.4 million cubic yards of MSW per year (MCPA, 2006c).

There are 16 closed landfills in St. Louis County (MPCA, 2006d). One closed landfill, the Hoyt Lakes Sanitary Landfill, is located approximately 3,000 feet south of the East Range Site. According to the MPCA, groundwater monitoring at the closed landfill indicates that impacts to the groundwater are minimal and that natural attenuation is occurring. No exceedances of drinking water standards have occurred based on groundwater sampling performed from 2003 to 2004 (MPCA, 2006d).

Recycling Facilities

In 2004, the state's base recycling rate was 41 percent, with recycling programs accepting over 2.42 million tons of recyclable materials (e.g., paper, metals, glass, plastic, and food) (MOEA, 2004). The MPCA maintains a list of companies that accept materials from Minnesota for recycling. Most of the companies listed are located in Minnesota; however, facilities located in other states are also listed.

West Range Site

In Itasca County, recycling is a primary element in the county's solid waste management plan. Private contractors provide recycling services to businesses and other institutions in the county. In 2004, recycling programs collected 18,831 tons of recyclable materials from residents and organizations (MOEA, 2004).

East Range Site

In St. Louis County, the current waste reduction and recycling program consists of a volume-based collection and disposal pricing structure, support for regional materials exchange programs, and public education and information programs encouraging reuse and reduction. Approximately 52,619 tons of recyclable materials were collected in 2004 (MOEA, 2004).

3.16.2 West Range Site and Corridors Site Assessment

The West Range Site is located in an area formerly mined for iron ore and taconite, and there are several mine pits, rock stockpiles, and tailing basins in the vicinity. Mining activities ceased in the 1970s, and mined areas of the Canisteo complex and Hill Annex complex have subsequently filled with water.

Industrial or commercial areas near the West Range Site include the Itasca County Solid Waste Transfer Station and a closed landfill located along the southern boundary of the West Range Site. Other industrial uses in the area include substations, communication facilities, power plants, private air strips, landfills, storage maintenance yards, businesses, factories, lumber mills, and commercial livestock/poultry/grain operations.

A Phase I site assessment was performed for the West Range Site and surrounding areas in 2005 (SEH, 2005a) that included a search of available Federal and state databases for information pertaining to the location of contaminated sites in the vicinity of the West Range Site. Based on the database searches, no contaminated sites or sites undergoing cleanup or remediation are located near the West Range Site.

The Phase I site assessment also included a review of aerial photographs. Mining activities, including the Arcturus Mine Complex, are evident in aerial photographs for 1947 and 1966. The Arcturus Mine Complex appears as a lake in a 1991 photograph with portions of the tailings pile covered with vegetation. In a 2003 photograph, small cleared areas are visible north of Big Diamond Lake (SEH, 2005a).

Topographic maps (1952 Bovey, Minnesota USGS 7.5 minute) revised in 1969 and 1977 were also reviewed as part of the Phase I Assessment. During the 1950s through 1970s, the area was mostly forested with the Arcturus Mine pit, tailings ponds, and mine stockpiles as prominent features. Numerous roads, trails, and railroad corridors also were present. The 1969 map shows a road north of Big Diamond Lake, and the extent of tailings ponds associated with the Arcturus Mine is expanded from the 1952 map. The 1977 map is similar to the 1952 map, revised in 1969 (SEH, 2005a).

A site reconnaissance performed in 2005 for the Phase I Assessment observed the following at the site or surrounding areas (SEH, 2005a):

- Remnants of mining activities in the area; however, no structures were observed on the site.
- Numerous dumpsters and solid waste containers at the entrance of the capped landfill located south of the site.
- Small burn piles (approximately 4 feet in diameter), which appeared to contain household waste, near all-terrain vehicle trails.
- Solid waste, including tires, household waste, and building materials. One empty container of paint thinner was observed.
- Stockpiled batteries and old equipment at an offsite property located southwest of the property in the northeastern portion of Taconite.
- Railroad tracks along the eastern boundary of the site.

A site visit performed in May 2006 for the preparation of this EIS noted some areas where household trash was discarded on and adjacent to the West Range Site.

3.16.3 East Range Site and Corridors Site Assessment

Land north and west of the East Range Site was part of a large mining complex **formerly** owned by CE, where a mineral sales business (decorative and other specialty rock) is currently in operation. Other industrial uses in the vicinity of the East Range Site include the Minnesota Power Syl Laskin Energy Center (a coal-fired, steam electric generating plant) located about 6,900 feet southwest of the East Range Site, and Laskin Energy Park located about 11,500 feet southwest of the East Range Site.

The East Range Site has been disturbed through years of mining activity and is currently unoccupied with no structures. Past and present mining activity is evident by the presence of mine pits, piles of rock debris, and tailing basins at the former LTV Mining Company. A large pile of rock debris (80 to 100 feet high, covering over 300 acres) is located immediately to the west of the East Range Site and was observed during a site visit to be overgrown with grasses. The rock pile likely resulted from placement of overburden materials excavated as part of past mining operations. A site visit performed in May 2006 for this EIS noted the rock pile as well as some areas where household trash was discarded on and adjacent to the East Range Site.

3.17 SAFETY AND HEALTH

This section describes the affected environment for occupational and public safety and health, including worker injuries, transportation safety, community health, and electromagnetic field (EMF) issues. Baseline data for assessing sensitive receptors within a 2-mile (3-kilometer) radius of the West Range Site and East Range Site, and within a 0.5-mile radius of the proposed HVTL and gas pipeline corridors associated with each site are presented. Transportation safety issues are discussed as related to traffic accidents and rail crossings. With respect to EMFs, this section provides a discussion of current standards established for utility lines and the current scientific studies related to potential health concerns associated with EMFs.

3.17.1 Occupational Safety and Health

Worker fatalities and injuries are generally a concern in construction and in industrial facility operation. The OSHA regulates worker safety in both construction and industrial settings. OSHA has promulgated a number of regulations that are codified under Chapter 29 of the CFR that are designed to protect workers from potential construction and industrial accidents, as well as to minimize exposure to work place hazards (e.g., noise, chemicals). Workplace injuries can and still do occur even with these regulations and protections in place. Table 3.17-1 summarizes safety statistics from the Bureau of Labor Statistics for industry categories that are relevant to the Proposed Action. The rate of recordable injury cases for the construction field is nearly twice that of the utility sector.

Table 3.17-1. Statistics for Work Place Hazards

Industry	Total recordable incidents (rate per 100 FTEs)[1]	Lost workday cases (rate per 100 FTEs)[1]	Fatalities (rate per 100,000 FTEs)[2]
Construction	5.8	2.2	14.3
Utilities	3.1	0.9	12.7[3]

Source: [1]BLS, 2004 [2]BLS, 1999
[3] This fatality statistic is found under the sector "Transportation and Public Utilities." Most fatalities in this group are in the transportation category.
FTE=full-time employee

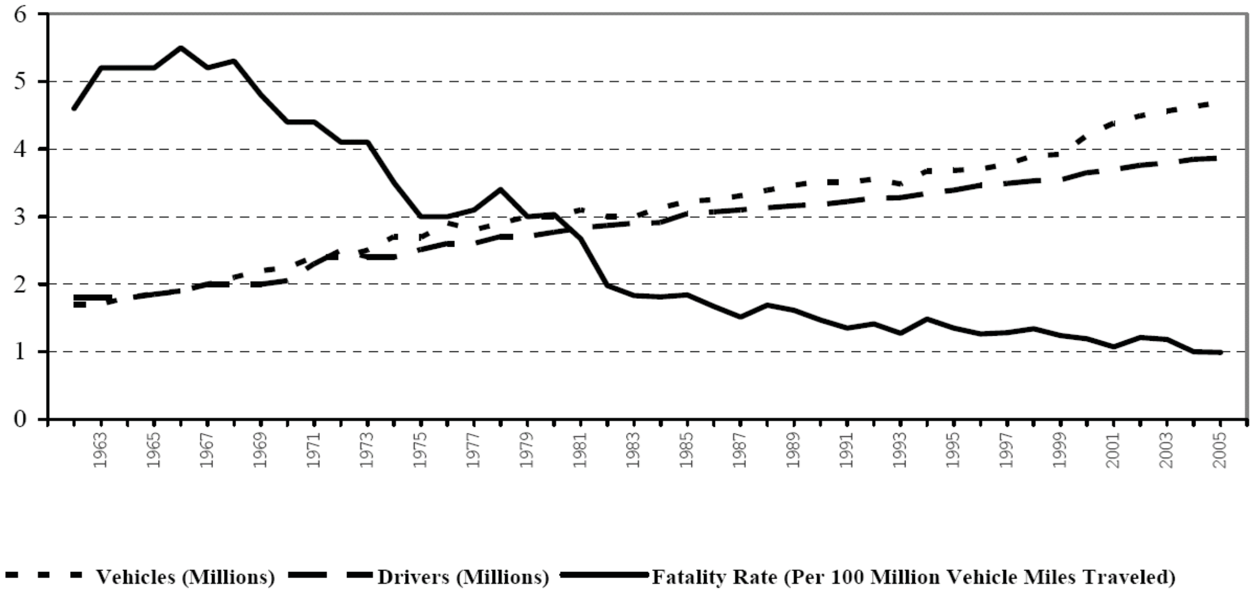
Although power plants are much safer than they once were, plant employees can still encounter workplace hazards. Among the most common hazards to power plant workers are electrical shocks, burns, boiler fires and explosions, and contact with hazardous chemicals (Hansen, 2005). According to the National Board of Boiler and Pressure Vessel Inspectors, between 1999 and 2003 there were 1,477 reported boiler accidents, resulting in 143 injuries and 26 deaths (power boilers include utility boilers as well as boilers used by other industries for cogeneration and on-site power production) (Hansen, 2005). Many power plant workers are also routinely exposed to dangerous chemicals such as corrosives (acids and bases), oxidizers, and solvents. Comprehensive training, detailed pre-job planning, and proper and well-maintained safety equipment are key to accident prevention, regardless of the hazard (Hansen, 2005).

3.17.2 Transportation Safety

3.17.2.1 Roadway Safety

In 1966 there were 53,041 traffic fatalities in the U.S., or 5.7 for every 100 million vehicle miles of travel (OTS, 2006). In 1968, there were 1,060 traffic fatalities in Minnesota, or 5.3 per 100 million miles of travel. To date, these represent the worst years for traffic fatalities for the country and Minnesota. Since then, both the rate and the number of fatalities have declined in a fairly steady pattern for both the country and the state. In 2005, there were 43,200 traffic fatalities throughout the country and 559 in

Minnesota. The respective rates per 100 million miles of travel were 1.46 and 0.99, and therefore, represent a relatively dramatic decrease since 1966. In general, the vehicle miles of travel fatality rate in Minnesota has shown dramatic improvement in the last three decades. For example, 1990 had a rate of 1.47, 1980 had a rate of 3.03, and 1970 had a rate of 4.41 (see Figure 3.17-1).



Source: OTS, 2006

Figure 3.17-1. Number of Vehicles, Drivers, and Fatalities in Minnesota from 1962-2005

The decline in traffic fatalities is in large part the result of conscious decision-making on traffic safety issues in the U.S. The National Highway Traffic Safety Administration (originally called the National Highway Safety Bureau) was established by the DOT in 1967. Since then it has promoted, and Congress has passed, legislation mandating the manufacture of safer cars. At the same time, the Federal interstate highway system has expanded, contributing to a safer roadway environment. Simultaneously there has been an effort to change human behavior factors. Minnesota's legislature has made significant amendments to the driving while intoxicated law since 1971 and has also passed the child passenger protection law in 1981 and the mandatory seat belt law in 1986. Therefore, although there has been a steady increase in the number of drivers and vehicles, there has been a general steady decrease in the vehicle fatality rate per hundred million miles of travel as evidenced in Figure 3.17-1.

West Range

According to the *2005 Minnesota Motor Vehicle Crash Facts*, of the 729 total vehicular crashes that occurred in Itasca County during 2004, 10 of them were fatal. The year 2005 showed a decrease in accidents with 667 total crashes, four of which were fatal. In general, these represent low numbers relative to the county's population.

Itasca County's Transportation Department provided a listing of reported vehicle accidents within a one-mile radius at the US 169 and CR 7 intersection near the project area. The accident reports cover a five-year period (2001 through 2005). The number of accidents occurring in this area is shown in Table 3.17-2.

Table 3.17-2. Five-Year Traffic Accident History near Intersection of US 169 and CR 7 at West Range Site

Location	2001	2002	2003	2004	2005
US 169	5	3	6	1	10
CR 7	4	5	2	5	4

Source: Itasca County, 2006

As indicated in Table 3.17-2, the number of accidents on key roads remained more or less steady over the five-year period, except for US 169 in 2005, which showed a marked increase. After reviewing the reports, it appears that approximately half of the accidents in 2005 were caused by icy/snowy conditions. There were no recorded fatal accidents within the one-mile radius of this intersection over the five-year period. In general, Itasca County has experienced slope stability problems with CR 7 near its intersection with US 169. According to the County Engineer, this intersection is dangerous for heavy truck hauls because of the steep approach to US 169 (Excelsior, 2006b).

East Range

According to the *2005 Minnesota Motor Vehicle Crash Facts*, of the 2,553 total vehicular crashes that occurred in **St. Louis** County during 2004, 21 were fatal. The year 2005 showed a decrease in accidents with 2,364 total crashes, 19 of which were fatal.

According to accident data from the St. Louis County's Public Works Department, there have been three accidents in the past five years (2001 through 2006) at the intersection of CR 666 and CR 110 in Hoyt Lakes (St. Louis County, 2006). There were no accidents reported at the intersection of CR 110 and Hampshire Drive (Hoyt Lakes) during this same period. From 2000 to 2005, there were 11 accidents reported on CR 110 between CR 665 in Aurora (now referred to as CR 130) and CR 666 in Hoyt Lakes. Five of these accidents were related to poor visibility or icy roads as a result of weather conditions.

3.17.2.2 Railroad Safety

The extensive network of roads crisscrossing over railroads within the region facilitates the potentially dangerous interaction between motor vehicles and freight trains. Each day, thousands of vehicles using local roads cross over active railroad tracks. Including private crossings, there are a total of approximately 740 railroad crossings within the northeastern Minnesota region. Given the fact that some of the high-speed railroads within the region have been experiencing increasing volumes, railroad safety planning has become increasingly important in providing safe interaction between trains and motor vehicles.

A structure that allows one track to cross another track or a highway at the same elevation is referred to as an *at-grade crossing*. A structure or set of structures allowing two tracks, or one or more tracks, and a highway to cross each other at different elevations is referred to as a *grade-separated crossing*. Grade-separated crossings are provided by either a bridge over highway or bridge over rail. At-grade rail-highway crossings can contribute to traffic bottlenecks depending on their location.

As of 2002, Minnesota ranked 17th in the nation for the highest number of collisions and 14th in overall deaths and injuries from crashes at highway-rail intersections. Minnesota has worked actively with counties, cities, townships and railroads to improve safety for at-grade crossings. Active warning devices have been installed at over 1,300 of the approximately 4,500 public grade crossings in the state. The number of at-grade rail crossings with high exposure ratings and hazard ratings has increased significantly from 1996 to 2000 (Excelsior, 2006b). In 2000, 22 percent of the 363 at-grade crossings in the region had high hazard ratings, up from 3 percent in 1996. It is likely that this growth is attributable primarily to increased vehicle traffic rather than increased train traffic. All of the at-grade intersections on trunk highways are guarded with gates and signals. Safety improvements for at-grade crossings are funded through a shared cost negotiated between Mn/DOT and the railroad company.

According to the *2005 Minnesota Motor Vehicle Crash Facts*, 17 percent of all vehicle/train crashes in Minnesota resulted in a fatality in 2004 (train collisions with pedestrians or bicyclists were not counted in these crashes). Over the years, the number of vehicle/train crashes in Minnesota has been declining. Seventy-two crashes were reported in 2004, an 18 percent decrease from the 1995-2002 average of 87. Fourteen of the 72 vehicle/train crashes, including three of the 12 fatal crashes, occurred at a railroad crossing signed by a railroad crossbuck. An additional 11 crashes (including three fatal crashes) occurred at crossings with a railroad crossing stop sign. Combined, these two types of traffic control devices were present at 35 percent of the crashes and accounted for nearly half of the fatalities.

Motor vehicle crashes involving a train were a predominantly rural phenomenon, defined as an area with less than 5,000 population. In 2004, 69 percent of the total crashes, 74 percent of the injuries, and 85 percent of the fatalities occurred in rural areas. Furthermore, for the motor vehicles involved in train crashes, failure to yield ROW, driver inattention or distraction, and disregard for traffic control device were the three contributing factors cited most often by officers at the scene. These three reasons accounted for 74 percent of all contributing factors cited.

The locations of at-grade crossings and existing traffic volumes at these crossings near the West Range and East Range Sites are discussed in Section 3.15.3.2 and 3.15.3.3, respectively.

3.17.3 Community Health Issues

Information from health profiles for Itasca County and St. Louis County were compiled from the Minnesota Department of Health. The health profiles comprise an overview of the health status of Minnesota residents at the state and county levels.

Minnesota statistics for adults with behavioral health risks (shown as a percentage of the adult population considered at risk due to a particular behavior) on a state-wide and county basis are shown in Table 3.17-3. These behavioral health risk factors of adults are similar rates for both counties and state-wide. Cancer statistics for the state and counties is provided in Table 3.17-4.

Table 3.17-3. Estimated Percent of Adults with Behavioral Health Risk Factors (2004)

Behavioral Health Risk Factors of Adults	Minnesota (percent)	Itasca County (percent)	St. Louis County (percent)
Overweight	59.6	60.0	58.9
Current Smokers	20.8	19.7	20.3
Acute Drinking	19.9	18.0	19.1
Chronic Drinking	5.6	5.5	5.7
Perceiving health status as fair or poor	10.0	11.3	10.7
Limitation of activities due to any impairment or health problem	21.8	23.7	22.7
No exercise	15.9	16.6	16.3
Hypertension	28.5	28.5	26.5

Source: MDH, 2004

Leading causes of mortality (as a total for 2004 and a percent of total deaths) for the state and each county are provided in Table 3.17-5. Overall, health risk factors and mortality rates (percentages) are similar in both counties and to state-wide statistics. Both counties have higher cancer incidence rates when compared to state-wide rates, although this may not be statistically significant due to the small sample size (population) of each county. Itasca County has a slightly higher cancer incident rate than St. Louis County, however, this data may be skewed due to the large difference in the population between the two counties (St. Louis County's population is over four times that of Itasca County).

Table 3.17-4. Estimated Number of Adults with Cancer Incidences (2004)

Type of Cancer	Minnesota Men	Minnesota Women	Itasca County Men	Itasca County Women	St. Louis County Men	St. Louis County Women
Cancer Incidence -all types	14,049 (0.56%)[1]	13,524 (0.53%)[1]	208 (0.94%)[1]	166 (0.75%)[1]	812 (0.83%)[1]	702 (0.70%)[1]
Colon and Rectum Cancer	1,290	1,436	14	21	74	68
Lung Cancer	3,748	3,033	63	43	210	152
Breast Cancer	20	2,054	1	24	2	114
Prostate Cancer	1,797	0	35	0	110	0
Other Types	7,194	6,731	95	78	416	368

[1] Percentages are based on 2000-2002 cancer numbers divided by reported 2003 populations.
Source: MDH, 2002a.

Table 3.17-5. Causes of Mortality, State and County Statistics (2003 and 2004)

U.S. 15 Leading Causes of Death	Minnesota, Percent of Total Deaths (2004)	Itasca County, Percent of Total Deaths (2003)	St. Louis County, Percent of Total Deaths (2003)
Malignant Neoplasms (Cancer)	24.6	24.3	24.5
Diseases of the Heart	21.3	22.1	24.3
Cerebrovascular Diseases (stroke)	6.9	7.0	6.3
Accidents	5.0	4.7	4.7
Chronic Lower Respiratory Diseases	5.0	4.0	5.1
Alzheimer's Disease	3.3	4.0	3.3
Diabetes Mellitus	3.1	3.4	3.4
Influenza and Pneumonia	2.0	3.2	1.8
Nephritis, Nephrotic Syndrome and Nephrosis	1.8	0.6	1.6
Intentional Self-Harm	1.4	2.3	1.8
Essential Hypertension and Hypertensive Renal	1.3	1.9	0.9

Table 3.17-5. Causes of Mortality, State and County Statistics (2003 and 2004)

U.S. 15 Leading Causes of Death	Minnesota, Percent of Total Deaths (2004)	Itasca County, Percent of Total Deaths (2003)	St. Louis County, Percent of Total Deaths (2003)
Disease			
Parkinson's Disease	1.1	0	0
Chronic Liver Disease and Cirrhosis	0.9	1.3	1.6
Aortic Aneurysm and Dissection	0.8	0	0
Septicemia	0.7	1.1	0.6
All Other Causes	20.8	20.1	20.1

Source: MDH, 2003

3.17.4 Sensitive Receptors and Chemicals of Potential Concern

3.17.4.1 Sensitive Receptors

Sensitive receptors include populations that are the most vulnerable to adverse health effects associated with air pollutants and chemical exposure, such as the elderly and the very young. Sensitive receptor locations are typically associated with residential areas, hospitals, long-term health care facilities, playgrounds, and schools. Additionally, farms**, Native American tribal communities** and fishable bodies of water are also considered significant receptor locations because potential chemical or pollutant deposition at these sites can affect food supplies. Aerial photography, current as of 2003, was used to identify significant receptors in Itasca County and St. Louis County in relation to the proposed West Range Site and East Range Site, respectively.

3.17.4.2 West Range Site and Corridors

There are no farms, schools, daycare centers, recreation centers, playgrounds, nursing homes, or hospitals located within 0.5 miles of the West Range Site.

The residences nearest to the West Range Site are located to the southeast on the north shore of Big Diamond Lake and the southeast shore of Dunning Lake (approximately 0.6 to 0.8 miles from the West Range **plant footprint**). The residences along the lakes are a mix of seasonal and year-round dwellings. The City of Taconite, located approximately 1.7 miles from the West Range **plant footprint**, has both single-family and multi-family residential houses that are occupied year-round. Based on a review of aerial photography, there are as many as 214 residences (depending on corridor) located within 0.5 miles of the centerline of the proposed HVTL corridors, and a maximum of 935 residences (depending on corridor) located within 0.5 miles of the centerline of the proposed natural gas pipelines associated with the West Range Site. No hospitals, long-term health care facilities, playgrounds, schools, farms or fishing areas were noted to be within 0.5 miles of the centerline of the proposed HVTLs based on aerial photographs, however, one church and four cemeteries were identified within 0.5 miles of the centerline of the proposed natural gas pipeline corridors associated with the West Range Site.

3.17.4.3 East Range Site and Corridors

The nearest residences to the East Range **plant footprint** are located about 1 mile directly south in the City of Hoyt Lakes. No sensitive receptors such as schools, daycare centers, recreation centers, playgrounds, nursing homes or hospitals are located within 0.5 miles of the East Range **plant footprint**. Based on a review of aerial photography, residential areas are located along the corridors proposed for the HVTLs (maximum 962 residences) and natural gas pipelines (856 residences). In addition, two schools (Fayal School and Lincoln School), the Mamrelund Church, Forbes Cemetery, Camp Olcott, and Eveleth Scout Camp are located along the proposed HVTL corridor within 0.5 miles of the HVTL ROW centerline. A 4H Camp and the Eveleth-Virginia Airport are located within approximately 0.5 miles of the natural gas pipelines. No hospitals, long-term health care facilities, playgrounds, or fishing areas are noted within 0.5 miles of the proposed HVTLs or natural gas pipeline corridors.

3.17.4.4 Chemicals of Potential Concern

Exposure to certain chemicals, or chemicals of potential concern, can adversely affect human health through toxic and/or carcinogenic effects. Chemical exposure can occur as a result of a variety of human activities ranging from the use of household chemicals and products to the fueling of a motor vehicle. In addition, exposure can result from chemicals that could be present in the air, water, soil, or the food chain through air emissions or other discharges from industrial sources to the environment.

The EPA has developed cancer and non-cancer toxicity values for chemicals of potential concern that serve as the basis for many of the regulatory standards for emission and exposure limits that have been established to protect human health and the environment. In addition, EPA has established standards for evaluating risks of exposure to chemicals related to specific project and site conditions. For a chemical exposure to occur at a specific site, several conditions must be met, including: (1) a chemical or exposure source; (2) a release mechanism; (3) a migration pathway; (4) an exposure route; and (5) a receptor population. Consequently, if either a chemical-specific (toxic) effect or exposure pathway is not present, there is no unacceptable carcinogenic risk (or non-carcinogen hazard).

To calculate potential risks associated with chemical exposures, categories of sensitive receptor populations are defined. These populations reflect persons with potentially high exposure rates due to the frequency and duration of exposure, or increased sensitivity due to health or age. To estimate the potential risk associated with an action, risk calculations are conducted for the most susceptible populations, including resident/home gardener (adult and child), farmer (adult and child), and fisherman (adult and child).

3.17.5 Electromagnetic Fields

3.17.5.1 Electric and Magnetic Field Primer

High-voltage AC transmission lines produce extremely low frequency (60 Hertz [Hz]) alternating electric and magnetic fields. Electric fields are lines of force exerted on electrically charged particles. Magnetic fields, on the other hand, are lines of force exerted on moving charged particles (current). Magnetic fields are generally considered to have more potential for affecting human health than electric fields, in part because electric fields are more easily reduced by shielding. The intensity of the electric field is related to the voltage of the line. However, the intensity of the magnetic field is directly related to the amount of current flowing through the conductors, not the voltage. Therefore, a higher-voltage transmission line does not necessarily produce stronger magnetic fields than lower voltage lines.

Electric fields are characterized by their wavelength, frequency, or energy. The frequency of an electromagnetic wave is simply the number of oscillations which pass a fixed point per unit of time. Frequency is measured in cycles per second, or Hz. One cycle per second equals one Hz. Typically, the shorter the wavelength, the higher the frequency. An electromagnetic wave consists of very small packets of energy called photons. The energy in each packet or photon is directly proportional to the frequency of the wave; the higher the frequency, the larger the amount of energy in each photon.

The voltages on the conductors of transmission lines generate electric fields in the space between the conductors and the ground. Directly under transmission lines, the electric field is nearly constant in magnitude and direction over distances of several feet. Electric fields are vector quantities; that is, they have both magnitude and direction. The direction corresponds to the direction that a positive charge would move in the field. In general, the field decreases with distance from the conductors. If an energized conductor (source) is inside a grounded conducting enclosure, then the electric field outside the enclosure is zero, and the source is said to be shielded.

The strength of the electric field is measured in volts per meter (V/m), and is calculated at a height of 3.28 feet (1 meter) above an un-vegetated, flat earth under straight parallel transmission lines.

In contrast to electric fields, a magnetic field is only produced once a device is switched on and current flows. The higher the current, the greater the strength of the magnetic field. Like electric fields, magnetic fields are strongest close to their origin and rapidly decrease at greater distances from the source. Magnetic fields are not blocked by common materials such as the walls of buildings. In the case of transmission lines, distribution lines, house wiring, and appliances, the 60-Hz electric current flowing in the conductors generates a time-varying, 60-Hz magnetic field in the vicinity of these sources. The strength of a magnetic field is measured in terms of magnetic lines of force per unit area (amperes per meter (A/m)), or magnetic flux density (measured in units of gauss [G], or milligauss [mG]).

The uniformity of a magnetic field depends on the nature and proximity of the source, just as the uniformity of an electric field does. Transmission-line-generated magnetic fields are quite uniform over horizontal and vertical distances of several feet near the ground. However, for small sources such as appliances, the magnetic field decreases rapidly over distances comparable with the size of the device.

The magnetic field generated by currents on transmission-line conductors extends from the conductors through the air and into the ground. The magnitude of the field at a height of 3.28 feet (1 meter) is frequently used to describe the magnetic field under transmission lines. As previously mentioned, the distance from the transmission-line conductors is inversely proportional to the magnetic field.

Electromagnetic waves can be classified as either ionizing radiation or non-ionizing radiation:

- Ionizing radiation consists of extremely high frequency electromagnetic waves (X-rays and gamma rays), which have enough photon energy to produce ionization (create positive and negative electrically charged atoms or parts of molecules) by breaking the atomic bonds that hold molecules in cells together.

- Non-ionizing radiation is a general term for that part of the electromagnetic spectrum, which has photon energies too weak to break atomic bonds. They include ultraviolet radiation, visible light, infrared radiation, radiofrequency and microwave fields, extremely low frequency fields, as well as static electric and magnetic fields.

3.17.5.2 Current Standards

Regulations that apply to transmission-line electric and magnetic fields fall into two categories: safety standards/codes and field limits/guidelines. Safety standards or codes are intended to limit or eliminate electric shocks that could seriously injure or kill persons. Field limits or guidelines are intended to limit electric- and magnetic-field exposures that can cause nuisance shocks or may cause health effects. In no case has a limit or standard been established because of a known or demonstrated health effect. The majority of the national standards draw on the guidelines set by the International Commission on Non-Ionizing Radiation Protection. This non-governmental organization evaluates scientific results from all over the world. The International Commission on Non-Ionizing Radiation Protection has included a safety factor of 10 for occupational exposure levels and a safety factor of 50 for public exposure levels.

An important point is that there is no specific level above which exposures become hazardous to health. Instead, the potential risk to human health gradually increases with higher exposure levels. Guidelines indicate that, below a given threshold, EMF exposure is safe according to scientific knowledge. However, it does not automatically follow that, above the given limit, exposure is harmful.

At low frequencies, exposure guidelines ensure that the level of currents induced by EMFs is below that of natural body currents. The main effect of radiofrequency energy is the heating of tissue. Consequently, exposure guidelines for radiofrequency fields and microwaves are set to prevent health effects caused by localized or whole-body heating.

In the United States, there are no Federal standards limiting occupational or residential exposure to 60 Hz EMF. Only six states (Florida, Minnesota, Montana, New Jersey, New York, and Oregon) have set standards for electric fields, and two states (Florida and New York) have standards for magnetic fields as shown in Table 13.17-6.

3.17.5.3 Electromagnetic Field Health Concerns

Some people have attributed a diverse collection of symptoms to low levels of exposure to EMFs at home. Reported symptoms include headaches, anxiety, suicide and depression, nausea, fatigue and loss of libido. To date, scientific evidence does not support a link between these symptoms and exposure to EMFs (WHO, 2006).

Scientists are also investigating the possibility that effects below the threshold level for body heating occur as a result of long-term exposure. To date, no adverse health effects from low level, long-term exposure to radiofrequency or power frequency fields have been confirmed, but scientists are actively continuing to research this area (WHO, 2006).

Some initial epidemiological studies of 60 Hz EMF levels showed a weak but possible correlation between magnetic fields and childhood leukemia. However, after over 20 years of research there is general scientific consensus that there is no evidence that power line EMF causes biological responses and health effects in humans. Recent research indicates:

- There is little evidence that power lines are associated with an increase in cancer.
- Laboratory studies have shown little evidence of a link between power-frequency fields and cancer.
- An extensive series of studies have shown that life-time exposure of animals to power-frequency magnetic fields does not cause cancer.
- A connection between power line fields and cancer is physically implausible (Moulder, 2005).

Table 3.17-6. State Transmission Line Standards and Guidelines

State	Electric Field		Magnetic Field	
	On ROW	Edge ROW	On ROW	Edge ROW
Florida	8 kV/m[1]	2 kV/m	NA	150 mG[1] (max load)
	10 kV/m[2]	NA	NA	200 mG[2] (max load)
	NA	NA	NA	250 mG[3] (max load)
Minnesota	8 kV/m	NA	NA	NA
Montana	7 kV/m	1 kV/m[5]	NA	NA
New Jersey	NA	3 kV/m	NA	NA
New York	11.8 kV/m	1.6 kV/m	NA	200 mG (max load)
	11 kV/m[6]	NA	NA	NA
	7 kV/m[4]	NA	NA	NA
Oregon	9 kV/m	NA	NA	NA

[1] For lines of 69-230 kV
[2] For 500 KV lines
[3] For 500 KV lines in certain existing ROW
[4] Maximum for highway crossings
[5] May be waived by the landowner
[6] Maximum for private road crossings
ROW = right-of-way; NA= not applicable: kV/m=kilovolts per meter ; mG= miligauss
Source: NIEHS, 2002

In 1999, the National Institute of Environmental Health Sciences (NIEHS) issued its final report on "Health Effects from Exposure to Power-Line Frequency Electric and Magnetic Fields" in response to the 1992 Energy Policy Act. NIEHS concluded that the scientific evidence linking EMF exposures with health risks is weak and that this finding does not warrant aggressive regulatory concern (NIEHS, 2002).

In 2002, Minnesota formed an Interagency Working Group to evaluate the body of research and develop policy recommendations to protect the public health from any potential problems resulting from HVTL EMF effects. The Working Group consisted of staff from the Minnesota Department of Health, the Department of Commerce, the Public Utilities Commission, the Minnesota Pollution Control Agency, and the Environmental Quality Board. In September 2002, the Working Group published its findings in a White Paper on Electric and Magnetic Field Policy and Mitigation Options (MDH, 2002b). The following summarizes the findings of the Working Group.

Research on the health effects of EMF has been carried out since the 1970s. Epidemiological studies have mixed results – some have shown no statistically significant association between exposure to EMF and health effects, and some have shown a weak association. More recently, laboratory studies have failed to show such an association, or to establish a biological mechanism for how magnetic fields may cause cancer. A number of scientific panels convened by national and international health agencies and the United States Congress have reviewed the research carried out to date. Most concluded that there is insufficient evidence to prove an association between EMF and health effects; however, many of them also concluded that there is insufficient evidence to prove that EMF exposure is safe (MDH, 2002b).

Despite this consensus, however, there are still concerns. For example, California's Department of Health Services published a report by the California EMF Program in 2002 that concluded there was a weak, but probably real association between EMF and cancer. In addition, on June 3, 2005, the British Medical Journal released a paper entitled "Childhood Cancer in Relation to Distance from High Voltage

Power Lines in England and Wales: A Case-Control Study" (Draper, 2005). This paper contained findings from a study on childhood cancer carried out by Oxford University that analyzed and compared 33 years of data (from 1962 to 1995) on 29,000 children diagnosed with cancer. The study found slightly elevated rates of childhood leukemia in children whose residence at birth was close to power lines. Proponents of the EMF health connection have argued that the magnetic fields produced by the power lines are responsible for this correlation.

The British study found elevated rates of childhood leukemia at distances less than 0.5 miles (approximately 600 meters) from the lines. At such distances, the magnetic fields in homes due to power lines are negligible compared to existing background levels. Moreover, the authors of the study found no causal link between childhood leukemia and EMF, stating "we emphasize again the uncertainty about whether this statistical association represents a causal relation." In addition, the authors state "neither the association reported here nor previous findings relating to level of exposure to magnetic fields are supported by convincing laboratory data or any accepted biological mechanism" (Draper, 2005).

Additional studies and areas of concern include:

- <u>Effects on pregnancy outcome.</u> Many different sources and exposures to EMFs in the living and working environment, including computer screens, water beds, and electric blankets, radiofrequency welding machines, diathermy equipment, and radar, have been evaluated by the World Health Organization **(WHO)** and other organizations. The overall weight of evidence shows that exposure to fields at typical environmental levels does not increase the risk of any adverse outcome such as spontaneous abortions, malformations, low birth weight, and congenital diseases. There have been occasional reports of associations between health problems and presumed exposure to EMFs, such as reports of premature births and low birth weight in children of workers in the electronics industry, but these have not been regarded by the scientific community as being necessarily caused by the field exposures (as opposed to factors such as exposure to solvents) (WHO, 2006).

- <u>Cataracts.</u> General eye irritation and cataracts have sometimes been reported in workers exposed to high levels of radiofrequency and microwave radiation, but animal studies do not support the idea that such forms of eye damage can be produced at levels that are not thermally hazardous. There is no evidence that these effects occur at levels experienced by the general public (WHO, 2006).

- <u>EMFs and cancer.</u> Over the last 20 years, research has been conducted in the United States and around the world to examine whether exposures to electric and magnetic fields at 50/60 Hz from electric power lines are a cause of cancer or adversely affect human health. The research included epidemiology studies that suggested a link with childhood leukemia for some types of exposures, as well as other epidemiology studies that did not; it also included lifetime animal studies, which showed no evidence of adverse health effects. Comprehensive reviews of the research conducted by governmental and scientific agencies in the U.S. and in the United Kingdom did not find a basis for imposing additional restrictions (NIEHS, 1999; IEE, 2000).

- <u>Electromagnetic hypersensitivity and depression.</u> Some individuals report "hypersensitivity" to electric or magnetic fields. In the past, residents have questioned whether their reported symptoms (e.g., aches and pains, headaches, depression, lethargy, sleeping disorders, and even convulsions and epileptic seizures) could be associated with EMF exposure near their homes. There is little scientific evidence to support the idea of electromagnetic hypersensitivity. Recent Scandinavian studies found that individuals do not show consistent reactions under properly controlled conditions of EMF exposure. Currently, there is not an accepted biological mechanism to explain hypersensitivity (WHO, 2006).

- Henshaw Effect. Researchers in England have suggested that the AC electric fields from power lines might affect health indirectly, by interacting with the electrical charges on certain airborne particles. This phenomenon, sometimes referred to as the Henshaw Effect, relates to the hypothesis that particles would be deposited on the skin by a strong electric field, or in the lung by charges on particles (Henshaw et al., 1996; Fews et al., 1999a, 1999b). In their laboratory, Henshaw and colleagues have developed models to test the physical assumptions of their hypothesis: that an electric field can change the behavior of particulates in the air. For example, they measured the deposition of radon daughter particles on metal plates, in the presence of an electric field at intensities found under or near power lines. Under these conditions, deposition of particles on surfaces was slightly increased, an occurrence that implies that the deposition might also occur on other surfaces, such as skin. However, Henshaw and colleagues have not tested the most speculative parts of their hypothesis: that such changes in deposition rate of particles would lead to an important increase in human exposure and that the increased skin exposure would be sufficient to affect human health. Henshaw et al. also hypothesized that AC electric fields at the surface of power line conductors lead to increased charges on particles, and thereby increases the likelihood that inhaled particles (including radon daughters) would be deposited on surfaces inside the lungs and airways, even at considerable distances from a power line. Outside air generally contains particles of various sizes, including aerosols from emissions from vehicles and manufacturing, as well as natural sources such as radon from soil, rock, and building materials. If, as hypothesized, charges on aerosol particles were increased, and if this change were to increase deposition in the lungs when inhaled over long periods of time, in theory these events could lead to increases in respiratory disease and other diseases. **However, a recent study (Jeffers, 2007) could not support the hypothesis that ion exposure from HVTL charges increases lung deposition of airborne particles.**

> **Radon daughters** are short-lived radioactive decay products of radon that decay into longer-lived lead isotopes that can attach themselves to airborne dust and other particles and if inhaled, damage the lining of the lungs.
>
> An **aerosol** is a mixture of microscopic solid or liquid particles in a gaseous medium. Smoke, haze, and fog are examples of aerosols.

There are many sources of more detailed information on the potential health effects of EMF. For example, the Minnesota Department of Heath maintains information on its web site: http://www.health.state.mn.us/divs/eh/radiation/emf/index.html. Another extensive site maintained by a University of Wisconsin medical research faculty is found at: http://www.mcw.edu/gcrc/cop/powerlines-cancer-FAQ/toc.html#19N.

Scientific literature clearly evidences that substantial research has been, and continues to be, conducted by academic laboratories, as well as the most qualified health research organizations in the world, including NIEHS (within the National Institutes of Health) and the WHO, into the potential health risks from EMF exposure. In spite of these efforts, there are no established health criteria or quantifiable impact assessment methods currently accepted for determining adverse effects to human health with respect to EMF exposure or the Henshaw Effect. In a very recent publication, the New Zealand National Radiation Laboratory (NZNRL, 2008) concluded: "In spite of all the studies that have been carried out over the past thirty years there is still no persuasive evidence that the [EMF] fields pose any health risks. The results obtained show that if there are any risks, they must be very small."

3.17.5.4 Existing Sources of EMF

Existing sources of EMF near each proposed site include HVTLs and substations. A description of these sources is provided below. However, the electric and magnetic field strengths for these sources are not available.

West Range Site and Corridors

The West Range Site is bounded by CR 7 to the west and the Iron Range Township to the east. MP currently owns an existing 115-kV HVTL (designated as 28Line), located north of the power plant footprint and buffer land (hereafter, all HVTLs will be identified by their number followed by the letter "L" for "Line," e.g., 28L). The line runs between the Clay Boswell Generating Station and a 115-kV substation near Nashwauk, Minnesota.

MP also owns the 83L, a 230-kV HVTL that connects the Clay Boswell Station with the Blackberry Substation, and the 20L, an 115-kV HVTL that interconnects the Grand Rapids and Blackberry Substations. The Blackberry Substation is the major HVTL hub in the area.

Finally, MP operates two 115-kV HVTLs known as 62L and 63L between the Nashwauk and Blackberry Substations. At one time, two 115-kV tap lines identified as 45L ran along the east side of the Project Site and connected 28L to the Greenway 115-kV Substation (just north of Holman Lake). The two 115-kV tap lines have since been de-energized and the Greenway Substation retired.

Two HVTL corridors traverse the West Range Site, one in a north/south direction and a second in an east-west direction. The HVTLs that occupy the north-south corridor are not currently used.

East Range Site and Corridors

The East Range Site comprises approximately 800 acres of undeveloped property **formerly** owned by CE, within the City Limits of the Hoyt Lakes in St. Louis County, Minnesota. This site is bounded by CR 666 to the east, the Superior Natural Forest to the north, and an existing 138-kV HVTL corridor leading to MP's Syl Laskin Energy Center Substation (Laskin Substation) to the west.

Three existing transmission lines emanate from the Laskin Station, located approximately 2 miles southwest of the generating station footprint, and connect with the Forbes and Virginia substations. The three 115-kV lines connect the Laskin Substation (34L, 38L, and 39L) with the Forbes and Virginia substations. These facilities are part of the MP transmission network known as the "North Shore Loop."

The 38L that interconnects directly to the Forbes Substation is about 35.5 miles in length, is rated at 146 Mega Volt-Amps, and has one intermediate distribution load service substation (the Peary Substation). For the 39L and 34L routes that connect to the Virginia Substation, there are existing 115-kV lines (37L directly to the Forbes Substation and 16L/18L to the Forbes Substation via United Taconite).

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3.18 NOISE

This section presents the current noise conditions at and near the proposed Mesaba Energy Project. It provides background information about noise principles, guidelines, and regulations; noise measurement methods and criteria; and existing noise levels and sources in the West Range and East Range Sites.

3.18.1 Background

3.18.1.1 Noise Principles

Definitions

Noise, simply defined as unwanted sound, can have an adverse effect on humans and their activities as well as the natural environment. Sound pressure (loudness) is the physical force from a sound wave that affects the human ear, and is typically discussed in terms of decibels (dB), which is a logarithmic unit of the sound pressure level (SPL). Zero dB represents the threshold of hearing.

The impact of noise is highly dependent upon the characteristics of the noise (i.e., loudness, pitch, time of day, duration, etc.) and the sensitivity (or perception) of the noise receptor. The EPA has classified noise levels for several common sounds along with typical human responses or perceptions for these noises (Table 3.18-1).

Table 3.18-1. Noise Levels for Common Sounds

Sources[1]	Noise Level (dBA)	Response
Carrier deck, jet operation	140	Painfully loud
Live rock music	130	Limits amplified speech
New York subway station	90	Hearing damage (8 hours)
Dishwasher	80	Annoying
Freeway traffic (50 ft)	70	Telephone use difficult
Air conditioning unit (20 ft)	60	Intrusive
Light auto traffic (100 ft)	50	Quiet
Breathing	10	Just audible
Silence	0	Threshold of hearing

[1]Noise levels decrease with distance from the source and are reduced by barriers, both man-made (e.g., sound walls) and natural (forested areas, hills, etc.).

Sound can be quantified in terms of its amplitude (loudness) and frequency (pitch). The standard unit of sound amplitude measurement is the dB; however, since the human ear is not equally sensitive to sound at all frequencies, four weighted scales (A through D) have been developed to measure noise from different sources. Typically, the A-weighted scale is used to measure noise as it relates human sensitivity, by discriminating against frequencies in a manner approximating the sensitivity of the human ear. Sound pressure presented in the A-weighted decibel scale is designated with the symbol dBA. Generally, a change of less than 3 dBA in noise levels with respect to existing conditions is not perceptible to humans in ambient situations. Noise levels for combinations of sounds are added and subtracted based on a logarithmic scale. As a result, the addition of two noises, such as a garbage truck (100 dBA) and a lawn mower (95 dBA), would result in a cumulative sound level of 101.2 dBA, not 195 dBA. In most cases, where the addition of decibels only needs to be accurate by ±1 dB, the following rule of thumb can be used to add decibels:

When two decibel values differ by:	Add the following amount to the higher value:
0 or 1 dB	3 dB
2 or 3 dB	2 dB
4 or 9 dB	1 dB
10 dB or more	0 dB

Because the decibel scale is logarithmic, a relative increase of 10 decibels represents a sound pressure level that is 10 times higher. However, humans do not perceive a 10-dBA increase as 10 times louder; they perceive it as twice as loud. The following is typical of human response to relative changes in noise level:

- ±3 dBA change is the threshold of change detectable by the human ear, in ambient environments;
- ±5 dBA change is readily noticeable;
- +10 dBA increase is perceived as a doubling of noise level/loudness; and
- +20 dBA increase is perceived as a fourfold increase in noise level/loudness.

The SPL that humans experience typically varies from moment to moment. Therefore, a variety of descriptors are used to evaluate noise levels over time. Some typical descriptors are defined below:

- L_{eq} is the continuous equivalent sound level. The sound energy from the fluctuating sound pressure levels is averaged over time to create a single number to describe the average energy or intensity level. High noise levels during a monitoring period will have greater effect on the L_{eq} than low noise levels. The L_{eq} has an advantage over other descriptors because L_{eq} values from different noise sources can be added and subtracted to determine cumulative noise levels.
- L_{dn} is the day-night equivalent sound level. It is similar to a 24-hour L_{eq}, but with 10 dBA added to SPL measurements between 10:00 pm and 7:00 am to reflect the greater intrusiveness of noise experienced during these hours. L_{dn} is also termed DNL.
- L_{min} is the lowest SPL measured during a given period of time and L_{max} is the highest.
- L_{10} is the SPL exceeded 10 percent of the time. Similar descriptors are the L_{50}, L_{01}, and L_{90}.

Noise Loss Over Distance

Sound travel over distance is acted upon by many factors. Temperature, humidity, wind direction, barriers, and absorbent materials such as soft ground and light snow are all factors in how sound will be perceived at different distances.

Sound energy is lost at higher humidity conditions due to the combined action of the viscosity and heat conduction of the air, and the behavioral state of the molecules therein. When humidity rises, there is an increase in the high frequency absorption of air. Thus, in the summer months, and assuming a higher relative humidity, less of the high frequency noise will be heard. As well, leaves and shrubs while in bloom during the summer months will further serve to attenuate propagated noise.

Noise from a fixed location (e.g., industrial equipment) is termed a stationary or point source. Point sources of noise attenuate at a rate of 6 dBA per doubling of distance when traveling through air over a hard surface and up to 7 or 8 dBA when traveling over a soft surface. These attenuation rates are general rules for total noise levels from a given source.

A roadway or railway is considered a line source because a motor vehicle or diesel engine moves from one point to another along a fixed linear route, and the receiver experiences noise from all points along the line. Noise from a line source typically attenuates at the rate of 3 dBA per doubling of distance based on a reference distance of 50 feet. Thus, traffic noise level of 65 dBA at a distance of 50 feet from a roadway would be 62 dBA at a distance of 100 feet from the roadway, and it would be 59 dBA at a distance of 200 feet from the roadway. The 3-dBA attenuation rate is used for noise traveling through the air or over a hard surface. Noise traveling over a soft surface, such as grass or other vegetation, may attenuate at a more rapid rate of approximately 4.5 dBA.

Vibration

Ground vibration is commonly viewed as the major concern for off-site damage to existing structures. The measurement of ground vibration is Peak Particle Velocity, which is the maximum speed (measured in inches per second or millimeters per second) at which a particle in the ground is moving relative to its inactive state. The U.S. Bureau of Mines and the Office of Surface Mining have conducted extensive research over the last 40 years to develop acceptable vibration standards, vibration damage criteria, and techniques to predict and control blast vibrations that greatly reduce the risk of off-site impacts.

The Office of Surface Mining initially found that if Peak Particle Velocity were limited to 1 inch per second, then 95 percent of the damage to surrounding houses and structures would be prevented. After more recent research, the Peak Particle Velocity limit was changed to 0.5 inches per second to avoid off-site damage.

A Peak Particle Velocity of 0.5 is generally equivalent to the vibration caused by a loaded truck or bus passing by 50 to 100 feet away. As a general rule, a person will begin to feel blast vibrations at levels as low as 0.02 inches per second. This is well below the level at which research has shown that damage may occur.

3.18.1.2 Methodology

Ambient Noise

In order to describe baseline noise conditions, ambient noise monitoring was performed in key areas throughout the West Range and East Range Sites, including areas of common use by residences. Descriptions of the noise monitoring locations (i.e., receptor locations) are detailed in subsequent paragraphs in this section under respective site-specific discussions.

MPCA guidelines for noise equipment calibration and monitoring procedures were followed in order to establish accuracy and consistency (MPCA, 1999). All monitoring was completed using a Type II, American National Standards Institute-approved noise level meter with calibration being performed before and after each monitoring cycle. A windscreen was also used to counter any wind effects and no monitoring was performed during times when winds greater than 15 miles per hour were measured or when precipitation was occurring.

The results of the ambient noise levels discussed in this section were used to predict traffic noise levels at chosen virtual receptor sites as a result of the Proposed Action. Virtual receptor sites refer to sites that were not included in the original ambient noise monitoring, but nonetheless, were modeled to describe future noise levels (i.e., no actual field measurements were taken at these locations). The virtual receptor locations and predicted noise levels are discussed in Section 4.18.

Guidelines and Regulations

Several agencies have noise regulations for different noise sources. Noise regulations are either source standards or receiver-based standards. The MPCA has a receiver-based standard intended to limit noise levels and protect the health and welfare of the general public. These standards were used for comparison in describing baseline noise conditions measured at each of the receptor locations.

The MPCA noise standards are grouped according to land activities by the noise area classification (NAC) system (MPCA, 1999). The NAC has four classes. NAC-1 includes household units, including farmhouses, as well as religious activities. NAC-2 applies to more commercial development, such as retail, businesses, government services, and parks. NAC-3 and NAC-4 are less stringent and are composed primarily of industrial uses.

The MPCA guidelines, measured in dBA, are stipulated in the form of L_{10} and L_{50}. Simply stated, L_{10} means that the measured SPL (in dBA) must not exceed a certain threshold more than 10 percent of the time (for a 1-hour survey), and L_{50}, being a level that must not be exceeded more than 50 percent of the time (again, for a 1-hour survey). The thresholds for NAC-1 **and NAC-3** are listed in Table 3.18-2 **(revised since Draft EIS)** as SPL maximums by the MPCA. **All of the receptors that were analyzed for this project are represented by NAC-1, except for R1 at the East Range Site, which is represented by thresholds under NAC-3.**

Table 3.18-2. Noise Area Classification (NAC) Thresholds

	NAC-1		NAC-3	
	L_{10}	L_{50}	L_{10}	L_{50}
Daytime (7:00 a.m. to 10:00 p.m.)	65 dBA	60 dBA	80 dBA	75 dBA
Nighttime (10:00 p.m. to 7:00 a.m.)	55 dBA	50 dBA	80 dBA	75 dBA

Source: MPCA, 1999

For this project, ambient monitoring at each location was performed for no less than one hour and during both times specified as “night” (i.e., 10:00 pm to 7:00 am) and “day” (7:00 am to 10:00 pm) by the MPCA classification.

Other agency noise guidelines that were reviewed include guidelines under the Federal Highway Administration (FHWA) and the Federal Rail Administration (FRA) for traffic- and rail-related noise, respectively. The FHWA does not provide actual noise standards, but has guidelines of an L_{10} of 70 dBA, which are used to trip a Federal funding mechanism for noise abatement on highway projects. The FRA provides noise impact criteria for railroad projects, which are dependent on land use categories as defined by the DOT. Further details on these agencies’ requirements are discussed in Section 4.18 as these were examined in relation to predicted noise levels as a result of the Proposed Action.

Investigations regarding noise ordinances at the West Range and East Range sites revealed little to no written local noise ordinances. In general, noise is dealt with on a complaint basis and is determined by general annoyance and disruption of the common peace. Discussions with local officials at both sites confirmed that the MPCA regulations should be used for noise monitoring and analysis (SEH et al., 2005 and SEH, 2005b).

3.18.2 Existing Noise Levels

As stated earlier, to establish and characterize the baseline noise environment, a noise monitoring program was developed and implemented. The program focused on potential noise-sensitive receptors in areas near proposed project activities in the West Range and East Range Sites. Noise sensitive receptors are defined as homes, schools, hospitals, etc., which are especially sensitive to high noise levels. The monitoring results and descriptions of the significant receptors are provided below.

3.18.2.1 West Range Site

Existing noise levels were monitored at five receptor locations near the proposed plant site, the railroad and roadways, or both. Monitoring events took place during the months of June and July 2005. **Locations of the noise receptors for the West Range site are shown in Figure 3.18-1 (added in Final EIS).**

Results of the ambient noise monitoring during the daytime and nighttime for the West Range Site are provided in Table 3.18-3 **(updated for the Final EIS; exceedances of state thresholds are indicated in italicized and underlined typeface)**. It is presumed that noise levels that equaled or exceeded the MPCA noise thresholds occurred because of a receptor location's proximity to a major transportation corridor (i.e., CR 7).

Table 3.18-3. Existing Noise Levels at Ambient Noise Receptors for West Range Site

Receptor	Approximate Distance from nearest edge of Plant Footprint	Time of Monitoring	L_{10}	L_{50}	L_{10} dB over State Compliance	L_{50} dB over State Compliance
Receptor 1, Reclaimed County Landfill	**1,870** ft south	9:15 am –10:15 am	53 dBA	52 dBA	0 dB	0 dB
		10:04 pm – 11:04 pm	51dBA	49 dBA	0dB	0dB
Receptor 2, Residence Big Diamond Lake	**4,025** ft southeast	3:15 pm –4:15 pm	54 dBA	53 dBA	0 dB	0 dB
		11:15 pm – 12:16 am	50 dBA	49 dBA	0 dB	0 dB
Receptor 3, 31950 CR7	**4,110** ft west	1:03 pm –2:04 pm	59 dBA	55 dBA	0 dB	0 dB
		11:15 pm – 12:16 am	***<u>58 dBA</u>***	***<u>53 dBA</u>***	**3** dB	**3** dB
Receptor 4, 32423 CR7	**4,650** ft west	2:30 pm –3:30 pm	59 dBA	52 dBA	0 dB	0 dB
		11:45 pm – 12:45 pm	*<u>56 dBA</u>*	*<u>53 dBA</u>*	1 dB	3 dB
Receptor 5, Dunning Lake	**4,300** ft southeast	4:00 pm –5:00 pm	51 dBA	**50** dBA	0 dB	0 dB
		correlated with Receptor 2	50 dBA	49 dBA	0 dB	0 dB

Table 3.18-3. Existing Noise Levels at Ambient Noise Receptors for West Range Site

Receptor	Approximate Distance from nearest edge of Plant Footprint	Time of Monitoring	L_{10}	L_{50}	$L_{10\ dB}$ over State Compliance	$L_{50\ dB}$ over State Compliance
Receptor 6. Lutheran Church	**18,060 ft southeast**	Daytime – correlated with nearby receptors	52 dBA	50 dBA	0 dB	0 dB
		Nighttime – correlated with nearby receptors	50 dBA	49 dBA	0 dB	0 dB
Receptor 7. Catholic Church	**9,940 ft northwest**	Daytime – correlated with nearby receptors	52 dBA	50 dBA	0 dB	0 dB
		Nighttime – correlated with nearby receptors	50 dBA	49 dBA	0 dB	0 dB
Receptor AAC-6, AAC-6. Near Beasley Ave., City of Taconite	**9,100 ft southwest**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**
AAC-7. North side of Twin Lakes; near City of Marble	**15,000 ft southeast**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**
AAC-8. Between O'Reilly Lake & Island Lake (off Reilly Beach Rd.)	**11,050 ft northwest**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**

Note: Bold typeface indicates values updated for Final EIS (distances have been updated to reflect adjustment of plant footprint); Values in italics and underlined typface indicate areas in which MPCA noise thresholds have been reached or exceeded. **N/A – Not Available: Note that AAC-6, AAC-7, and AAC-8 were used in construction and rail noise impact analyses and not used for the predictive plant noise modeling discussed in Section 4.18 – no ambient noise measurements were taken for these locations.**
Source: Noise Analysis, West Range Site; SEH et al., 2005**; AAC, 2009**

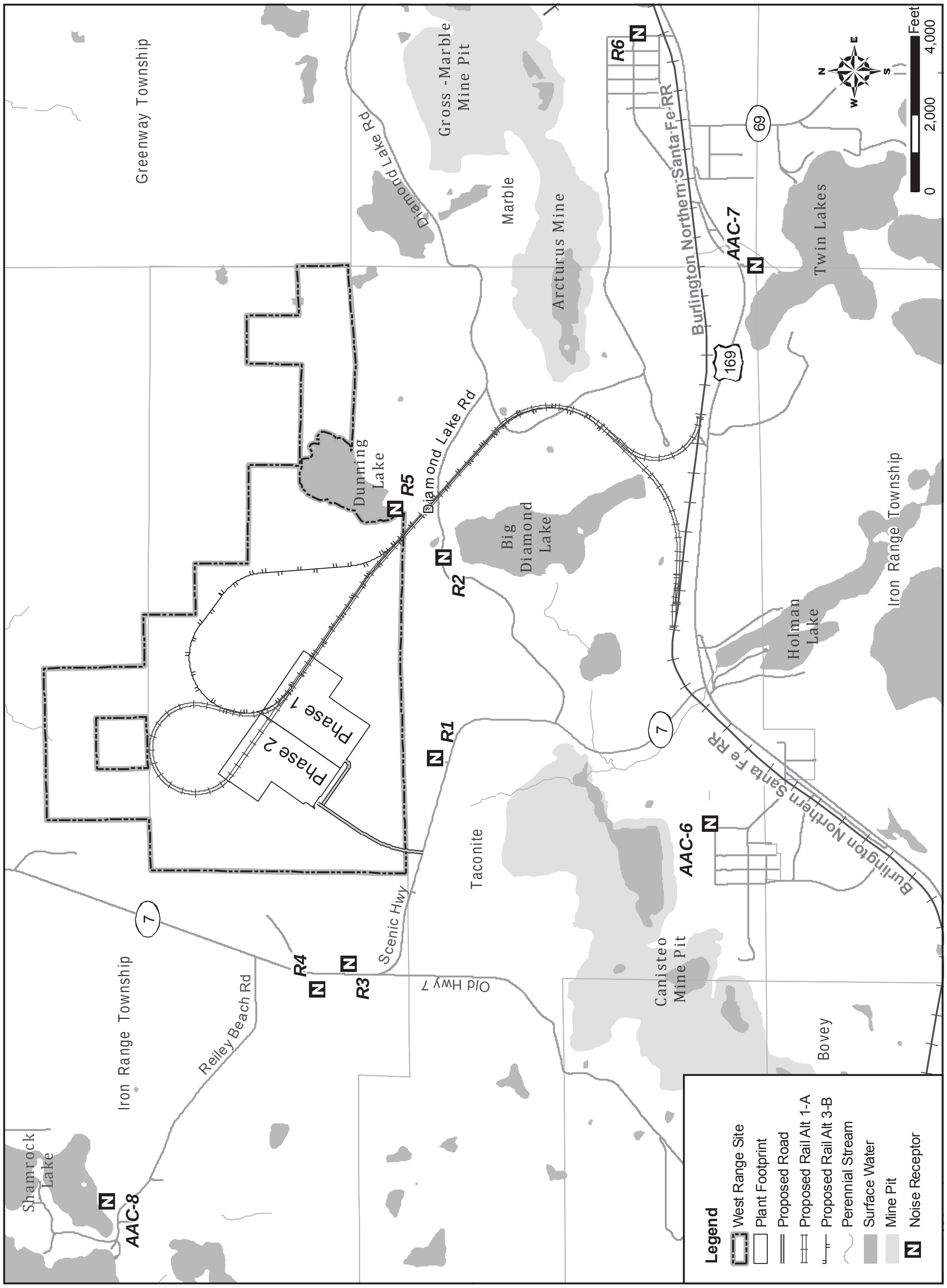

Figure 3.18-1. Noise Receptors at West Range

In general, results of the monitoring at the West Range Site indicate noise levels typical of townships and locales of this size and are below those of typical urban environments that are in close proximity to major transportation corridors. Since the setting surrounding the West Range Site can generally be described as a quiet, rural area with sparsely-spaced residential areas, any significant increases in noise levels could result in substantial acoustical impacts to surrounding receptors.

Receptor Location 1, Reclaimed County Landfill

Receptor 1 was the closest measurement point towards the proposed facility; however its proximity to CR 7 accounted for a small amount of traffic noise especially during the daytime monitoring event. The area where this receptor resides is within a reclaimed waste management sight. Although no residences are within this area, monitoring at this location was performed in an attempt to collect readings as close to the proposed facility as possible.

Ambient noise recorded during the daytime event consisted mainly of slight winds through the surrounding woods, and car and truck passes along CR 7. Ambient noise during the nighttime hours consisted mainly of insect noise, slight winds through the surrounding woods, and three cars passing along CR 7. Results from both monitoring events fall within the MPCA thresholds for acceptable noise daytime and nighttime criteria.

Receptor 2, Residence Big Diamond Lake

Receptor 2 was located along a cluster of residential and summer homes along the northern edge of Big Diamond Lake. These homes are situated along an undeveloped roadway with access off of CR 7 and proceeding east north of Big Diamond Lake. The roadway itself **(Diamond Lake Road)** consists of dirt and red clay and is, at times, difficult to navigate without a four-wheel drive vehicle.

Daytime ambient noise consisted of slight winds through the surrounding woods, some slight traffic along the adjacent roadway and insect noise. Since winds were calm and there was no traffic along the adjacent roadway, ambient noise during the nighttime event almost exclusively consisted of insect noise. Results from both monitoring events fall within the MPCA thresholds for acceptable noise for daytime and nighttime criteria.

Receptor 3, 31950 CR 7

Receptor 3 was located at 31950 CR 7 within the property of a medium-sized residential home with a small hobby farm attached. The residents run a small tourist-orientated horse-riding business.

Traffic during the daytime monitoring event was consistent with car passes 2 to 3 times per minute, and cement trucks proceeding south and exiting CR 7 and proceeding south along CR 7. The cement trucks were counted traveling both north and south (presumed laden and then empty) at a consistent rate of two passes every 2 to 3 minutes for a large part of the daytime monitoring event. These cement trucks were also observed traveling at a relatively high rate of speed, which also heightened pavement noise. Noise levels during the nighttime monitoring event exceeded MPCA noise thresholds **by up to 3 dB,** presumably due to their proximity to CR 7.

Receptor 4, 32423 Scenic Highway 7

Receptor 4 was located along CR 7 near a residential area. Traffic-related noise along CR 7 was the predominant noise source during times of monitoring. Noise levels during the nighttime monitoring event exceeded MPCA noise thresholds **by up to 3 dB,** presumably due to their proximity to CR 7.

Receptor Location 5, Dunning Lake

Receptor 5 was located along the southern end on Dunning Lake and represented one residential location and the location of future potential residential expansion. Because of its remote location and the fact that there was a locked and gated roadway, no nighttime measurements were made (i.e., after 10:00 pm). Nighttime measurements are therefore correlated with the nearest receptor, Receptor 2.

The results of the daytime monitoring event fall within the MPCA thresholds for acceptable noise for daytime criteria.

Receptor Location 6 (Lutheran Church) and Receptor Location 7 (Catholic Church)

For purposes of the noise modeling, R6, a Lutheran Church located 18,600 feet southeast in Marble, and R7, a Catholic Church located 9,940 feet northwest and along CR 7, were added as these locations could be classified as the closest sensitive receptors (churches) other than residential units. No measurement data for ambient conditions were taken for R6 and R7. Baseline conditions for these locations were estimated based on data at locations with similar characteristics.

3.18.2.2 East Range Site

Existing noise levels were monitored at four receptor locations throughout the East Range Site and within areas of common use by residences. These areas included one residential location and three locations surrounding the proposed plant site. Monitoring events took place during the month of July 2005. **Locations of the noise receptors for the East Range are shown in Figure 3.18-2 (added in Final EIS).** Results of the ambient noise monitoring during the daytime and nighttime for the East Range Site are provided in Table 3.18-4 **(updated for the Final EIS)**.

In general, Hoyt Lakes and the surrounding areas are in relatively quiet places. During daytime hours there is little to no manufacturing noise other than from the Laskin power plant across Colby Lake. There are limited traffic passes along Kennedy Memorial Drive proceeding through town and very few school related noise sources such as buses and playgrounds.

The preponderance of noise observed during daytime monitoring events related to lawn mowers in the distance, a small amount of light plane passes overhead, and distant noise from the Laskin power plant when in the vicinity of Colby Lake. Nighttime monitoring events were equally quiet with readings 1-2 decibels lower than daytime readings in most instances. Daytime and nighttime noise levels fluctuated slightly due to insect noise during evening events, and higher traffic and wind noise generated during the day.

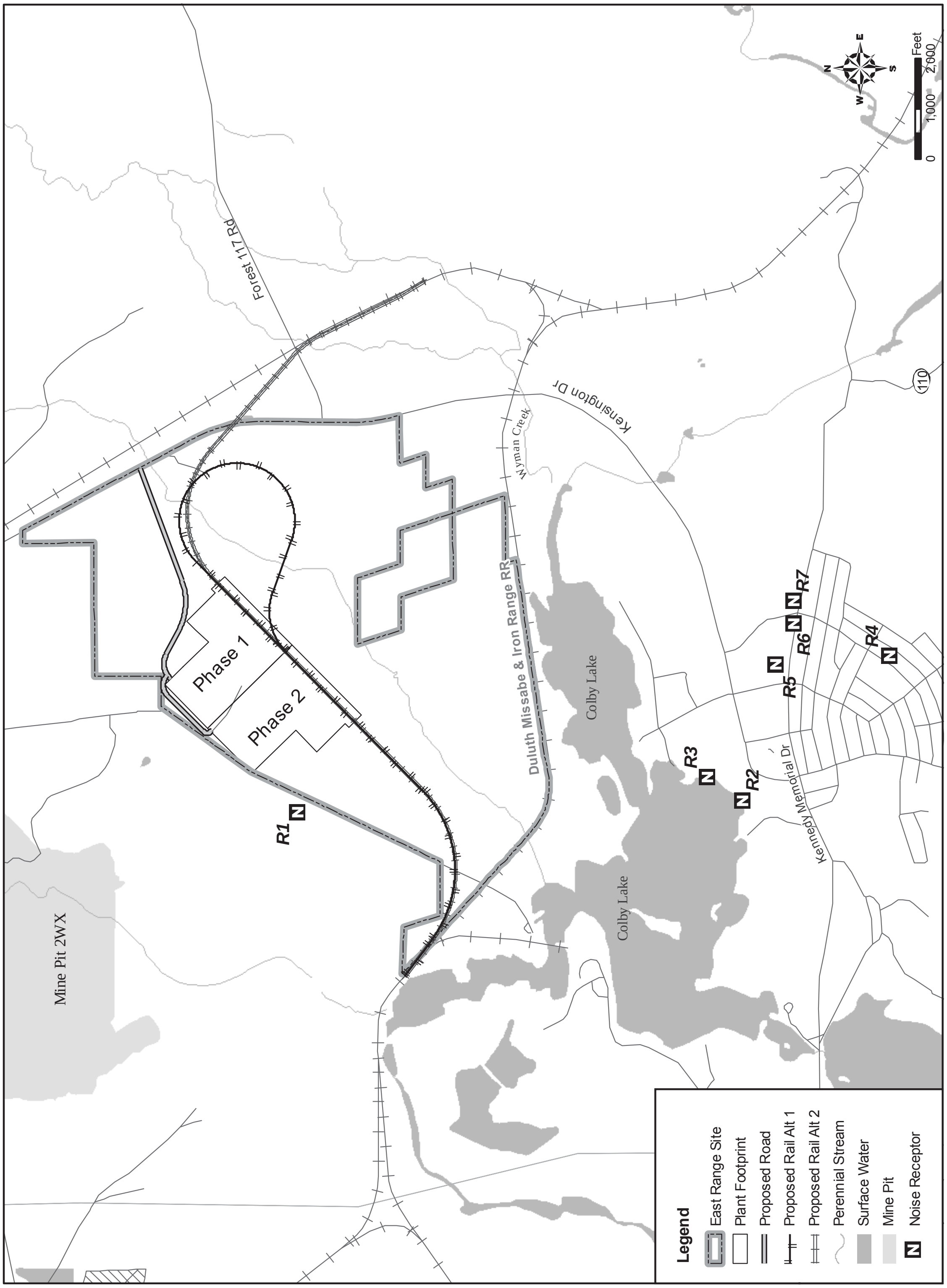

Figure 3.18-2. Noise Receptors at East Range

Table 3.18-4. Existing Noise Levels at Ambient Noise Receptors for East Range Site

Receptor	**Approximate Distance from nearest edge of Plant Footprint**	**Time of Monitoring**	**L_{10}**	**L_{50}**	**$L_{10\ dB}$ over State Compliance**	**$L_{50\ dB}$ over State Compliance**
Receptor 1, Access Road Southeast of Plant	800 ft northwest	8:23 a.m.–9:23 a.m.	50 dBA	50 dBA	0 dB	0 dB
		10:12 a.m.–11:13 p.m.	49 dBA	49 dBA	0 dB	0 dB
Receptor 2, Boat Landing and Park	9,200 ft southwest	9:50 a.m.–10:50 a.m.	52 dBA	51 dBA	0 dB	0 dB
		11: 30 p.m.–12:30 a.m.	50 dBA	49 dBA	0 dB	0 dB
Receptor 3, Colby Ridge Development	8,300 ft southwest	10:23 a.m.–11:23 a.m.	53 dBA	51 dBA	0 dB	0 dB
		12:40 a.m.–1:40 a.m.	50 dBA	49 dBA	0 dB	0 dB
Receptor 4, 321 Kent St, Hoyt Lakes, MN	11,500 ft south	12:30 p.m.–1:30 p.m.	52 dBA	50 dBA	0 dB	0 dB
		1:45 a.m.–2:45 a.m.	49 dBA	48 dBA	0 dB	0 dB
Receptor 5. Faith Lutheran Church	**8,400 ft south**	**Daytime – correlated with nearby receptors**	**53 dBA**	**50 dBA**	**0 dB**	**0 dB**
		Nighttime – correlated with nearby receptors	**50 dBA**	**49 dBA**	**0 dB**	**0 dB**
Receptor 6. Queen of Peace Catholic Church	**8,800 ft south**	**Daytime – correlated with nearby receptors**	**53 dBA**	**50 dBA**	**0 dB**	**0 dB**
		Nighttime – correlated with nearby receptors	**50 dBA**	**49 dBA**	**0 dB**	**0 dB**
Receptor 7. Trinity Methodist Church	**8,800 ft south**	**Daytime – correlated with nearby receptors**	**53 dBA**	**50 dBA**	**0 dB**	**0 dB**
		Nighttime – correlated with nearby receptors	**50 dBA**	**49 dBA**	**0 dB**	**0 dB**

Note: Bold typeface indicates values updated for Final EIS (distances have been updated to reflect adjustment of plant footprint). Source: Noise Analysis, West Range Site, SEH et al., 2005

Receptor Location 1, Access Road Southeast of Plant

Receptor 1 was the closest measurement point from the East Range Site. This location is fairly remote residing on an old township highway (6401) with no throughway.

Daytime monitoring conditions were calm with light cloud cover and variable winds. Any slight noise that was collected by the sound level meter during daytime hours was from leaves rustling through the trees and one small plane pass. Ambient noise during the nighttime hours consisted mainly of insect noise and slight winds through the surrounding woods. Results from both monitoring events fall within the MPCA thresholds for acceptable daytime and nighttime noise criteria.

Receptor Location 2, Boat Landing and Park

Receptor 2 was located along a public boat landing and city park **(Birch Cove Park) on the south shore of Colby Lake**. The sound level meter was placed near the waters edge and away from the park users.

There was no traffic entering and exiting the park. Daytime ambient noise consisted of slight winds through the surrounding woods, some slight boating traffic, and water noise. Ambient noise during the nighttime event consisted of insect noise and slight wind noise (leaves rustling). Results from both monitoring events fall within the MPCA thresholds for acceptable daytime and nighttime noise criteria.

Receptor Location 3, Colby Ridge Developments, Pospeck Lane

Receptor 3 was within a newly developed area along the southern end of Colby Lake on Pospeck Lane, adjacent the property of a medium sized residential lake home and 50 ft from the waters edge. The existing Laskin plant across the lake was a continual source of noise.

Results from both monitoring events fall within the MPCA thresholds for acceptable daytime and nighttime noise criteria.

Receptor Location 4, 321 Kent St, Hoyt Lakes

Receptor 4 was located within the southeastern neighborhoods of Hoyt Lakes, directly south of the proposed plant site.

Both daytime and nighttime monitoring sessions were quiet with the occasional car passing though the neighborhood. Additionally, during daytime monitoring, lawn mower noise was slightly evident in the distance. Results from both monitoring events fall within the MPCA thresholds for acceptable daytime and nighttime noise criteria.

Receptor Locations 5, 6, and 7, Kennedy Memorial Drive, Hoyt Lakes

For purposes of the noise modeling, three other sensitive receptors (churches) were located within the Hoyt Lakes city limits. These included:

- **R5 - Faith Lutheran Church located at the northwest corner of Dorchester Drive and Kennedy Memorial Drive.**
- **R6 - Queen of Peace Catholic Church at the northwest corner of Hampshire Road and Kennedy Memorial Drive.**

- **R7 - Trinity Methodist Church located at the northeast corner of Hampshire Road and Kennedy Memorial Drive.**

No ambient noise measurements were taken for these locations. Baseline conditions for these locations were estimated based on data at locations with similar characteristics.

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4. ENVIRONMENTAL CONSEQUENCES

4.1 CHAPTER OVERVIEW

This chapter describes the potential impacts of the Proposed Action and alternatives. The chapter has been prepared to address the required elements of an EIS in accordance with NEPA (40 CFR 1502.16) and the Minnesota Power Plant Siting Act, including the analysis of relevant environmental issues identified through the scoping process. The chapter is organized in the following key sections:

4.2 Aesthetics

4.3 Air Quality and Climate

4.4 Geology and Soils

4.5 Water Resources

4.6 Floodplains

4.7 Wetlands

4.8 Biological Resources

4.9 Cultural Resources

4.10 Land Use

4.11 Socioeconomics

4.12 Environmental Justice

4.13 Community Services

4.14 Utility Systems

4.15 Traffic and Transportation

4.16 Materials and Waste Management

4.17 Safety and Health

4.18 Noise

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4.2 AESTHETICS

4.2.1 Approach to Impacts Analysis

4.2.1.1 Region of Influence

The region of influence for aesthetic resources includes the areas that would be impacted from construction and operation of the Mesaba Generating Station and its associated utility and transportation corridors under the Proposed Action. While the power plant stacks and HVTL structures would be the most visible structures, the variable topography and forest cover would screen them from most receptors. Therefore, the region of influence for the power plant and corridors would be 2 and 0.5 miles, respectively.

4.2.1.2 Method of Analysis

Impacts to the aesthetic resources in the region of influence were assessed based on the existing regional scenic qualities, the potential for negative aesthetic effects, and the local population concentration. The evaluation of potential impacts to aesthetic recourses considered whether the Proposed Action or an alternative would cause any of the following conditions:

- A blocked or degraded scenic vista or viewshed;
- A change in area visual resources; or
- Glare or illumination that would be obtrusive or incompatible with existing land uses.

Potential impacts could include the negative aesthetic effects from the elimination of open space, generation of high contrast colors or shapes, or the introduction of an incompatible visual element to the environment. Other adverse impacts could include blocking a scenic view or interfering with views or the setting of historic properties.

The impacts analysis for this section was based on a low, moderate, and high impact scale, which was determined on the duration, size, and contrast of the project in relation to the local resource quality. Structures with high visual contrast in relation to the surrounding environment would have a greater potential for aesthetic impacts. Low impacts to the aesthetic resources would occur from minor or temporary changes to the viewscape that would not dramatically alter the existing aesthetic quality, nor block views of significant receptors.

The analysis used to determine the impact levels is based on the BLM visual resource inventory process, which uses contrast ratings to determine potential impacts from construction and operation of a project. In addition, a model showing potential line-of-sight views of the IGCC power plant stacks was generated to assess potential impacts. The GIS-generated model incorporated the known heights and locations of the proposed power plant stacks, the expected heights/location of generator outlet HVTL structures, the surrounding topography and forest heights, and known locations of rural residential receptors and their topographic characteristics (see Section 3.2 for residential receptor locations). The results of the visibility analysis show the locations where at least one of the IGCC power plant stacks would be visible. These locations would have the greatest potential for impacts to the aesthetic resources in the surrounding area. Details regarding the methodology of the GIS visibility analysis are contained in the project's Environmental Supplement (Excelsior, 2006b).

The potential impacts to aesthetic resources were also related to air quality, water resources, biological resources, and noise, which are further discussed in Sections 4.3, 4.5, 4.8, and 4.18, respectively.

4.2.2 Common Impacts of the Proposed Action

4.2.2.1 Impacts of Construction

Within the Proposed Action, the power plant emission stacks and associated air emissions would have the greatest visibility to the surrounding area. Generally, the power plant structures tend to be either tall and narrow, or short and wide. The tank vent boiler would be the tallest structure at 210 feet, with an outside diameter of 5.5 feet. Buildings, such as the rod mill feed binds, are shorter (150 feet), but have larger outside widths (155 feet). The heights of the HVTL towers would range from 100 to 140 feet tall (Table 4.2-1). Depending upon an observer's location, views of the Mesaba Generating Station, the proposed HVTL structures, and the proposed HVTL/pipeline corridors could be blocked to varying degrees by trees or surrounding topographical features.

Seasonality would also affect the aesthetic impacts in the area. During the growing seasons, the Mesaba Generating Station buildings and emissions points would be screened from adjacent views. The increased foliage would also shield the rail corridor and mask the line-of-sight along pipeline corridors. In the wintertime, the visibility of the structures associated with the power plant would increase. The associated impacts would temporarily increase due to the loss of leaves on the trees and the cold-weather condensation of water vapor present in combustion gases and cooling tower exhaust.

The greatest impacts to aesthetic resources would occur closer to the structures, around local resident concentrations, and near quality viewscapes. The pipeline corridors would be the most visible where they cross other features, such as lakes, wetlands, and roads.

Table 4.2-1. IGCC Power Plant Structure Dimensions

Structure	Height of Emission Point (feet)	Outside Diameter of Emission Point/ Width (feet)	Total Number of Emission Points	
			Phase I	Phase II
CTG/HRSG	150	22	2	2
Tank Vent Boiler	210	5.5	1	1
Flare	185	7	1	1
CTG Building	90	170	1	1
Rod Mill Feed Bins	150	155	1	1
ASU Cooling Tower	48	54	5	5
Power Block Cooling Tower	48	100	12	12

Note: Structures higher than 60-80 feet would be above the tree line and could be visible by local residents. The cooling towers would generally be shorter than the surrounding trees, although water vapor plumes from these towers could rise hundreds of feet and be highly visible depending on weather conditions.
Source: Excelsior, 2006b

The power plant footprint size is site-independent and basic construction activities would not differ greatly between the West Range Site and East Range Site. The power plant construction would be conducted in two phases, as outlined in Section 2.4. Preconstruction activities would include tree and brush clearing on the site, dewatering the facility footprint, grading activities, road building, and upgrading of existing utilities. The construction activities for the Mesaba Generating Station would occur within the West Range or East Range Sites. Land between the plant footprint and the site boundary would generally extend at least 1,500 feet from the plant footprint and could extend as much as 5,000 feet in areas north and east of the proposed power plant footprint. By reserving a buffer of existing forest between the local receptors and the construction site, the visual impacts from the missing vegetation would be minimized. After construction is complete, the disturbed area would be re-seeded and re-vegetated, minimizing the long-term visual impacts. During construction, a security fence would be built within the site boundary. The HVTL, pipeline, rail, and road construction activities would occur within variable-width corridors along the length of the alignments. The majority of corridor construction would occur during Phase I. Depending on which site and HVTL alternative is chosen, additional power line construction could also continue through Phase II.

Disturbed areas within utility ROWs would be re-seeded with grass, but large bushes and trees would be prevented from re-growing in these areas as part of routine maintenance activities. Subsequently, permanently cleared ROWs on such corridors would be visible wherever a line-of-sight between the observer and ROW in question occurs (e.g., where such routes follow or cross existing roadways or wetlands). Similarly, areas cleared for the construction of the access roads and railroad lines would be permanently cleared of large bushes and trees, but would be re-seeded with grass, where appropriate.

Construction would also require increased heavy-haul and rail traffic to the Mesaba Generating Station. During the construction period an estimated 15 to 20 semi-trailer trucks per day would bring materials to the facility. The rail alignment would be constructed in the early phases and material delivery would be supported by rail cars, thereby reducing the total number of required trucks.

During construction for Phase II, offsite staging and laydown areas would be used to stockpile materials and store equipment, and for a cement batch plant. Excelsior would establish these offsite construction staging and laydown areas on 85 acres of land selected from potential sites as described in Section 2.3. All the candidate sites are located on lands that have been disturbed or cleared during prior use, and all have access to local roadways. Sites used would be restored to prior existing conditions following completion of Phase II construction.

4.2.2.2 Impacts of Operation

The amount of land cleared of trees and other vegetation during the operational phase would not likely increase from the amount of land cleared during the construction phase. The primary visual impacts due to the plant operation would occur from the presence of structures, which would remain constant through the life of the power plant, and water vapor emissions from cooling tower, which would be dependent on the time of year and the coal-firing rate. The cooling towers, and to a lesser extent, the emission stacks, would exhaust substantial quantities of air laden with water vapor, generating large white plumes. Although the cooling tower structures may not be visible from a location, the plume would travel horizontally and vertically, with a greater range. The water vapor would be especially present during the winter, as condensation generates larger cloud cover.

Coal would be brought by rail and unloaded at the power plant. The coal, petroleum coke, and flux would be stored in facilities with built-in dust suppression systems to prevent coal dust fugitive emissions. During the winter months, the frozen cargo would be thawed in a shed, which would minimize the appearance of dust on snow. Section 4.3, Air Quality, addresses the potential impacts from fugitive emissions.

During the operational phase, road traffic approaching either site would be reduced from construction levels, although the frequency of rail movements for deliveries could be sustained or increase. Tree growth would be prevented along the pipeline and utility corridors and a primitive access road would be maintained to facilitate repairs. The impacts to the aesthetic environment along the HVTL corridors would not increase from the impacts associated with the construction impacts.

The Mesaba Generating Station would require security lighting, which would impact the closest residential receptors. In addition, warning lights may be required on tall structures near airports to meet Federal Aviation Administration (FAA) requirements. A lighting plan would be developed during the front-end engineering and design and environmental review processes. The plan would receive input from the Taconite or Hoyt Lakes City council and seek to minimize the night aesthetic impacts.

4.2.3 Impacts on West Range Site and Corridors

4.2.3.1 Impacts of Construction

Construction of Phase I would first require clearing the wooded and shrub vegetation from the project site, dewatering the area, and constructing the proposed power plant access roads. During Phase I, approximately 74 acres of forest would be removed. During Phase II, an additional 81 acres of forest would be removed. Potential impacts associated with the Mesaba Generating Station construction would include visible dust and exhaust, landscape scars, visible equipment, decreased forest from thinning, views of the security fences around the disturbed area, and additional truck and rail traffic. These activities would occur below the tree line and would be primarily visible to locations immediately surrounding the Mesaba Generating Station.

During construction of Phase I, materials used for construction would initially be stored in the Phase II footprint. For Phase II, Excelsior would establish off site construction staging and laydown areas on 85 acres of land, from four potential sites described in Chapter 2 and shown in Figures 2.3-1 and 2.3-3. Most of the potential Phase II lay-down areas have been disturbed during prior use by mineral extraction companies. The one exception, directly northwest of the West Range Site, had previously been cleared and left as a field. Excelsior would select the appropriate sites for the necessary acreage prior to construction, taking into account the potential effects to nearby receptors. The lands would be cleaned and restored to their pre-existing condition at the end of Phase II construction.

Figures 3.2-6 and 3.2-7 show the locations of the residential receptors within the vicinity of the West Range Site, with the closest residences within 5,000 feet of the power plant footprint. Multiple residences are also located along CR 7, approximately 1 mile west of the proposed power plant footprint. The construction activities would be visible to residential receptors immediately surrounding the power plant site and would be visible to a lesser extent to the surrounding area. Impacts to the views by sensitive receptors would be mitigated by preserving a layer of forest along the boundary of the buffer zone and by constructing the power plant in two stages.

Security lighting would be required during the construction phase. The majority of the construction work would be performed during one shift during the day. Occasionally in the summer, a second shift may be added. During that time, more lights would be needed. The lights would be immediately apparent to the surrounding residential receptors and anyone driving along US 169 at night. These impacts would be temporary. A lighting plan would be developed to minimize lighting impacts to nearby sensitive receptors and to avoid interference with views of the northern lights.

HVTL Corridors

Because route selection and construction of new HVTLs would be required for the Mesaba Energy Project Phase I, the incremental impacts from construction of the Phase II plant would be negligible with respect to HVTLs. Therefore, the impacts on aesthetic resources described below would be essentially the same for Phase I as for both phases of the Mesaba Energy Project.

New corridors would be required between the Greenway Substation to the Blackberry Substation for the WRA-1 and WRA-1A HVTL Alternative Alignments. The construction activities to generate the new corridors would include grading, clearing vegetation, excavation for the tower foundations, and stringing of the new line. These activities would occur within the 150-foot temporary ROW along the length of the corridor. In areas along the HVTL corridors where the transmission line towers are upgrades, there would be an increase in traffic and construction equipment to access these areas and construct the HVTLs. The greatest impacts to the local population would occur within the corridor region of influence, approximately 0.5 miles on either side of the ROW. There are approximately 66 residences within 0.5 miles of the WRA-1 Alternative Alignment; 62 residences within the region of influence of the WRA-1A Alternative Alignment; and, 214 residences within 0.5 miles of the WRB Alternative Alignments. The majority of the residences along all of these proposed corridors are within the 0.25- to 0.5-mile range.

The proposed double circuit 345-kV HVTL for the WRA-1 and WRA-1A Alternative Alignments would be carried on single-pole steel structures. The steel pole structures would be about 130 to 140 feet tall, with average spans of about 800 feet. Structures on the taller end of this range would be needed on the one-mile segment where the structures share a ROW with an existing line near the Blackberry Substation. H-frame or other structure types may be necessary near waterfowl areas or water crossings to minimize the likelihood of fatal collisions between birds and the HVTL structures and/or conductors. These structures would be shorter and therefore be less visible than the primary single-pole structures.

The single-pole structures would be visible to residents along the proposed route between the Mesaba Generating Station and the Blackberry Substation and to passengers of vehicles traveling along portions of Twin Lakes Road and Birch Road. The poles would be most visible between mileposts 3 and 6, where the corridor would parallel these two county roads.

The HVTL structures associated with the WRA-1 Alternative Alignment would be visible at numerous points along this route, which includes the Hill Annex Mine State Park, Dunning Lake, Big and Little Diamond Lake, the CMP, Holman Lake, and the Twin Lakes. The HVTL corridor would impact the aesthetic resources by introducing new visual elements when crossing extended flat areas, such as wetlands. In addition, the visual resources in an area would be changed if multiple structures were visible over the tops of the trees. Therefore, the locations with the greatest frequency of tower views would be the most affected.

The WRA-1A Alternative Alignment would have many of the impacts discussed above for the WRA-1 Alternative Alignment. The WRA-1A Alternative Alignment would cross the Swan River three times and travel directly alongside or overhead of the river for approximately 3,200 feet. For most of the year between these points, flow in the Swan River is not believed to be capable of supporting canoe traffic, but the stream could support limited fishing activity and the overhead HVTLs would negatively impact the aesthetic quality of that experience.

Near milepost 4 of the HVTL corridor, a long line-of-sight view of the HVTL corridor would exist just south of the bridge over the Swan River and looking toward the northwest. While the long line-of-sight view would be noticeable when looking in a southeasterly direction, part of that view is already open from a large wetland area and by active gravel pit mining. The HVTL corridor would be directly visible from a public access point located on Loon Lake between mileposts 4 and 5 where the HVTL route turns due south.

Visual impact modeling has not been conducted for alternate route WRB-2A. All but approximately one mile of this route would use existing HVTL ROWs resulting in existing long lines-of-sight views. The WRB-2A corridor would pass through rural areas where the visual impacts would be minimized. More residential locations would be impacted by WRB-2A than WRA-1 because overall length of the WRB-2A route is approximately 18.3 miles, almost twice the length; however, this would mostly be along an existing HVTL ROW.

The WRB-2A corridor would use taller structures along the existing ROWs, which would be more visible for long distances to travelers along US 169. The existing corridor also travels along a prominent ridge, which increases the visibility to the residents of Pengilly. Residents along the southern half of the HVTL route that live close to the existing route would be affected by the more imposing visual impact of the taller structures.

Pipeline Corridors

Because route selection and construction of pipelines would be required for the Mesaba Energy Project Phase I, additional impacts would not occur during Phase II plant construction. Therefore, the impacts on aesthetic resources described below would be essentially the same for Phase I as for both phases of the Mesaba Energy Project.

In the event that Excelsior were to reach terms for the use of the Nashwauk Natural Gas Pipeline, as described in Section 2.3.1.4, construction of a proposed pipeline for Mesaba would not be necessary. The Nashwauk pipeline would follow a route essentially the same as the Mesaba Natural Gas Pipeline Alternative 1. In which case, the impacts from construction of the pipeline described in the following paragraph would be attributable to the Nashwauk project approved by the PUC rather than to the Mesaba Energy Project.

The ROW construction requirements for the Mesaba Generating Station pipelines would be 60 to 120 feet width along the corridor. Approximately 11.5 miles of the Natural Gas Pipeline Alternative 1 route would be a new ROW, of which about 3.3 miles would be shared with the new Plan A Preferred HVTL Route WRA-1 Alternative Alignment and about 1.5 miles would follow the existing HVTL ROW corridor from the retired Greenway Substation to the southern boundary of the West Range Site. Significant clearing would be required between mileposts 0 to 8.3, where a new ROW segment would be constructed.

Approximately 8 miles of the Natural Gas Pipeline Alternative 2 route would travel along the existing natural gas pipeline ROW that is currently under control of NNG. Aesthetic impacts along the existing section of ROW would be temporary and occur across one or two growing seasons. The aesthetic impacts along the new segment of ROW between mileposts 8 and 12.5 would occur entirely along the new HVTL ROW described above.

The first 3.5 miles of the Natural Gas Pipeline Alternative 3 11.5-mile route would travel along the existing natural gas pipeline ROWs under control of NNG. A new pipeline ROW would follow the existing highway ROWs between Coleraine and the existing HVTL ROW connecting the Greenway Substation to the West Range Site.

Where natural gas or water pipelines would be constructed and impacts to roadways or all terrain vehicle trail-type surfaces are unavoidable, the original surface condition would be restored or improved. Clearing activities to remove vegetation would be reduced along the routes that follow existing county roads and highways. Where the pipeline segment would follow secondary or forest roads, such clearing would be increased.

The potential impacts from the process water supply pipelines construction activities would be similar to the natural gas pipeline alternatives. The temporary aesthetic impacts to the area visual resources would be associated with preconstruction land clearing and grading activities. Increased visibility of construction equipment, increased traffic, clearing vegetation, and exposed landscape scars would also temporarily change the visual resource.

Where the process water pipelines would travel along the existing highway ROW or forest roads, aesthetic impacts would be reduced because additional land clearing would not be necessary. The expected permanent aesthetic impacts would be associated with the supplemental clearing of additional land at the periphery of pipeline corridors. Soil piles from trenching and the exposed equipment would generate temporary visual impacts during construction.

Rail Alignments and Access Roads

Because route selection and construction of the rail line and access road would be required for the Mesaba Energy Project Phase I, additional impacts would not occur during Phase II plant construction. Therefore, the impacts on aesthetic resources described below would be essentially the same for Phase I as for both phases of the Mesaba Energy Project.

The rail line alternatives would vary in their impacts to the surrounding area for line construction and train operation. Noise impacts associated with rail line construction and train operations are presented in Sections 4.18.2.1 and 4.18.3.1, respectively. Track visibility from area roads would be reduced, as the construction activities would be focused on the side of the track furthest from US 169 and at an elevation significantly above the grade at which CR 7 is located. However, the centerline of Rail Line Alternative 1A **and 3-B** alignment**s** would pass within **470** feet of the closest resident on Big Diamond Lake and within about 850 feet of the closest resident on Dunning Lake. At these locations, aesthetic impacts related to construction would be visible by residents and others living north of Big Diamond Lake.

Construction activities would impact the present visual resources that exist in the vicinity of the residential areas on Big Diamond and Dunning Lakes. To accomplish the grade required to accommodate unit train deliveries, significant cuts would be required. Cuts up to 60 feet would occur within close proximity to residences nearest to the track. Such cuts would require blasting and would result in the rail line becoming more visible to surrounding areas. Once construction activities ceased, revegetation of the cut slopes would reduce the contrast. Some temporary aesthetic impacts would occur, including vibration, noise, dust, and heavy truck traffic associated with the alignment construction. During operation of the plant, aesthetic impacts associated with routine rail shipments, such as noise and vibration would still occur (see Section 4.18, Noise).

Rail Line Alternative 1B **(evaluated in the Draft EIS)** would move the centerline of the rail track about 2,500 feet from a Dunning Lake residence and about 2,900 feet from a residence on Big Diamond Lake. Rail Line Alternative 1B would require cuts through a mine tailings pile east of Big Diamond Lake and Dunning Lake, in addition to the standard construction activities described above. However, the distance from the proposed rail alignment to the residences would greatly reduce the visual and noise impacts when compared to Alternative**s** 1A **and 3B**.

As described in Section 2.3.1.2, the realignment of CR 7 (Access Road 1) has been deferred by Itasca County because of reduced state funding priority. Access Road 1 would be an extension of CR 7 by Itasca County that would require cuts through previously disturbed and undisturbed areas. Such cuts could be significant and the scenic view would be compromised if the road passed too closely to existing residential properties causing numerous driveways to be visible from the highway.

As described in Section 2.3.1.2, Access Road 2 would be contingent on the realignment of CR 7, which has been deferred by Itasca County since publication of the Draft EIS. Access Road 2 would require clearing of wooded areas in the southern part of the property.

Access Road 3 would directly connect CR 7 to the West Range plant site. The road corridor would require clearing of wooded areas in the southwestern part of the property that would be wide enough to contain the revised Process Water Pipelines and the Water and Sewer Pipeline. The road would curve to the northeast to prevent direct line-of-sight views of the plant.

4.2.3.2 Impacts of Operation

The combined two-phased Mesaba Generating Station would be twice the size of Phase I, which would double the number of tall structures that may be visible to residents and travelers in the surrounding area. Other than the potential for increased visibility due to size, the aesthetic impacts from operation of both phases would be essentially comparable to those for Phase I alone.

The Mesaba Generating Station emission points and its generator outlet HVTL structures would affect views in the vicinity of the West Range Site. The taller power plant buildings and stack emission points would be visible from nearby residential areas, high vantage points, CR 7, and other points where clear lines of sight between an observer and the power plant would occur. For example, **numerous locations along the south shore of the CMP** would have views of all eight stacks **(both phases)**.

During the growing seasons, the West Range Site Mesaba Generating Station, buildings, and emission points would be screened but still visible from some nearby homes, businesses, and CR 7. In the wintertime, the visibility of the structures associated with the power plant would increase. In addition to the loss of leaves, the cold weather condenses the water vapor present in combustion gases and the cooling tower exhaust. During **damp weather, the effects of plant emissions may** cause the appearance of a **water vapor** haze **in the vicinity of** the plant site.

Figure 4.2-1 shows the results of the GIS visibility analysis of the IGCC power plant stacks for the area surrounding the West Range Site. This figure shows those locations where a person could see least one IGCC power plant stack. These areas are shown as a black overlay on a shaded relief map.

There are relatively few vantage points from which all eight stacks would be visible due to visual barriers (e.g., tree line or hills) that would block a direct line-of-sight to the power plant. High elevation points and lake borders would have the highest concentration of views. The tailings pile at the Hill Annex Mine State Park, the western shores of Reiley Lake, and the southern border of CMP would have the best views of the stacks. However, mine tailings piles and mine pits are areas with existing disturbed aesthetic properties which would reduce the visual impact of the Mesaba Generating Station stacks.

The stacks and vapor plume would be potentially visible to an area with a radius of 20 miles. The closest public lands in the areas are the Hill Annex Mine State Park (5 miles), the Forest History Center (15 miles) and the eastern edge of the Chippewa National Forest (20 miles). The Hill Annex Mine State Park would have the greatest impacts from the operation of the power plant; the stacks would also be seen from areas adjacent to exposed mine pits and tailing piles. Leech Lake Indian Reservation and the George Washington State Park are more than 20 miles from the plant site and would not likely be affected by the Proposed Action.

Lighting

The combined two-phased Mesaba Generating Station would be twice the size of Phase I, which would nearly double the amount of security lighting that may be visible to residents and travelers in the surrounding area. Other than the potential for increased illumination due to increased lighting structures, the aesthetic impacts from operation of both phases described in the following paragraphs would be essentially comparable to those for Phase I alone.

Lighting would increase the visibility of the power plant at night. However, the tank vent boiler emission point would be positioned at a height greater than 200 feet above ground level, resulting in the requirement for a determination of no hazard to aviation from the FAA. According to FAA Advisory Circular AC 70/7460-1K ("Obstruction Marking and Lighting") Paragraph 20:

> *Any temporary or permanent structure, including all appurtenances, that exceeds an overall height of 200 feet above ground level or exceeds any obstruction standard contained in 14 CFR Part 77, should normally be marked and/or lighted. However, an FAA aeronautical study may reveal that the absence of marking and/or lighting will not impair aviation safety.*

Additionally, the FAA may "recommend marking and/or lighting a structure that does not exceed 200 feet (61 meters) above ground level or 14 CFR 77 standards because of its particular location" (U.S. DOT, 2000). If required to install obstruction lighting, such lighting would increase visibility of the structures during evening hours (and daylight hours, if the lighting were required to be operated 24 hours per day).

Phase I and Phase II would be equipped with security lighting that would enhance visibility of the power plant during evening hours. This would negatively affect aesthetics for residents that live close to the power plant and those driving within visual range. A power plant lighting plan would be developed during the FEED and environmental review processes and would seek to minimize such aesthetic impacts as well as to consider any affects to viewing the northern lights. A lighting plan could include reduced lighting at night to make the plant less visible at night. The lighting plan would be developed in coordination with the Taconite City Council's input and ultimate approval.

HVTL Corridors

Once completed for the Phase I plant, the HVTL structures required for both phases of the Mesaba Energy Project would be in place. Hence, the incremental aesthetic impacts from operation of the Phase II generating station would be negligible. The visual impacts from the operation of the proposed HVTL corridors would be similar to the construction impacts described above. In addition to the changed visual viewscape, some of the HVTL structures may require obstruction lighting to comply with the FAA regulations. Although none of the HVTL towers would be taller than 200 feet high, their position in relation to local airports **and/or seaplane bases** may require additional lighting. The WRA-1 and WRA-1A Alternative Alignments would be located more than 8 miles from the Grand Rapids Airport and would parallel the existing 5,755-foot runway. Therefore, it is unlikely these structures would require obstruction lighting.

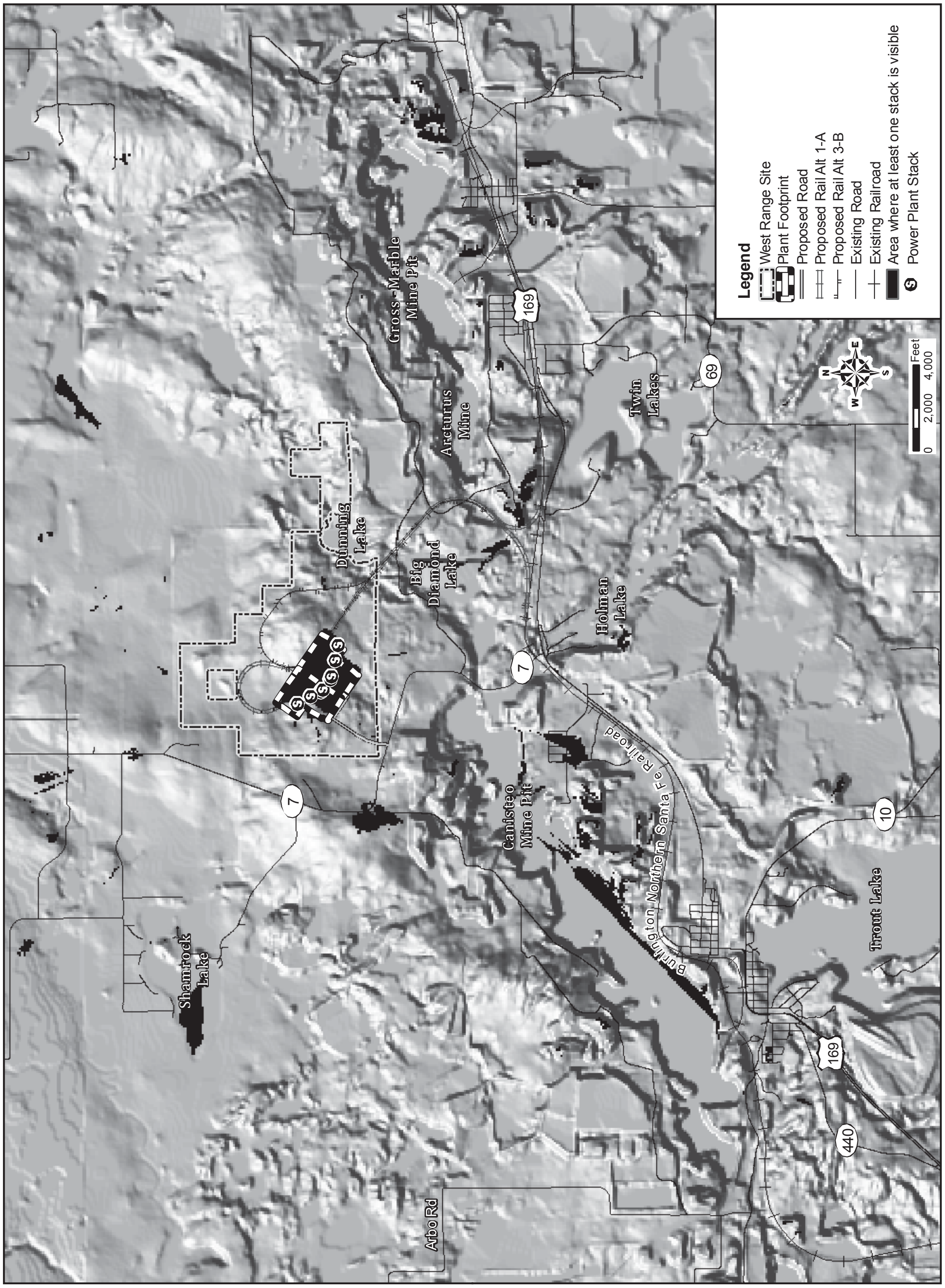

Figure 4.2-1. Predicted Locations where Mesaba Plant at West Range Site would be Visible

The WRB-2A corridor would travel along a prominent ridge, which would increase the overall height of the structures. Although there are no airports near this route, DOE consultation with the FAA would determine if obstruction lighting are required for the taller poles along the ridge.

Pipeline Corridors

Once completed for the Phase I plant, the pipelines required for both phases of the Mesaba Energy Project would be in place. Hence, the incremental aesthetic impacts from operation of the Phase II generating station would be negligible.

A 40- to 80-foot wide permanent easement along the natural gas, process water, potable water, industrial wastewater, and sanitary sewer pipelines would be maintained under the Proposed Action. Although some re-growth of vegetation would be allowed after construction is completed, trees and large bushes would be prevented from growing. Most of the visual impacts would be shielded by forest borders along these corridors. Views would occur at the edge of mining pits or when the corridor crosses a road or all terrain vehicle trail.

The majority of Process Water Supply Pipeline Segment 1 would travel over previously disturbed mining areas and along current road ROWs. **The pipeline would enter the Mesaba Generating Station property along proposed Access Road 3.** The segment 2 pipeline would have **one** line-of-sight view along a relatively short stretch of CR 7. Process Water Supply Pipeline Segment 3 would primarily travel over existing corridors and the permanent aesthetic impacts would be associated with the open space to accommodate the new pipeline. **The use of an enhanced ZLD system at the West Range Site would eliminate the need for the blowdown discharge pipeline that was described in the Draft EIS.**

Rail Alignments

Once the selected rail alignment would be completed for Mesaba Energy Project Phase I, the principal aesthetic impacts from operations would be related to the number of trains servicing the plant, which would be essentially double for the combined two-phased generating station. Increased rail traffic between the Mesaba Generating Station and coal/petroleum coke suppliers could occur. Noise impacts associated with rail line construction and train operations are presented in Sections 4.18.3.1 and 4.18.3.2, respectively.

Permanent aesthetic impacts from the Rail Alignment Alternative 1A would not be evident from either US 169 or from CR 7. However, Rail Line Alternative 1A tracks and/or embankments would be visible from Big Diamond Lake and Dunning Lake. The corridor would cross an unpaved all terrain vehicle road twice, a proposed access road, and a private driveway before approaching the Mesaba Generating Station. Several residences are located within the immediate vicinity of the rail alignment alternative. The centerline of Rail Line Alternative 1A would pass within 400 feet of a residence on Big Diamond Lake and within about 850 feet of a residence on Dunning Lake. At these locations, permanent aesthetic impacts would occur to these residents and others living north of Big Diamond Lake. Aesthetic impacts include the noise and vibration associated with such deliveries and unloading activities as well as the recurring visual appearance of the trains and permanent visibility of a **rail bridge** crossing.

The aesthetic impacts for Big Diamond Lake and Dunning Lake residents would be reduced with Rail Line Alternative 1B **(which was evaluated in the Draft EIS)**. Alternative 1B would initially follow the same path as Rail Line Alternative 1A, but continue to travel north around the eastern portion of the West Range Site. The Alternative 1B rail track centerline would be located about 2,500 feet from the Dunning Lake residence and about 2,900 feet from the residence on Big Diamond Lake. Such movement away from these residences would reduce temporary and permanent aesthetics impacts identified for Rail Line Alternative 1A. There are no other residences that would be affected by Alternative 1B.

The Rail Alignment Alternative 3B approach to the West Range site would be similar to Rail Line Alternative 1A. The center line would still pass within 470 feet of the residence on Big

Diamond Lake, and within 850 feet of the residence on Dunning Lake. Rail Line alternative 3B would have a larger loop next to the plant site, though it would not be visible from CR 7. The train, however, would be stationary near the residents during unloading. Because the track approaching the coal dumper cannot accommodate the full 8,000-foot train, approximately 2,000 feet of the train would extend along the approach track, and within 1,000 feet of the residence on Dunning Lake. This would mean that the train would be located near residents for an hour longer than on the Rail Alternative 1A.

Access Roads

Once the access road would be completed for Mesaba Energy Project Phase I, the principal aesthetic impacts from operations would be related to the amount of traffic entering and leaving the plant, which would be approximately **doubled for the combined two-phased generating station.**

For Access Road 1 **and Access Road 2,** the increase in the level of traffic past Big Diamond Lake and Dunning Lake residences would compound the negative aesthetic impact associated with construction of the Mesaba Generating Station. The county has indicated its intention to leave in place the existing segment of CR 7 between US 169 and the power plant, which would allow travel on alternate routes; heavy truck traffic would be required to travel via the new segment of highway. **However, as described in Section 2.3.1.2, the realignment of CR 7 (Access Road 1) has been deferred by Itasca County because of reduced state funding priority. Without the realignment of CR 7 for Access Road 1, construction of Access Road 2 would not be practicable.**

Access Road 3 would directly connect CR 7 to the West Range Site at the southwestern corner of the property. Vehicles entering and leaving the plant would increase traffic along CR 7 between US 169 and the entrance to the Mesaba Generating Station as described in Section 4.15, with impacts on noise as described in Section 4.18. Because Access Roads 1 and 2 would not be constructed, trucks would be restricted to one section of CR 7 and not pass residences along Diamond Lake Road.

4.2.4 Impacts on East Range Site and Corridors

4.2.4.1 Impacts of Construction

Construction activities on the East Range Site would be similar to the West Range Site. Trees and other vegetative growth would be cleared for the Mesaba Generating Station footprint and along new and existing corridors for purposes of constructing Phase I and Phase II, the natural gas pipelines, process water pipelines, sewer pipelines, HVTLs, new access roadways, and rail lines. During Phase I and II, approximately 83 and 85 acres of forest would be removed, respectively.

Construction activities would also increase visible dust, equipment visibility, generate visible landscape scars, and increase traffic in the surrounding area. Security fencing and lighting would also increase the overall visibility of the construction site.

The Mesaba Generating Station would be located between the **residential areas in** Hoyt Lakes and the CE mining operation in a previously disturbed area. The Mesaba Generating Station site property is partially cleared of vegetation, which means the temporary impacts would not drastically change the visual resources. The closest residences would be located approximately 1.2 to 1.4 miles from the power plant footprint. Because the majority of the impacts related to construction would be located below the tree line, most views from residences would be shielded. Figures 3.2-9 and 3.2-10 show the locations of the residential receptors within the vicinity of the East Range Site Mesaba Generating Station and associated corridors.

During construction of Phase I, materials used for construction would initially be stored in the Phase II footprint. For Phase II, Excelsior would establish offsite construction staging and laydown areas on 85 acres of land at potential sites described in Chapter 2 and shown in Figure 2.3-5. The

potential Phase II laydown areas have all been disturbed during prior uses by mineral extraction companies. Excelsior would select the appropriate sites for the necessary acreage prior to construction, taking into account the potential effects to nearby receptors. The lands would be cleaned and restored to their pre-existing condition at the end of Phase II construction.

HVTL Corridors

Because route selection and construction of new HVTLs would be required for the Mesaba Energy Project Phase I, the incremental impacts from construction of the Phase II plant would be negligible with respect to HVTLs. Therefore, the impacts on aesthetic resources described below would be essentially the same for Phase I as for both phases of the Mesaba Energy Project.

The two East Range Site HVTL alternative corridors would upgrade existing transmission lines from the Mesaba Generating Station to the Forbes Substation. For both alternatives, a new ROW would be constructed along the 43L HVTL Route to the Syl Laskin power plant. To accommodate the larger HVTL towers, construction activities would clear an additional 30 feet to the existing ROW along the 39L/37L HVTL Route. The existing 115-kV lines would need to be transferred to the new HVTL towers, which would require an increase in construction vehicles along the corridor. Approximately 962 residences would be located within 0.5 miles of 39L/37L HVTL Route, and 271 residences would be located within 0.5 miles of the 38L HVTL Route. The majority of these residences would be located over 500 feet away from the construction. Construction-specific impacts, such as construction noise and visible equipment along the HVTL alternatives would be temporary. The construction activities would also shift along the corridor as towers were completed, and when finished, the area would be re-vegetated with native plants.

Single pole steel structures are proposed for both East Range Site HVTL alternatives, as required to accommodate the new transmission lines. The heightened visibility of the taller structures would affect the aesthetic character of the existing viewshed from Hoyt Lakes through Eveleth. Shorter, yet wider, H-frame or other structure types may be necessary near waterfowl areas or water crossings.

The 39L/37 HVTL Route would require vertically configured 140-foot single-pole steel structures to carry one new 345 kV circuit and the existing 115-kV circuit across most of the route's length. The new corridors along the 43L HVTL Route and around the Thunderbird Mine Substation would not need to accommodate any existing circuits. The HVTL route would cross long stretches of relatively flat terrain, which would increase the number of visible towers. In addition, the 39L/37L HVTL Route would pass nearby relatively populated areas that would increase the number of residents having a direct line-of-sight to one or more of the HVTL structures. A greater concentration of tower views would occur around Hoyt Lakes, Gilbert, and Eveleth. Other views of the 39L/37L HVTL Route would occur around relatively flat terrain and along the shores of area lakes, including Whitewater Lake, Ely Lake, and Embarrass Lake. The increased height of the upgraded towers would be more prominent and would cause a moderate change in the area visual resources.

The 38L HVTL Route would travel south and away from major population centers. The single pole double circuit HVTL towers along the 38L HVTL Route would be shorter (125 feet) than the towers along the 39L/37L HVTL Route (140 feet). The shorter structures and alternative route would generate fewer visual impacts across around the corridor. The 38L HVTL Route would still be visible from Colby and Whitewater Lake, in areas with relatively flat terrain, and along long line-of-sight views. The views of the structures would still cause a moderate change to the area visual resources surrounding the HVTL corridor.

Pipeline Corridors

Because construction of pipelines would be required for the Mesaba Energy Project Phase I, additional impacts would not occur during Phase II plant construction. Therefore, the impacts on aesthetic resources described below would be essentially the same for Phase I as for both phases of the Mesaba Energy Project.

Construction of the natural gas pipeline to serve the Mesaba Generating Station would be located in a pre-existing gas pipeline ROW. The temporary aesthetic impacts associated with construction would include visible equipment operations, traffic disruptions, cleared vegetation, and trenching activities that leave piles of soil exposed for indefinite time periods. Approximately 856 residential receptors would be located within 0.5 miles of the natural gas pipeline. Construction of the natural gas pipeline corridor would generally result in a moderate impact to these residences. Once the construction phase is completed, excess soil piles would be regraded and areas would be re-seeded with grass.

Most of the process water supply pipeline corridors would be constructed on land **previously mined by** CE. The construction of the process water pipelines would be largely confined to areas of property with restricted access or have been disturbed from past mining practices. The aesthetic impacts level would be considered low because the construction disturbance would not differ greatly from the existing visual resources. For the East Range Site Alternative, an enhanced ZLD system would be used to eliminate wastewater discharges. Therefore, there would be no aesthetic impacts associated with constructing a pipeline to an outfall or discharge structure.

Potable water and sewer pipelines would be buried along existing utility corridors so that installation would generally create low and temporary aesthetic impacts. The primary construction impacts would occur from clearing vegetation, trenching, and increased visibility of equipment. Directional drilling under Colby Lake would alleviate aesthetic impacts. After construction, temporary soil stockpiles would be graded and re-seeded to minimize the permanent impacts.

Rail Alignments and Access Roads

Because route selection and construction of the rail line and access road would be required for the Mesaba Energy Project Phase I, additional impacts would not occur during Phase II plant construction. Therefore, the impacts on aesthetic resources described below would be essentially the same for Phase I as for both phases of the Mesaba Energy Project.

The two East Range Site rail alignment alternatives would be constructed on land immediately adjacent to the Mesaba Generating Station. Construction activities that would result in impacts would include clearing vegetation, landscape scaring, additional equipment visibility, and cuts and fills. Once the rail alignment is completed, trains would bring construction supplies, generating additional noise and visual impacts along the rail alignment. There are no residential receptors within 0.5 miles of the rail alignments. Construction of the rail lines would mostly be shielded from residents' views by existing tree cover and/or topographic obstructions.

Construction of the access road would occur between the Mesaba Generating Station and the mining operation. During construction, the area would be cleared, graded, and dewatered. Because the Mesaba Generating Station footprint would be located between the closest residences and the access road, any additional temporary impacts would be low.

4.2.4.2 Impacts of Operation

The combined two-phased Mesaba Generating Station would be twice the size of Phase I, which would double the number of tall structures that may be visible to residents and travelers in the surrounding area. Other than the potential for increased visibility due to size, the aesthetic impacts from operation of both phases would be essentially comparable to those for Phase I alone.

As with the West Range Site, the Mesaba Generating Station emission points and its HVTL structures would affect views near the East Range Site. The taller Mesaba Generating Station buildings and stack emission points would be visible from nearby residential areas, high vantage points, CR 666, and other points where clear line-of-sights between an observer and the power plant are available. The proposed HVTL structures would be taller than existing structures and would be visible from further distances than the existing 115-kV structures. The East Range Site is on private land **within** the Superior National

Forest, which could affect views from within the forest. Other public lands, Bear Lake Park and Soudan Underground Mine State Park are located 16 and 20 miles to the north-northwest of the proposed site, and are unlikely to be affected.

Building and stack heights for the East Range Site Mesaba Generating Station would be similar to those specified for the West Range Site. Figure 4.2-2 shows the results of the GIS visibility analysis for the area surrounding the East Range Site that would contain views of the Mesaba Generating Station emission stacks. The areas where a person could see at least one emission stack are colored black. The topography of the area is also shown as a shaded relief map.

The Mesaba Generating Station stack emission points would be visible from most vantage points along the south shore of Colby Lake, line-of-sight views from the southwest section of Hoyt Lakes, the southwest end of Whitefish Reservoir, and locations mostly to the north of the power plant footprint and East Range Site. Some locations within the region of influence would be shielded from view of the power plant by visual barriers. Residents living within the farthest southeast portions of Hoyt Lakes would not likely see the power plant or its stacks because of terrain obstacles. The power plant would be visible from residential areas in Hoyt Lakes.

During the growing season, the East Range Mesaba Generating Station buildings and stacks would be partially screened from homes located on the south shore of Colby Lake. In general, Colby Ridge residents and other homes on the south shore of the lake would be able to see the power plant buildings and stacks year round. During the winter months, the visibility of the Mesaba Generating Station and associated structures would increase due to the condensed water vapor and loss of leaves. During **damp weather**, **the effects of plant emissions may** cause the appearance of a **water vapor** haze **in the vicinity of** the plant site.

The surrounding area of the East Range Site would be most impacted by the plant's stack location by Hoyt Lakes. However, the Syl Laskin plant is also visible from the south side of Colby Lake, which decreases the visual sensitivity of the area. Compared to the West Range Site, more residents would be able to see the plant, but their view would be from slightly further away.

Lighting

The combined two-phased Mesaba Generating Station would be twice the size of Phase I, which would nearly double the amount of security lighting that may be visible to residents and travelers in the surrounding area. Other than the potential for increased illumination due to increased lighting structures, the aesthetic impacts from operation of both phases described in the following paragraphs would be essentially comparable to those for Phase I alone.

The tank boiler stack would reach 200 feet above ground level. Therefore, an FAA request for a determination of no hazard to aviation would be required. The other stack emission points would not be close enough to any public airport to be likely deemed an obstruction to air navigation. If required by the FAA to install obstruction lighting, such lighting would increase visibility of the structures during evening hours.

The Mesaba Generating Station would have security lighting in place. Plant lighting impacts would be more visible to Colby Ridge residents than to residents living nearby the West Range Site Mesaba Generating Station. Otherwise, the same concerns at the West Range Site would apply to the East Range Site. A lighting plan would be developed in coordination with the Hoyt Lakes City Council to develop a mutually acceptable power plant lighting plan that minimizes aesthetic impacts, including reduced lighting at night. The potential to impact views of the northern lights would also be considered as part of the lighting plan.

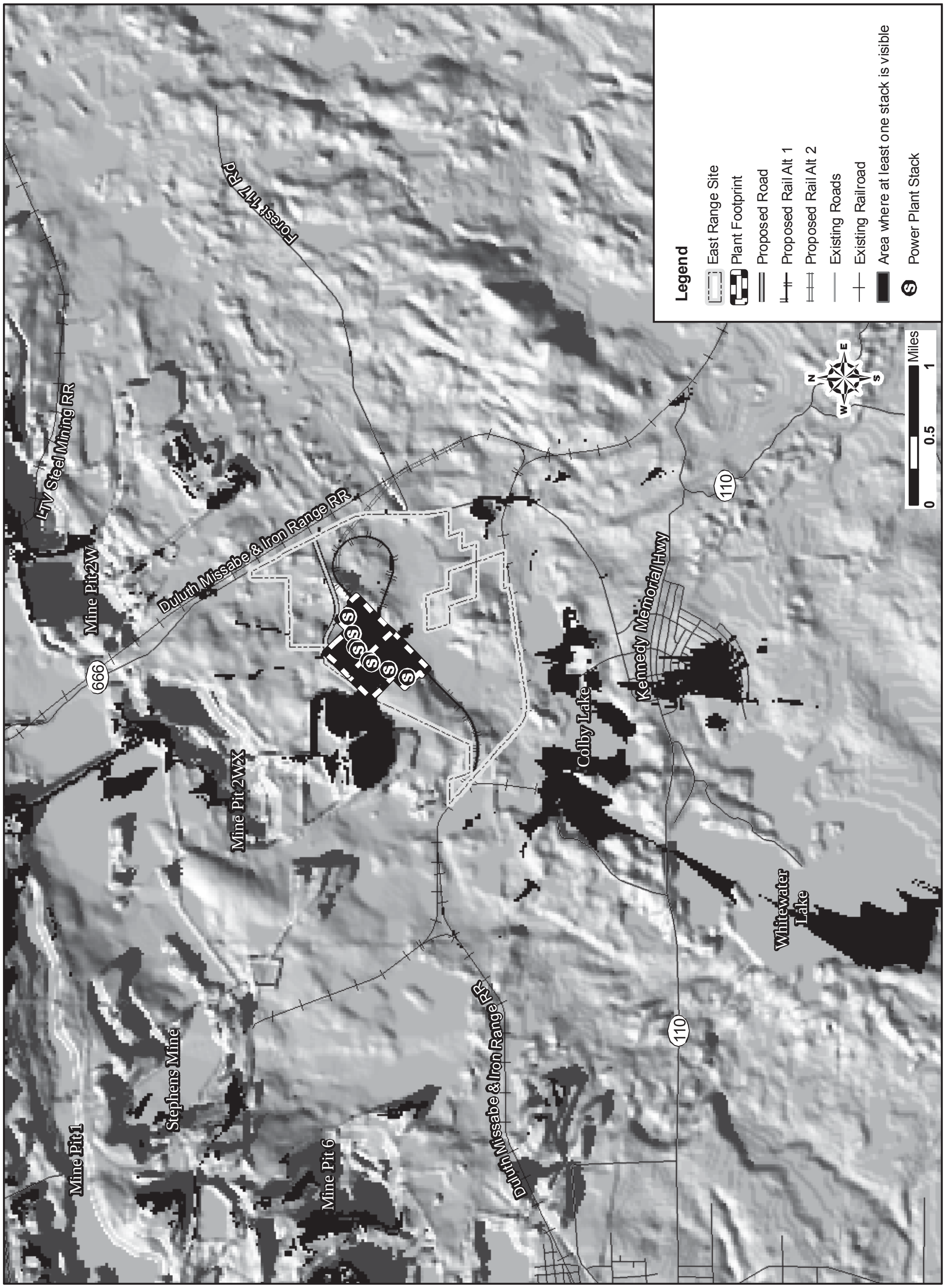

Figure 4.2-2. Predicted Locations where Mesaba Plant at East Range would be Visible

HVTL Corridors

Once completed for the Phase I plant, the HVTL structures required for both phases of the Mesaba Energy Project would be in place. Hence, the incremental aesthetic impacts from operation of the Phase II generating station would be negligible.

The 39L/37L HVTL Route would be located about 3,300 feet from Sky Harbor Airport, a seaplane base (Figure 3.2-9). The route would require an FAA determination on whether or not the HVTL structures and conductors pose an obstruction to aviation. Given its proximity to the Seaplane Base, it is likely that obstruction lighting would be required on portions of this HVTL. Adding lights to the towers would generate a moderate change in the area's visual resources and be noticeable over significant distances. The 39L/37L HVTL Route would also be located relatively close to the Eveleth-Virginia Municipal (EVM) Airport (Figure 3.2-9). The filing to the FAA would include a request for determination as to whether the structures on the segment of the 39L/37L HVTL Route near the EVM Airport would pose a hazard to air navigation and require special lighting.

The 38L HVTL Route would be located within 20,000 feet of the EVM Airport, which would require filing a lighting request to the FAA. If obstruction lighting were required, the aesthetic impact would be new and noticeable over significant distances. The impacts would be similar as for the 39L/37L HVTL Route.

Pipeline Corridors

Once completed for the Phase I plant, the pipelines required for both phases of the Mesaba Energy Project would be in place. Hence, the incremental aesthetic impacts from operation of the Phase II generating station would be negligible.

The natural gas pipeline corridor would be co-located primarily with existing natural gas lines and within an existing ROW. Subsequently, little or no aesthetic impacts associated with natural gas lines would be expected to occur.

The process water supply pipelines for the East Range Site would be located on **former** CE property and along disturbed mining areas. Because access to the property is restricted, it is unlikely that the water supply corridors would be visible.

Aesthetic impacts related to the use of the ZLD system would include increased truck traffic required to transport solids produced to a solid waste landfill. Storage would most likely occur at the demolition landfill located about 3.5 miles away (Gerlach, 2005). If storage is physically and economically feasible, impacts to the aesthetics would be low as traffic associated with transporting the solids would occur outside the general public's domain. Additional discussion of the impacts and mitigation measures related to transportation are discussed further in Section 5.3.

Outside of the East Range Site, the potable water and sewer pipelines would follow along existing utility corridors. The area along the utility corridors is already disturbed and operation of the pipelines would generate no additional impact to the aesthetic resources.

Rail Alignments and Access Roads

Once the selected rail alignment and access road would be completed for Mesaba Energy Project Phase I, the principal aesthetic impacts from operations would be related to the number of trains servicing the plant and vehicles entering and leaving the plant, which would be essentially double for the combined two-phased generating station. Impacts from traffic and noise are addressed in Sections 4.15 and 4.18.

The existing rail alignment and proposed rail line alternatives would be located north of Colby Lake and shielded from local residential receptors and road traffic. No grade crossings occur in Hoyt Lakes and the nearest crossing occurs in Aurora in two places. Although there would be an increase in rail traffic, it would not be expected to impact visual resources in Hoyt Lakes.

Rail Line Alternatives 1 and 2 would share the initial rail spur west of the IGCC power plant. The closest residence to the spur would be located about 5,000 feet away. Although the rail loop and trains would be visible from CR 666, traffic along the road would be mostly limited to personnel going to work at the IGCC power plant. Therefore, aesthetic impacts related to visual changes related to the rail spur would be low.

Rail Line Alternative 2 would cross the Mesaba Generating Station and connect to the CN north-south track north of Wyman Junction. The rail line would cross CR 666 where it would be more visible to traffic traveling to the power plant and CE. The profile grades would also be more visible than Rail Line Alternative 1 and the total coal train aesthetic impacts would be spread over a longer distance. In addition, the longer distance would expose the coal cargo to more winds, increasing the potential for dust along CR 666. The permanent visual impacts would be moderate around the CR 666; however, it is likely this would be visible only to people employed within the area.

As explained in Section 2.3.2.2, following publication of the Draft EIS, Excelsior eliminated the proposed northernmost access road in favor of a single access road connecting the generating station with CR 666. The access road would have very low impacts on the aesthetic resources because it would be located at the northern end of CR 666 and shielded by forest. **The majority of people travelling on CR 666 nearby would be employees of the mining plant or of the generating station.**

4.2.5 Impacts of the No Action Alternative

For purposes of this EIS, as explained in Section 2.1.1.2, the DOE No Action Alternative is assumed to be equivalent to a "No Build" Alternative. Therefore, the power plant would not be built, and none of the impacts would occur. The existing HVTL corridors would not be updated, pipelines would not be built and the transportation corridors would remain unchanged. Because the site is zoned industrial, another facility could develop the site for industrial use purposes in the future.

4.2.6 Summary of Impacts

Basis for Impact	No Action	West Range	East Range
Block or degrade a scenic vista or viewshed.	No changes to scenic vistas or viewsheds.	Visual changes from power plant and HVTL structures.	Visual changes from power plant and HVTL structures.
Cause a change in area visual resources.	No changes to area visual resources.	Three public lands within 20 miles. **Combined 2-phased plant would be twice the size of Phase I only and have 8 emission stacks instead of 4. No substantial differences in corridors for 2-phased plant compared to Phase I only.**	**Within** Superior National Forest Land, and two other public lands within 20 miles. **Combined 2-phased plant would be twice the size of Phase I only and have 8 emission stacks instead of 4. No substantial differences in corridors for 2-phased plant compared to Phase I only.**
Create glare or illumination that would be obtrusive or incompatible with existing land uses.	No additional glare or light sources from area.	Security lighting around plant, aviation warning lights on tank boiler stack and some HVTL structures. **Combined 2-phased plant would have nearly twice the security lighting compared to Phase I only.**	Security lighting around plant, aviation warning lights on tank boiler stack and some HVTL structures. **Combined 2-phased plant would have nearly twice the security lighting compared to Phase I only.**

4.3 AIR QUALITY

This section describes the potential impacts that may occur to local and regional air quality from implementing the Proposed Action and No Action Alternative. Potential visibility impacts that could occur from increases in regional haze and localized vapor plumes are also discussed. Potential impacts related to human health due to changes in air quality are discussed in Section 4.17. **Text discussing greenhouse gases has been deleted from this section. Instead, discussion on the emissions of greenhouse gases, including carbon dioxide (CO_2), has been revised and is now provided in Section 2.2.3.1; cumulative impacts and climate change are discussed in Section 5.2.8.**

4.3.1 Approach to Impacts Analysis

Various state and Federal air quality standards and emissions limits have been established to minimize degradation of air quality as described in Section 3.3. The evaluation of potential impacts on air quality considered whether the Proposed Action or an alternative would cause any of the following conditions:

- Result in emissions of criteria pollutants and HAPs;
- Result in mercury (Hg) emissions and conflict with the regulations related to coal-fired electric utilities;
- Change in air quality related to the NAAQS and Minnesota Ambient Air Quality Standards (MAAQS);
- Result in consumption of PSD increments as defined by the CAA, Title I, PSD rule;
- Affect visibility and cause regional haze in Class I areas;
- Result in nitrogen and sulfur deposition in Class I areas;
- Conflict with local or regional air quality management plans;
- **Result in increased criteria pollutant emissions from the transport of materials and use of personally owned vehicles (POVs)**;
- Cause solar loss, fogging, icing, or salt deposition on nearby residents; and
- Discharge odors into the air.

Detailed air dispersion modeling was conducted as part of the application for a Part 70/New Source Review Construction Authorization Permit for the West Range Site to evaluate compliance with NAAQS and MAAQS, to conduct PSD increment analysis, and to review potential impacts to Class I areas. The permit application was submitted to the MPCA in June 2006 pursuant to the PSD regulations. The methods used for modeling are summarized below. The results of the modeling and potential impacts of the Mesaba Energy Project are used to represent an upper bound for assessing potential impacts, and are discussed in Section 4.3.2.5.

4.3.1.1 Changes to the Air Modeling Protocol

Since publication of the Draft EIS, several major changes have developed that resulted in a revised air modeling protocol, including: the promulgation and availability of a corrected and EPA-approved version of the CALPUFF modeling system; use of more recent meteorology data; an enhancement and/or update of the overall modeling parameters and project design information; incorporation of updated land use data across the entire modeling domain; use of a finer CALPUFF grid resolution of 1 kilometer to match the resolution of available land use data; and the development of a revised draft Federal Land Manager's Air Quality Related Values Working Group (FLAG) Phase I Report, which identifies significant changes to the manner in which future visibility assessments should be conducted.

On November 4, 2008, Excelsior submitted a revised modeling protocol ("Mesaba Energy Project, Mesaba One and Mesaba Two, Class I Area Modeling Protocol," October 2008; TRC et. al.,

2008) to the MPCA and FLMs for consideration in determining the project's potential impacts on air quality and Air Quality Related Values (AQRVs) at appropriate Class I areas of interest. By a letter dated December 1, 2008, the FLMs submitted their technical comments on the revised protocol and, after further discussions with regulatory personnel from the MPCA, EPA, and FLMs, Excelsior submitted on January 15, 2009 a supplemental protocol ("Mesaba Energy Project, Mesaba One and Mesaba Two, Class I Area Modeling Supplemental Protocol," January 2009; TRC et. al., 2009). The supplemental protocol detailed the proposed resolution of the FLMs' technical comments and provided, as necessary, documentation for the selection and use of appropriate modeling inputs and parameters for the final modeling analyses.

On March 5, 2009, the FLMs sent a letter (Bunyak, 2009) to the MPCA which summarized their review of the supplemental protocol and identified the model input and settings that they would accept for the Mesaba Energy Project modeling protocol and on which Excelsior based its modeling analyses, as presented in the Final EIS. Furthermore, as stated in the letter, the FLMs provided the option for Excelsior to submit additional modeling results as supplemental information, also included in the Final EIS. Follow-up correspondence from representatives of the FLMs confirmed their acceptance of the revised protocol on the condition that it met the requests made in their March 5, 2009 letter (Wickman, 2009 and Stacy, 2009). Discussions on the PSD increment impacts analysis and potential AQRVs impacts on Class I areas have been updated in this section to reflect the latest analyses, including additional analysis of East Range Site impacts and supplemental visibility analysis, based on the air modeling protocol identified above. The results on which such discussions are based are reported in "Mesaba Energy Project, Mesaba One and Mesaba Two, Class I Area Interim Modeling Protocol in Support of NEPA Review Process, April 2009" (TRC, 2009).

Subsequent to the discussions and agreements reached with the FLMs regarding supplemental modeling, EPA issued a memo on the use of CALMET/CALPUFF (see EPA memo in Appendix E). This memo states that use of a finer resolution is not adequately justified given the geographical characteristics of the domain of interest. The Forest Service considers this memo to be guidance in determining modeling parameters applicable to the Mesaba Energy Project (see July 31, 2009 letter from Forest Service in Appendix E). The results of a supplemental visibility analysis conducted by Excelsior are included in this EIS (see Section 4.3.1.4) since this supplemental modeling had been agreed to by the FLMs prior to the release of the EPA memo and since the supplemental modeling provides a better understanding of the effects of modeling parameters on predicted visibility impacts. However, DOE understands that the Forest Service now considers the results to be of "little value."

4.3.1.2 Air Permitting and the BACT Analysis

All compounds regulated under the CAA (i.e., regulated NSR pollutants) that are emitted by new major stationary sources in significant amounts would be subject to a BACT analysis in accordance with 40 CFR 51.166(j)(2). Based on the project's potential annual emissions as shown in Table 2.1-1, a BACT analysis was conducted for the criteria pollutants, except for lead.

For traditional pollutants such as nitrogen oxides (NO_x), sulfur dioxide (SO_2), particulate matter (PM) and mercury (Hg), an IGCC facility is inherently lower polluting than the current generation of traditional coal-fired power plants (EPA, 2006f). In its study of IGCC technology (EPA, 2006e), the EPA analyzed only methyldiethanolamine (MDEA) type acid gas cleaning systems and did not include selective catalytic reduction (SCR) equipment for the syngas turbines (i.e., to reduce NO_X in the CTGs). The EPA noted that the "reference" IGCC plant being engineered by GE Energy and Bechtel Corporation (GE's gasifier is only designed to accommodate bituminous coal) includes SCR, but indicated that it is difficult to compare the gasification technology development with low rank coals (i.e., subbituminous coal and lignite) to that of bituminous coal.

Although Excelsior's decisions regarding BACT for the IGCC process were made prior to the EPA's study of IGCC systems was published, the decisions were generally consistent with the EPA's analysis.

As described above in Section 4.3.1.1, Excelsior developed a new air modeling protocol since publication of the Draft EIS. Based on this protocol, a combination of emission controls that would be implemented for Phase I and Phase II of the Mesaba Energy Project were modeled, which were based on Excelsior's proposals to the MPCA regarding controls. The modeled scenarios include: the "proposed" level of emission controls (referred to by Excelsior as "BACT"); the "enhanced" level of emission controls (referred by Excelsior as "Beyond BACT"); and scenarios for short-term startup and shutdown conditions. The "proposed" rates reflect control of sulfur in product syngas via MDEA and control of nitrogen oxides via nitrogen dilution; the "enhanced" rates reflect control of sulfur in syngas via Selexol™ (a physical solvent) and control of nitrogen oxides via selective catalytic reduction.

MPCA is the state's permitting authority on the BACT determination process. Excelsior prepared a BACT analysis as part of the Mesaba Energy Project PSD permit application, which was submitted to MPCA on June 28, 2006. On October 19, 2007, the MPCA provided Excelsior a formal response disagreeing with Excelsior's BACT analysis. In response, Excelsior met with the MPCA and requested that the MPCA involve the EPA in reviewing the MPCA's analysis. On November 20, 2007, MPCA confirmed with Excelsior that the EPA had agreed to review MPCA's analysis and, on December 13, 2007, provided a package of relevant material to EPA as a basis for their input.

In correspondence since publication of the Draft EIS, MPCA stated in an August 12, 2008 letter to the Minnesota Department of Commerce that "We have since learned that the U.S. Environmental Protection Agency may disagree with our BACT analysis" and, therefore, has decided to address the BACT determination as part of the MPCA's permitting process. Furthermore, the MPCA agrees that the air permit for Phase I and Phase II of the Mesaba Energy Project must ensure the protection of Class I areas as required by 40 CFR 52.21(p). Currently, MPCA continues to review and analyze BACT and will make its final determination during the permitting process for the Mesaba Energy Project. Since the MPCA will make a final BACT determination based on subsequent negotiations between Excelsior and MPCA, DOE based the impacts analysis on the emission profiles proposed by Excelsior to the MPCA. Once MPCA makes a final BACT determination, the need for additional mitigation would be addressed by MPCA, in consultation with FLMs, through the PSD permitting process. DOE would also consider mitigation as a condition of the Record of Decision, pending progress in negotiations between Excelsior and MPCA regarding the BACT decision. If the final BACT determination by MPCA constitutes more stringent requirements than those on which the impact analysis in this Final EIS is based, then actual air quality impacts would be less than those presented in this Final EIS.

At the request of the Forest Service (see Forest Service letter dated July 31, 2009 in Appendix E), Table 4.3-1 – which summarizes BACT emission limits from operating and permitted IGCC plants – has been included for the Final EIS (proposed IGCC projects that have not been permitted or have been formally abandoned are not included in the table). The emission rates listed in the table were estimated based on permit documents and converted to units of pounds per million Btu (lbs/MMBtu) heat input to the gasifier and/or combustion turbine, for the purposes of general comparison.

Table 4.3-1. Permitted Emission Rates[1] for Existing and Permitted IGCC Plants

Facility	Status	Plant Output (MWnet)	Gasifier Fuel	SO_2		NO_x		PM_{10}		CO		VOC [5]
				BACT Limit [1] {lb/MMBtu gasifier} and/or [lb/MMBtu CT]	Acid Gas Removal Solvent	BACT Limit [1] {lb/MMBtu gasifier} and/or [lb/MMBtu CT]	Control Method	BACT Limit [1] {lb/MMBtu gasifier} and/or [lb/MMBtu CT]	Limit Basis[2]	BACT Limit [1] {lb/MMBtu gasifier} and/or [lb/MMBtu CT]	Control Method	BACT Limit [1] {lb/MMBtu gasifier} and/or [lb/MMBtu CT]
Tampa Electric PPS (FL)	In operation	250	petcoke/ bituminous	{0.163}	Clean Fuel	{0.101}	Nitrogen dilution	{0.008} [0.013]	F	{0.045}	GCP	[0.0017]
Wabash River (IN)	In operation	262	IL bituminous	{0.126}	MDEA	{0.087}	Steam injection	{0.005}[3]	See note (3)	{0.036}	GCP	{0.001} [0.0021]
Taylorville Energy Center (IL)	Final permit (to be amended for hybrid IGCC)	677	IL bituminous	[0.016]	Selexol	[0.034]	SCR	[0.022]	F/B	[0.049]	GCP	[0.006]
Lima Energy IGCC (OH)	Final permit (to be amended for hybrid IGCC)	541	petcoke/ coal	{0.017} [0.018]	Unspecified solvent-based absorption technology and minimum control efficiency of 99%	{0.067} [0.070]	Diluent (steam) injection into combustion zone	{0.008} [0.009]	F/B	{0.035} [0.037]	GCP	{0.007} [0.007]

Table 4.3-1. Permitted Emission Rates[1] for Existing and Permitted IGCC Plants

Facility	Status	Plant Output (MWnet)	Gasifier Fuel	SO_2		NO_x		PM_{10}		CO		VOC [5]
				BACT Limit [1] {lb/MMBtu gasifier} and/or [lb/MMBtu CT]	Acid Gas Removal Solvent	BACT Limit [1] {lb/MMBtu gasifier} and/or [lb/MMBtu CT]	Control Method	BACT Limit [1] {lb/MMBtu gasifier} and/or [lb/MMBtu CT]	Limit Basis[2]	BACT Limit [1] {lb/MMBtu gasifier} and/or [lb/MMBtu CT]	Control Method	BACT Limit [1] {lb/MMBtu gasifier} and/or [lb/MMBtu CT]
Cash Creek Generation Station (KY)	Final permit (to be amended for hybrid IGCC)	630	coal	[0.016]	Selexol	[0.033]	SCR	[0.022]	F/B	[0.049]	GCP	[0.006]
Edwardsport Generating Station (IN)	Final Permit	630	coal	[0.014]	Selexol	[0.08] [4]	Nitrogen dilution	[0.017]	F/B	{0.037} [0.046]	GCP	[0.002]
Mesaba Energy Project (MN)	Application	600	petcoke/ coal	{0.025} [0.035]	MDEA	{0.058} [0.074]	Nitrogen dilution	{0.01} [0.012]	F/B	{0.033} [0.045]	GCP	{0.003} [0.004]

(1) BACT limits based on lbs/MMBtu heat input to gasifier (values shown in "{ }") and/or heat input to combustion turbine (values shown in "[ ]")
(2) F = limit based on filterable (front half) PM testing; F/B = limit based on filterable (front half) and condensable (back half) PM testing.
(3) Emission limit not met, highest tested emissions reported at 0.012 lb/MMBtu. Based on filterable PM only.
(4) Although Duke Energy is installing SCR on its heat recovery steam generator, it is not necessary for the company to operate it to comply with the annual NO_X emissions limit (i.e., 2121.5 tons per year) specified in the air permit. Therefore, the NO_X emission rate from the facility is expected to be indicative of the SCR being out of service.
(5) Control methods for VOC are unspecified.
Acronyms: CT – combustion turbine; GCP – good combustion practices; MDEA - methyldiethanolamine; lbs/MMBtu – pounds per Million British thermal units; MWnet – net megawatt; SCR – selective catalytic reduction

Excelsior submitted similar information as shown in Table 4.3-1 to the MPCA and FLMs on January 12, 2007, in a response addressing the FLMs' concerns about BACT (Table 4.3-1, however, reflects more current information based on recent project/permitting status). On June 11, 2007, Excelsior submitted additional information to the MPCA and FLMs in support of its own emission rate decision-making. DOE recognizes that the MPCA would serve as the ultimate decision-maker regarding BACT determinations and expects that the MPCA would review the differences between individual innovative projects, such as those shown in Table 4.3-1, and traditional coal-fired power plants, such as those shown in Table 2.2-5. DOE is aware of the ongoing BACT negotiations between the MPCA and Excelsior and, as previously noted, understands that such decisions would be finalized during the permitting process.

4.3.1.3 Predictive (Near-Field) Modeling Approach

The latest available version of AERMOD (version 07026) – the EPA regulatory default model for near-field analysis – was utilized to assess air quality impacts from the Mesaba Generating Station. Model inputs and control parameter options were selected in accordance with the protocol established in *Guideline on Air Quality Models, Revised* and *User's Guide for the AMS/EPA Regulatory Model - AERMOD*, both EPA documents, as well as MPCA's guidance document *MPCA Air Dispersion Modeling Guidance for Title V Modeling Requirements and Federal Prevention of Significant Deterioration Requirements (Version 2.2)*. Dry or wet plume depletion was not utilized for any pollutant. A receptor grid was generated per MPCA guidance (provided in Appendix B). The model assumed a rural location because the terrain/land use within 3 kilometers (1.9 miles) of the sites are almost completely rural. The MPCA processed meteorological data suitable for input to AERMOD specifically for the West Range Site and East Range Site.

The air quality modeling addressed the individual point sources of the Mesaba Energy Project for both the Phase I-only and Phases I and II combined. Point sources included four CTG stacks, two TVB stacks, two auxiliary boilers, and two flare stacks, as well as all fugitive PM_{10} sources. The maximum expected point source criteria pollutant emission rates from each phase (and for different averaging times and operating scenarios) that were used as model input for the air modeling analyses are listed in Appendix B (Tables B.1-3 and B.1-4). In response to comments from the FLMs, Excelsior identified the worst-case emission scenarios that were possible in various operating scenarios, including flaring. To address emission rates and stack gas conditions for these worst-case, short-term scenarios, air modeling was also carried out for applicable averaging times (24 hours and less).

Other sources at the Mesaba IGCC Power Plant would consist of two emergency fire pumps and two emergency diesel generators per phase. Because these sources would operate for only short time periods – when the primary emission sources would not be in operation – these sources were not included in the air modeling analyses. Hours of operation for these other sources would likely be limited by permit conditions. The emissions from periodic testing of these emergency resources are considered negligible in comparison to the sources used in the analyses. Fugitive emissions of PM_{10} would result from the storage and handling of coal and other materials and have been modeled under normal operations.

The criteria air pollutants – SO_2, CO, NO_2, and PM_{10} – were modeled for each applicable averaging time and for the operating scenarios (i.e., normal operations and an alternative worst-case flaring scenario). Based on the modeling results, pollutants that would have significant ambient air impacts were determined and the significant impact area for each pollutant was identified. The significant impact area was defined for each pollutant as a circle, centered on the plant site, with a radius equal to the greatest distance to a significant impact for any applicable averaging time or emission scenario.

For criteria pollutants that were shown to have a significant impact in ambient air at any point, more refined modeling was carried out to evaluate compliance with PSD increments and NAAQS **or MAAQS, whichever was the more stringent standard**. **Table 4.3-2 lists the applicable significant impact levels (SILs), PSD increments for Class II regions, and the stricter NAAQS and MAAQS limit.**

Table 4.3-2. Applicable Air Quality Standards, Maximum Allowable PSD Class II Increments, and Significant Impact Levels

Pollutant	Averaging Time	NAAQS / MAAQS[1] (μg/m^3)	PSD Class II Increment (μg/m^3)	Significant Impact Level (μg/m^3)
SO_2	1-Hour	1,300	512	25
	3-Hour	915	512	25
	24-Hour	365	91	5
	Annual	60	20	1
NO_2	Annual	100	25	1
PM_{10}	24-Hour	150	30	5
	Annual	50	17	1
CO	1-Hour	40,000	NA	2,000
	8-Hour	10,000	NA	500

[1] Values in this column represent the more stringent NAAQS or MAAQS limit.

All point sources associated with Phase I and Phase II were included in the source input for PSD increment modeling. Additionally, **to account for distant and regional sources,** data on nearby major increment-consuming (or -expanding) sources were also included as source input**. This data was accumulated from MPCA and recent permit applications. For the Final EIS, a more refined regional source inventory, applicable to modeling for the Mesaba Generating Station at both the West Range and East Range sites, was developed and used in all PSD increment and NAAQS modeling analyses. For NAAQS modeling, total allowable emissions from significant nearby sources were included in the input file (see Appendix B for a list of regional sources and the modeled emissions).**

Regional source impacts were included (for worst-case modeled impact times and receptors) by modeling the First-Approximation Run Data emission inventory appropriate to the West Range Site and East Range Site, as provided by MPCA modeling staff. For comparison to the NAAQS, a background concentration representing natural background was added to all model-predicted concentrations.

4.3.1.4 Class I Area-Related (Far-Field) Modeling Approach

Air quality modeling analyses were conducted to estimate impacts of the Phase I and Phase II Mesaba Generating Station on air quality in Class I areas. Separate sets of Class I modeling analyses addressed PSD Class I increments (for SO_2, PM_{10}, and NO_x), the AQRVs of sulfur and nitrogen deposition, and visibility impairment (regional haze). The dispersion modeling analysis used standard EPA long-range transport modeling methodologies, and followed guidance as presented in EPA's Guideline on Air Quality Models, the IWAQM Phase 2 report, and the FLAG Phase I report. The analyses also incorporated suggestions and guidance received in pre-application meetings with the Forest Service and the National Park Service (Excelsior, 2006d), **and a series of ongoing conference calls and written correspondence as previously described in Section 4.3.1.1**. **The Class I analyses address impacts to the BWCAW, VNP, RLW, and IRNP (for East Range Site only). Of the two proposed sites, the East Range Site is located in closer proximity to Class I areas – the East Range Site is located within 100 kilometers of the BWCAW (40 kilometers) and the VNP (90 kilometers). The closest Class I area to the West**

Range Site is the BWCAW (100 kilometers). For a listing of distances to the closest Class I areas, see Table 3.3-4.

The CALPUFF air quality model was used for all Class I area analyses. CALPUFF is the approved EPA long-range transport model referenced in the *Guideline on Air Quality Models* and consists of the following three components:

- The CALMET model for processing of meteorological data;
- The CALPUFF model for the transport and dispersion calculations; and
- The CALPOST model for analysis and post-processing of model results.

A visibility/regional haze impact analysis was carried out for BWCAW and VNP **for both sites and for IRNP for the East Range Site (the West Range Site is more than 300 kilometers from the IRNP and visibility is not a designated AQRV for RLW)**. The recommended methodology for assessing visibility impacts according to the FLMs' FLAG guidance involves the use of CALPOST to process the data on concentrations of pollutants from the CALPUFF modeling of 24-hour emissions. In CALPOST, a daily value of light extinction is defined by the concentrations of each pollutant that can affect visibility, taking into account the efficiency of each particulate type in scattering light, and the relative humidity, which influences the size of sulfates and nitrates. The FLM has established threshold changes in light extinction (Δb_{ext}) as a percentage of natural background that are believed to represent potential adverse impacts on visibility. **Thus, the potential visibility impacts are expressed as changes in light extinction and the number of days resulting in a change greater than** 5 percent (a potentially detectable change) and 10 percent (a level that may represent an unacceptable degradation).

DOE understands that the FLMs have the authority to determine the appropriate methodology for determining visibility impacts and that Method 2 is the currently applicable method accepted by the FLMs. The FLAG 2000 Report established the default methodology (i.e., Method 2) for calculating the impact of an emission source on visibility at a Class I Area. In the FLAG 2000, the FLMs provided guidance on the threshold levels of light extinction change caused within a Class I area that may be considered significant or of concern. When using FLAG 2000 guidance background extinction values and a maximum hourly relative humidity factor of 95 percent, predicted impacts of greater than 5 percent maximum daily (i.e., 24-hour) change in light extinction may require additional consideration.

Since 2000, alternative methods to Method 2 have been developed and incorporated into the CALPUFF modeling system. In April 2006, a draft guidance was presented by the NPS staff at the specialty modeling conference in Denver, Colorado. The guidance suggested that for determining the potential for uniform haze visibility impacts of concern, the appropriate 24-hour extinction change modeled impact for comparison to the threshold value of concern (5 percent) should be based on Method 6 and the 98th percentile value (i.e., the 8th highest modeled value [H8H]) for any 1-year period. Additionally, the CALPOST program was recently updated to include the latest methods recommended by the Interagency Monitoring of Protected Visual Environments (IMPROVE) Steering Committee on calculating light extinction.

After considering developments and enhancements as described above, the FLMs have developed revisions to the FLAG 2000 guidance and these were proposed in the Federal Register on July 8, 2008 (73 FR 39039). Although the new proposed guidance, FLAG 2008 (referred to as Method 8), has not yet been finalized, in correspondence regarding the supplemental protocol (as discussed in Section 4.3.1.1) the FLMs indicated that supplemental visibility calculations for the Mesaba Energy Project could be submitted using Method 8. Under Method 8, a proposed source with a modeled 98th percentile daily change in light extinction of less than 5 percent (when using monthly, particle-size-dependent relative humidity factors and a more refined natural background provided in the FLAG 2008 methodology [FLAG, 2008]) is considered to have insignificant impacts

and are of limited concern. Predicted maximum daily impacts greater than 5 percent change in light extinction relative to the annual average background may require additional consideration. The visibility modeling presented in this section includes findings from both Method 2 and Method 8.

Class I Areas Modeling Domain

As previously discussed, the FLMs provided technical comments on the revised modeling protocol (TRC et. al., 2008) and, after further consultation, the FLMs identified the model settings that they would accept for the Mesaba Energy Project (Bunyak, 2009) . The letter also noted that Excelsior could submit supplemental model runs. The FLMs recommended that the air quality impact analysis be performed using 2 years of 36-kilometer MM5 data, which are included in Section 4.3.1.2, and a CALMET grid resolution of 4 kilometers in addition to another 1 or 2 years of 12-kilometer MM5 data and a CALMET grid resolution of 1 kilometer. Because 2002 was the only year for which 12-kilometer MM5 data was available in the public domain, the higher-resolution modeling was performed for that year. For 2003 and 2004, only 36-kilometer MM5 data was available, so the 4-kilometer CALMET grid resolution was used for those 2 years.

Supplemental modeling was conducted for 2002 at 4-kilometer resolution and for 2003 and 2004 at 1-kilometer resolution. Due to the much larger domain required for multi-source modeling and the increased computational time that would be incurred, the 4-kilometer grid resolution was used for multi-source modeling for all 3 years. Details on the model settings and input parameters used for the CALMET and CALPUFF modeling and supplemental modeling results are provided in Appendix B (Table B.2-1) and are summarized later in this section.

After acceptance of the latest modeling protocol from the FLMs, the Forest Service submitted a letter to DOE (dated July 31, 2009; see Appendix E) that referenced a memo issued by the EPA Model Clearinghouse in May 2009 (EPA, 2009b; see Appendix E). This memo provides EPA's comments on an air modeling protocol for an electric generating unit in eastern South Dakota and indicates EPA's concurrence with Region 8's position on the proposed grid resolution (EPA, 2009c). The memo states that use of a finer resolution in CALMET/CALPUFF (i.e., 1-kilometer grid resolution) is not adequately justified given the geographical characteristics of the domain of interest (i.e., South Dakota and Minnesota). The results of the supplemental visibility analysis are included in this EIS since this supplemental modeling had been agreed to by the FLMs prior to the release of the EPA memo and since the supplemental modeling provides a better understanding of the effects of modeling parameters on predicted visibility impacts. However, DOE understands that the Forest Service now considers the results to be of "little value" (see Appendix E).

Modeled Emission Rates and Scenarios

In response to comments on the Draft EIS, a range of emission rates and scenarios for Phases I and II were modeled, as discussed in Section 4.3.1.2. The scenarios include: the "proposed" level of emission controls; an "enhanced" level of emission controls; and reasonably worst-case sensitivity scenarios for short-term startup and shutdown conditions. The "proposed" rates reflect control of sulfur in product syngas via an amine-based solvent –MDEA – and control of nitrogen oxides via nitrogen dilution; the "enhanced" rates reflect control of sulfur in syngas via Selexol™ (a physical solvent) and control of nitrogen oxides via selective catalytic reduction. The pollutant emission rates used represent the maximum expected emissions and the appropriate averaging times from the Mesaba IGCC Power Station for each phase and are used for all CALPUFF modeling (see Appendix B, Tables B.2-2 to B.2-4, for modeling parameters used). For the AQRV modeling analyses, PM speciation was calculated using FLM guidance for gas-fired combustion turbines. In some cases, modeled scenarios for the East Range Site included Phase I at one level of emission controls and Phase II at a different level of emission controls.

Cumulative modeling was also conducted for the purpose of determining the amounts of Class I increment consumption for the pollutants, averaging periods, and Class I areas for which the Phase I and Phase II impacts were predicted to exceed the applicable SIL. For the Final EIS, a more comprehensive emission inventory of increment-consuming and -expanding sources within 300 kilometers of the applicable Class I areas was developed and is presented in Appendix B (Table B.2-5). The inventory is based on data supplied by the MPCA, the Wisconsin Department of Natural Resources, the Michigan Department of Environmental Quality, accumulated data from recent air permit applications for other facilities in the region, and data from actual air permits. The discussion on the updated cumulative air quality impacts is presented in Section 5.2.2 and Appendix D1.

4.3.2 Impacts of the Proposed Action

Common air quality impacts associated with the Mesaba Energy Project are from emissions from construction of the Mesaba Generating Station and associated facilities, operation of the Mesaba Generating Station, vehicle traffic, and cooling towers. In addition, **feedstock and slag** delivery **and slag transport to and from the power plant by** trains **and trucks** would **result in emissions** of criteria pollutants **at both the West Range and the East Range Sites (new text in Section 4.3.2.2 on vehicle emissions has been added for the Final EIS)**. However, these emissions are not expected to change air quality appreciably, because the emissions would be reduced by minimizing points of transfer of the material, enclosing conveyors and loading areas, and installing control devices such as baghouses and wetting systems. Trains would be advanced hydraulically to minimize exhaust emissions. These common impacts are discussed in more detail in the following sections. **Potential impacts from the emissions of criteria pollutants from individual point sources are also considered common impacts shared by both the West Range and East Range Sites; however, the extent and implications would differ as modeling input parameters, such as existing background concentrations, proximity to Class I areas, and levels of control, would not be the same for each site.**

4.3.2.1 Construction Emissions

During construction, air quality impacts could occur as a result of NO_X, VOCs, CO, and SO_2, and fugitive dust emissions from material handling and storage, site grading and movement of soil, and emissions from combustion of fuels in construction equipment and vehicles. Construction vehicles would include trucks, dozers, excavators, backhoes, loaders, cranes, forklifts, and other equipment. Power equipment would also be used including pumps, generators, and light towers. Internal combustion engines would be used for activities such as excavation, concrete placement, and structural steel installation. Construction vehicles and machinery would be equipped with standard pollution-control devices to minimize emissions. These emissions would be very small compared to regulatory thresholds typically used to determine whether further air quality impact analysis is necessary [such as 40 CFR Part 93.153(b)]. Air toxic emissions from construction activities would be associated primarily with VOC emissions from diesel equipment. Given the size of the West and East Range properties, these emissions are not expected to result in ambient concentrations of air toxics that would exceed any reference concentration associated with acute or chronic effects.

Potential impacts would be temporary in nature and would be minimized through use of BMPs such as wetting the soil surfaces, covering trucks and stored materials with tarp to reduce windborne dust, and using of properly maintained equipment. Given the size of the West and East Range properties, construction dust would be localized (Excelsior, 2006b).

4.3.2.2 Transportation-Related Emissions

Emissions from Personally Owned Vehicles (POVs)

During construction and operation of the Mesaba Generating Station and its associated facilities, emissions would be generated from vehicles, as by-products of combustion from vehicle engines and fugitive dust generated from traffic on the roadways near and on the power plant footprint and buffer land. During peak construction activities, when Phase I and Phase II overlap, on-site personnel are expected to reach about 1,500 persons. Based on similar analyses conducted in the past, it can be assumed that there would be a 20 percent reduction in vehicle trips from carpooling, peak vehicle trips during this time are estimated to be about 1,200 trips per day of POVs, and 20 to 30 delivery vehicles per day. During operation of Phases I and II, employees, on-site contractors, and visitors are expected to total between 107 and 182 persons (Excelsior, 2006b).

When compared with emissions from the facility, vehicular emissions are small (Excelsior, 2006b). Table 4.3-3 **(new table for the Final EIS)** shows estimated peak daily emission rates from personal vehicles during peak construction activities. The estimated emission rate of carbon monoxide, the pollutant emitted at the greatest rate, is 11 pounds per day.

Table 4.3-3. Daily Emission Rates from Vehicle Traffic – Peak Construction

Pollutant	Emission Factor[1] gram/mile	Number of Vehicle Trips/day	Distance Per Trip mile/trip	Emission Rate[3] lb/day
NO_X	0.3	1,200	1	0.8
CO	4.2	1,200	1	11
NMOC[2]	0.18	1,200	1	0.48
PM	0.06	1,200	1	0.2

Note, this is a new table for the Final EIS.
[1]Emission Factors taken from EPA Green Vehicle Guide using EPA's assumed average engine performance (http://www.epa.gov/greenvehicles/rating.htm).
[2] NMOC = non-methane organic compounds, which is equivalent to volatile organic compounds.
[3] Emission rates are for peak construction activities when Phase I and Phase II construction overlap.

Roadways and parking lots where emissions from mobile sources would occur are referred to as indirect sources. According to Minnesota Department of Transportation *Highway Project Development Process Handbook* (Mn/DOT, 2006a), a detailed air quality analysis is required if anticipated traffic volumes exceed a threshold of traffic volumes at the top 10 intersections in Minnesota. If the project has better conditions and does not meet the levels at one of these intersections, then it is presumed it would not cause any violations. The smallest traffic volume of the top ten intersections is 35,800 AADT (Mn/DOT, 2006b). As previously stated, peak traffic counts associated with the construction and operation of Mesaba Generating Station would be a small fraction of the AADT threshold; therefore, the impact from the indirect mobile sources associated with the Mesaba Energy Project is likely to be negligible.

Emissions from Trains and Trucks

Train traffic emissions associated with the Mesaba Energy Project would predominantly result from the delivery of feedstock during operations (see Table 4.3-4, a new table for Final EIS). These emissions represent the combined Phases I and II emissions and are calculated based on the worst-case scenarios of the maximum annual tonnage of feedstock delivery (i.e., partial slurry quench on 100 percent subbitumimous coal) from the farthest distance source from the Mesaba Generating Station (i.e., Powder River Basin) as described in Table 2.1-1. Phase I-only emissions would be halved in comparison of the values presented in Table 4.3-4.

For the West Range Site, a mileage of 1,073 miles is estimated based on an origin of Gillette, WY and the destination of Canisteo, MN (BNSF, 2008). It is expected that coal delivered to the East Range Site would be trans-loaded to CN rail in Superior, WI; therefore, the distance of 1,201 miles is estimated from the East Range Site based on an origin of Gillette, WY and the destination of Superior, WI, plus an estimated 90 miles of rail shipment from Superior, WI to Hoyt Lakes, MN (BNSF, 2009). Train fuel efficiency used to calculate the emissions from the trains reflects the

BNSF's average fuel required to move freight, accounting for the movement of both loaded and empty trains (STB, 2008).

While sulfur produced by Mesaba Phases I and II would be transported by rail, the quantity and distances associated with sulfur transport would be negligible compared to those of the worst-case feedstock delivery, because the use of 100 percent subbituminous coal would correspond to the lowest sulfur production. Additionally, although slag produced by the Mesaba Generating Station would be transported by rail, slag transport by truck is determined to be the worst-case scenario for truck emissions.

Table 4.3-4. Emissions from Trains
Phases I and II of the Mesaba Energy Project (tpy)

	CO_2[1]	SO_2[2]	NO_X[3]	PM[3]	CO[3]
West Range	150,000	1.5	2,300	80	410
East Range	170,000	1.7	2,600	90	460

Note, this is a new table for the Final EIS.
[1]Based on EPA emissions factor of 22.2 pounds CO_2 per gallon of diesel fuel. See http://www.epa.gov/otaq/climate/420f05001.htm.
[2]Based on 15 ppmw ultra low sulfur diesel, fuel weight of 7.3 lb/gal, and 2 lb SO_2 emitted per lb S in fuel.
[3]Based on EPA estimated emission rates for locomotives in 2013. See Table 9 of EPA420-F-97-051. Available at http://www.epa.gov/oms/regs/nonroad/locomotv/frm/42097051.pdf. Note that EPA finalized more stringent standards in 2008 that require emission reductions of 80% for NO_X and 90% for PM for model years 2015 and later (i.e., Tier IV standards), so train emissions over the project's lifetime are likely to be much lower than estimated here.

The truck emissions from the Mesaba Generating Station, as presented in Table 4.3-5 (new table for the Final EIS), would predominantly be as a result of transporting slag and ZLD salt at the greatest distance of truck transportation. Although Phase I-only emissions are not shown in the table, it should be noted that emissions for Phase I would generally be halved in comparison to the levels that would occur during the combined phase. It is assumed that slag and ZLD salts are hauled using 25-ton capacity trucks. The worst-case (i.e., most distant) disposal site for ZLD salts would be the landfill in Canyon, MN, which is 70 miles from the West Range Site and 60 miles from the East Range Site. The distance that slag could be transported to market would be limited by economics. Taking the above into consideration, a one-way distance of 100 miles is a conservative estimate for truck transport of slag and ZLD salts. Actual distances and emissions are likely to be much lower.

Table 4.3-5. Emissions from Trucks
Phases I and II of the Mesaba Energy Project (tpy)

	CO_2[1]	SO_2[2]	NO_X[3]	PM[3]	CO[3]
West Range	7,700	0.1	60	0.8	7
East Range	8,100	0.1	61	0.8	7

Note, this is a new table for the Final EIS.
[1]Based on EPA emissions factor of 22.2 pounds CO_2 per gallon of diesel fuel. See http://www.epa.gov/otaq/climate/420f05001.htm.
[2] Based on 15 ppmw ultra low sulfur diesel, fuel weight of 7.3 lb/gal, and 2 lb SO_2 emitted per lb S in fuel.
[3] Based on DOT estimated emission rates for rural freeway combination diesel trucks in 2010. See Table B-5 of http://www.fhwa.dot.gov/environment/freightaq/appendixb.htm.

Slag production at the Mesaba Generating Station would depend on the amount of feedstock used and would range from 1,000 to 1,600 tons per day. Total ZLD salt production would depend on the water quality of the water source, which is lower at the East Range Site. There are 9,000

tons per year of ZLD salt expected to be produced at the West Range Site and 29,000 tons per year from the East Range Site.

Except for NO_X, emissions from the trains and trucks would be much smaller than those from operation of the proposed plant; therefore, impacts would be considered negligible. Although quantity of NO_X emission rates would be comparable to those from proposed plant operations, the impacts from the train and truck emissions would be far less than those of the power plant, because the trains and trucks are mobile. Unlike a stationary source in which the emissions are localized, the emissions from trains and trucks would be dispersed over a large area and distance; thus, depending on the speed of the train or truck, wind and other meteorological factors, localized impacts would be negligible for Phase I-only and the combined phase. Additional measures would be used during material handling to reduce the fugitive dust emissions that would include minimizing points of transfer of the material, enclosing conveyors and loading areas, and installing control devices such as baghouses and wetting systems. Trains would be advanced hydraulically to minimize exhaust emissions.

4.3.2.3 Cooling Towers Emissions

The evaporative cooling towers at the Mesaba Generating Station would discharge warm saturated air and small quantities of liquid water droplets to the atmosphere. The wet plumes would be emitted vertically from 33-foot diameter fan stacks at an elevation of 48 feet above grade. Due to the buoyancy of the warm moist air and the vertical velocity imparted by the fans, the wet plumes would rise to significant heights above the ground. The potential environmental impacts of cooling tower emissions may include fogging or icing at nearby locations, deposition of water droplets or snow crystals and solids from the circulating water, and visible condensed water plumes.

The most obvious impact of the Mesaba Generating Station cooling towers would be visible, condensed water plumes, which would occur during periods of low air temperature and light winds. The plumes, which would be similar to small natural cumulus clouds, can rise to heights of several thousand feet above the ground in extremely cold weather, and can persist for several miles downwind. Liquid water droplets emitted by cooling towers (referred to as "drift") constitute a very small fraction of the total emitted water. Drift droplets represent circulating cooling water from the tower and contain dissolved solids (such as particulate matter) from the circulating water. Deposition of drift solids has been identified as a potential cooling tower impact where towers use saline water or water with high solids content. Particulate matter emissions from the Mesaba Generating Station on the West Range Site would be lower than on the East Range Site because of the high concentration of total dissolved solids found in pit waters near the East Range Site. **Due to the implementation of the ZLD system at the West Range Site, the cycles of concentration at which the cooling towers would likely increase to 10 COCs. Thus, at 10 COCs, the PM emissions due to drift would increase from 39 tons per year to 78 tons per year at the West Range Site**. **At the East Range Site, the PM emissions from drift would be 256 tons per year.** Deposition of these particles on surrounding ground surfaces would be negligible. Since the steam plumes consist almost entirely of condensed water, they would have no adverse effects other than their visual impact.

Experience with large cooling towers at power plants similar to the Mesaba Generating Station has shown that fogging and icing impacts of mechanical draft towers in cold climates are minimal. Extensive research occurred during the 1970s, when many large cooling tower installations were constructed or proposed at power generating facilities. These studies led to development of mathematical models for predicting cooling tower effects and collecting field observations at operating towers. In general, the models concluded that environmental impacts are negligible except within 500 to 1000 feet of the towers and the boundaries of the facilities. Due to the buoyancy of cooling tower emissions, they rise to heights above ground level and dissipate in the ambient air as they are transported by prevailing winds (Excelsior, 2006b).

Relevant experience with cooling towers in Minnesota is available from Xcel Energy's Sherburne County Generating Station near Becker, Minnesota. Detailed studies were carried out at the Sherburne County Generating Station because the plant is located in close proximity to Interstate Highway 94 and Minnesota Highway 10. Modeling analyses conducted during permitting of Sherburne County Generating Station Unit 3 predicted no significant impacts on nearby highways. Subsequent experience has shown that effects of the Sherburne County Generating Station cooling towers have been limited to isolated observation of very light snow on a few occasions per year, but no significant fog or other impacts have been observed. The Sherburne County Generating Station cooling tower facility is approximately twice as large as the proposed Mesaba Generating Station cooling towers in terms of total heat dissipation to the atmosphere. Therefore, despite the somewhat colder climate in northern Minnesota, there is no reason to anticipate off-site fog or icing impacts from the Mesaba Generating Station cooling towers.

There are no major highways, airports, or other sensitive facilities in close proximity to either the West Range Site or the East Range Site. CR 7 **and CR 666 are the closest roadways to the proposed facility for the West Range Site and East Range Site, respectively.** Given data and experience at other cooling tower installations, it is concluded that there would be no significant fogging, icing, or drift deposition impacts of the Mesaba Generating Station cooling towers on off-site human activities or the environment. The only predicted impacts are the visual impact of steam plumes in cold, moist weather conditions, and occasional, very light, localized fallout of snow crystals during times of very low temperature. Deposition of these particles on surrounding ground surfaces would be negligible.

4.3.2.4 Hazardous Air Pollutants

Table 4.3-6 (updated for the Final EIS) shows that the potential to emit individual HAPs from the Phase I only and Phase I and II combined Mesaba Generating Station would be below the 10-ton per year major source threshold. Additionally, at 12.0 and 24.1 tons per year of combined HAPs for Phase I and combined Phases I and II, respectively, the Mesaba Generating Station would be below the 25-ton per year major source thresholds for HAPs. Therefore, Phases I and II of the Mesaba Energy Project are not major sources of HAPs as defined under the NESHAP. **Note that based on agency comments on the Draft EIS, an updated AERA analysis was performed that generally provides a more conservative level of analysis and is presented in Section 4.17. However, the general conclusions regarding impacts, as stated in the Draft EIS, remain unchanged. Updated findings on the potential impacts to health risk are discussed in Section 4.17 and Appendix C.**

Table 4.3-6. Annual Hazardous Air Pollutant Emissions (Phase I and Phases I & II)

CAS No. or MPCA No.	Compound	Annual Average HAP Emission (TPY)				Total Phase I	Phase I & Phase II
		CTGs	TVB	Flare	Fugitive		
75-07-0	Acetaldehyde	4.41E-02	1.58E-04	3.94E-04		4.47E-02	8.93E-02
98-86-2	Acetophenone	2.21E-02	7.92E-05	1.98E-04		2.24E-02	4.48E-02
107-02-8	Acrolein	4.28E-01	1.53E-03	3.83E-03		4.34E-01	8.67E-01
7440-36-0	Antimony	2.73E-02	2.77E-04	6.93E-04		2.83E-02	5.66E-02
7440-38-2	Arsenic	5.91E-02	1.48E-03	3.70E-03		6.42E-02	1.28E-01
71-43-2	Benzene	6.12E-02	2.83E-02	7.08E-02	6.25E-03	1.66E-01	3.33E-01
100-44-7	Benzyl chloride	1.03E+00	3.70E-03	9.24E-03		1.05E+00	2.09E+00
7440-41-7	Beryllium	6.31E-03	7.88E-06	1.97E-05		6.33E-03	1.27E-02
92-52-4	Biphenyl	2.51E-03	8.97E-06	2.24E-05		2.54E-03	5.08E-03

Table 4.3-6. Annual Hazardous Air Pollutant Emissions (Phase I and Phases I & II)

CAS No. or MPCA No.	Compound	Annual Average HAP Emission (TPY)				Total Phase I	Phase I & Phase II
		CTGs	TVB	Flare	Fugitive		
117-81-7	Bis(2-ethylhexyl)phthalate (DEHP)	1.08E-01	**3.85E-04**	9.64E-04		1.09E-01	2.18E-01
75-25-2	Bromoform	**5.76E-02**	2.01E-04	**5.04E-04**		**5.83E-02**	**1.17E-01**
7440-43-9	Cadmium	2.34E-01	5.67E-05	1.42E-04		2.35E-01	4.69E-01
75-15-0	Carbon disulfide	1.13E+00	4.03E-03	1.01E-02	3.35E-02	1.17E+00	2.35E+00
463581	Carbonyl sulfide				5.83E-02	5.83E-02	1.17E-01
532-27-4	Chloroacetophenone, 2-	1.03E-02	3.68E-05	9.20E-05		1.05E-02	2.09E-02
108-90-7	Chlorobenzene	**3.25E-02**	1.14E-04	**2.85E-04**		**3.29E-02**	6.58E-02
67-66-3	Chloroform	**8.71E-02**	**3.15E-04**	7.88E-04		8.82E-02	**1.76E-01**
0-00-5	Chromium, total	1.27E-02	1.05E-03	2.62E-03		1.64E-02	3.28E-02
18540-29-9	Chromium, (hexavalent)	3.82E-03	3.14E-04	7.86E-04		4.92E-03	9.85E-03
7440-48-4	Cobalt	6.37E-03	1.20E-03	2.99E-03		1.06E-02	2.11E-02
98-82-8	Cumene	7.82E-03	2.63E-05	6.57E-05		7.92E-03	1.58E-02
57-12-5	Cyanide (Cyanide ion, Inorganic cyanides, Isocyanide)	**1.48E-01**	**3.88E-03**	**9.70E-03**	8.80E-03	**1.70E-01**	**3.41E-01**
77-78-1	Dimethyl sulfate	7.09E-02	2.53E-04	6.33E-04		7.18E-02	1.44E-01
121-14-2	Dinitrotoluene, 2,4-	4.13E-04	1.49E-06	3.72E-06		4.19E-04	**8.37E-04**
100-41-4	Ethyl benzene	1.39E-01	**2.53E-02**	**6.33E-02**	**9.24E-04**	**2.28E-01**	4.57E-01
75-00-3	Ethyl chloride (Chloroethane)	6.20E-02	2.19E-04	**5.48E-04**		**6.28E-02**	**1.26E-01**
106-93-4	Ethylene dibromide (Dibromoethane)	1.77E-03	6.31E-06	1.58E-05		1.79E-03	3.59E-03
107-06-2	Ethylene dichloride (1,2-Dichloroethane)	5.91E-02	2.10E-04	5.26E-04		5.98E-02	1.20E-01
50-00-0	Formaldehyde	4.17E-01	1.49E-03	3.72E-03	**1.14E-06**	4.22E-01	8.44E-01
110-54-3	Hexane	9.89E-02	3.50E-04	8.76E-04	1.49E-03	1.02E-01	2.03E-01
7647-01-0	Hydrochloric acid	9.56E-02	3.01E-04	**7.51E-04**	3.36E-02	1.30E-01	2.60E-01
7664-39-3	Hydrogen fluoride (Hydrofluoric acid)	1.23E+00	5.26E-05	1.31E-04		1.23E+00	2.45E+00
78-59-1	Isophorone	8.56E-01	3.06E-03	7.64E-03		8.67E-01	1.73E+00

Table 4.3-6. Annual Hazardous Air Pollutant Emissions (Phase I and Phases I & II)

CAS No. or MPCA No.	Compound	Annual Average HAP Emission (TPY)				Total Phase I	Phase I & Phase II
		CTGs	TVB	Flare	Fugitive		
7439-92-1	Lead	1.37E-02	6.34E-05	1.59E-04		1.39E-02	2.78E-02
7439-96-5	Manganese	2.55E-02	2.38E-03	5.94E-03		3.38E-02	6.76E-02
7439-97-6	Mercury	1.23E-02	**6.55E-04**	1.64E-04		1.31E-02	**2.61E-02**
74-83-9	Methyl bromide (Bromomethane)	1.23E+00	1.15E-02	2.88E-02		1.27E+00	2.54E+00
74-87-3	Methyl chloride (Chloromethane)	7.82E-01	**6.65E-03**	**1.66E-02**		8.06E-01	1.61E+00
71-55-6	Methyl chloroform (1,1,1 – Trichloroethane)	2.95E-02	**1.05E-04**	2.63E-04		2.99E-02	5.98E-02
78-93-3	Methyl ethyl ketone (2-Butanone)	5.76E-01	2.06E-03	**5.15E-03**		5.83E-01	1.17E+00
60-34-4	Methyl hydrazine	2.51E-01	8.97E-04	2.24E-03		2.54E-01	5.08E-01
80-62-6	Methyl methacrylate	**2.95E-02**	**1.05E-04**	2.63E-04		2.99E-02	5.98E-02
1634-04-4	Methyl tert butyl ether	**5.17E-02**	1.84E-04	4.60E-04		5.23E-02	1.05E-01
75-09-2	Methylene chloride (Dichloromethane)	5.65E-02	5.56E-04	1.39E-03		5.84E-02	1.17E-01
91-20-3	Naphthalene	6.39E-02	**8.03E-04**	2.01E-03	2.58E-05	6.67E-02	1.33E-01
7440-02-0	Nickel	**9.67E-03**	4.20E-03	**1.05E-02**		2.44E-02	4.87E-02
108-95-2	Phenol	9.49E-01	1.18E-02	2.96E-02	**7.82E-08**	9.90E-01	1.98E+00
123-38-6	Proprionaldehyde	5.61E-01	2.01E-03	5.01E-03		5.68E-01	1.14E+00
7784-49-2	Selenium	1.37E-02	2.37E-04	5.93E-04		1.45E-02	2.90E-02
100-42-5	Styrene	3.69E-02	1.32E-04	3.31E-04		3.74E-02	7.47E-02
127-18-4	Tetrachloroethylene (Perchloroethylene)	6.35E-02	2.27E-04	5.67E-04		6.43E-02	1.29E-01
108-88-3	Toluene	8.09E-04	**1.52E-02**	**3.79E-02**	**7.37E-04**	**5.46E-02**	**1.09E-01**
108-05-4	Vinyl acetate	1.12E-02	4.03E-05	1.01E-04		1.14E-02	2.27E-02
1330-20-7	Xylenes	5.46E-02	1.26E-02	3.14E-02	**9.24E-04**	9.95E-02	1.99E-01

Table 4.3-6. Annual Hazardous Air Pollutant Emissions (Phase I and Phases I & II)

CAS No. or MPCA No.	Compound	Annual Average HAP Emission (TPY)				Total Phase I	Phase I & Phase II
		CTGs	TVB	Flare	Fugitive		
	Total Federal HAPs	1.14E+01	**1.50E-01**	3.75E-01	1.45E-01	1.20E+01	2.41E+01

Bold typeface denotes updated values for the Final EIS; values were updated to reflect MPCA's comments on Excelsior's Joint Application submitted to the Minnesota Public Utilities Commission regarding detection limits; Source: Excelsior, 2006d **and Excelsior, 2009b**

4.3.2.5 NAAQS/MAAQS, PSD Increment, and AQRVs Impact Analyses (West Range Site and East Range Site)

State and Federal air quality rules prohibit emissions from a new facility that cause or contribute to a conflict with MAAQS or NAAQS. In addition, emissions cannot exceed established PSD increments. As discussed in Section 4.3.1.1, to demonstrate compliance with these requirements, an air dispersion modeling analysis for the Mesaba Generating Station at the West Range Site **and East Range Site** was conducted **(to provide an improved comparable review between the two sites, new analysis was performed on the East Range Site for the Final EIS). For criteria pollutants that were shown to have a significant impact in ambient air at any point, more refined modeling was carried out to evaluate compliance with PSD increments and the stricter NAAQS or MAAQS (see Table 4.3-2). Additionally, for Class I areas, separate sets of Class I modeling analyses addressed PSD Class I increments for SO_2, PM_{10}, and NO_x and the AQRVs.**

Note that because the worst-case operating condition would occur when operating the combined Phases I and II (i.e., under any given circumstance, two identical units performing at the same operating level would emit twice the pollutant mass of one unit under the same circumstance), no separate ambient air quality modeling studies were conducted to verify compliance with ambient air quality standards and Class II PSD increments during the single phase. Therefore, by confirming compliance with the applicable standards during the combined phase under a given circumstance, it is understood that compliance would also be achieved for the Phase I-only operation. Although not modeled, under the given circumstance (i.e., two separate, identical units, operating under identical conditions with the single and combined phases located in close proximity to each other and no terrain obstacles affecting one unit more than another), it is expected that the Phase-I only impacts would be halved in comparison to the combined phase or, at the very least, fall within state and federal thresholds if the combined phase demonstrated compliance with applicable limits.

Potential criteria and non-criteria pollutant emissions are expected from the following Mesaba Generating Station sources: CTGs, TVBs, flares, fugitive emission leaks, material handling systems, auxiliary boilers, cooling towers, emergency generators, and emergency firewater pump engines (Excelsior, 2006b). Fugitive emissions of PM_{10} would result from the storage and handling of coal and other materials. As discussed in Section 4.3.1.1, air quality modeling addressed emissions from all of the sources, except the two emergency fire pumps and the two emergency diesel generators, which are considered to result in negligible air impacts. As demonstrated in Table 4.3-7 **(updated for the Final EIS)**, the Mesaba Energy Project has the potential to emit annually, one or more of the regulated criteria pollutants above the PSD significance threshold; therefore, it would be a significant source of air emissions.

Table 4.3-7. Annual Criteria Air Pollutant Emissions (Phase I Only and Phase I & II Combined)

Pollutant	PSD Significance Threshold (TPY)	Phase I Potential to Emit[1] (TPY)	Phase I & II Potential to Emit[1] (TPY)
CO	100	**1,270**	2,539
NO_X	40	**1,436**	2,872
SO_2	40	**695**	1,390
PM	25	**271[2]/360[3]**	**542[2]/719[3]**
PM_{10}	15	**266[2]/355[3]**	**532**[2]/709[3]
O_3 as VOC	40	**99**	197
Pb	0.6	**0.015**	0.030
Sulfuric Acid (H_2SO_4) (mist)	7	**65**	130
Hydrogen Sulfide (H_2S)	10	**9**	17

Table has been updated for the Final EIS (bold typeface denotes updated values)
[1] The potential to emit is the maximum capacity of a stationary source to emit any air pollutant under its physical and operational design (i.e., the worst-case scenario) and does not include any regulatory limitations. For the Mesaba Generating Station sources, the worst-case scenario assumes full load at 8760 hrs per year.
[2] West Range Site.
[3] East Range Site: Higher emissions because water quality at the East Range Site results in higher PM_{10} emissions from the cooling tower.
Source: Excelsior, 2006d

Because the Mesaba Generating Station could potentially emit more than 100 tpy of the criteria pollutants (except Pb), it would be a major source of air emissions under the PSD regulation. Ozone (O_3) emissions could not be modeled or analyzed because O_3 is not emitted directly from a combustion source. O_3 is formed from photochemical reactions involving emitted VOCs and NO_X, which take a long time to complete. Consequently, O_3 can travel far from the sources of its precursors and the contribution of an individual source to O_3 concentrations at any particular location cannot be readily quantified. Furthermore, compliance with O_3 standards is normally analyzed as part of a state or regional implementation plan. Emissions of Pb were not modeled because the potential Pb emissions from the proposed project were determined to be less than the PSD significant impact threshold. Impacts due to these emissions for both the West Range and East Range sites are examined in more detail in the following sections.

Predictive (Near-Field) Modeling Results

Significant Impact Analysis

Table 4.3-8 (updated for the Final EIS) shows modeled **Phases I and II combined** impacts at normal operation **and at the alternative short-term/flaring scenarios as described in Section 4.3.1.3 and in Appendix B (Section B.1.1). The maximum expected point source criteria pollutant emission rates from each phase of the Mesaba Energy Project for different averaging times and operating scenarios were used as model input for the air modeling analyses. In response to comments from the FLMs, Excelsior has identified the worst-case emission scenarios that are possible in various operating scenarios including flaring. The worst-case flaring scenario was very conservative, as it reflects the simultaneous startup of two gasification trains concurrent with a third train experiencing an upset/malfunction. To address emission rates and stack gas conditions for these worst-case short-term scenarios, air modeling was also carried out for applicable averaging times**

(24 hours and less) using the emission rates given in Appendix B (Tables B.1-3 through B.1-5), which represent worst-case maximum emissions for each scenario. Although Phase I-only emissions are not presented in the table, it should be noted that emissions for Phase I would be halved in comparison to the levels that would occur during the combined phase.

Table 4.3-8. Highest Project Impacts and PSD SILs for Phases I and II Combined

Pollutant	Averaging Time	West Range Site		East Range Site		SIL $\mu g/m^3$
		Normal Operation $\mu g/m^3$	Alternative Flaring $\mu g/m^3$	Normal Operation $\mu g/m^3$	Alternative Flaring $\mu g/m^3$	
SO_2	1-hour	**124.1**	**93.1**	**304.1**	**140.5**	25
	3-hour	**74.7**	**53.5**	**208.7**	**82.3**	25
	24-hour	**31.1**	**21.7**	**62.5**	**35.4**	5
	Annual	**4.01**	N/A	**3.70**	**N/A**	1
PM_{10}	24-hour	**28.2**	**28.2**	**32.6**	**28.2**	5
	Annual	**1.75**	N/A	**4.15**	**N/A**	1
CO	1-hour	**158.7**	**2,034**	**178.2**	**4,716**	2000
	8-hour	**60.1**	**260.4**	**116.9**	**634.7**	500
NO_X	Annual	**7.16**	N/A	**7.93**	**N/A**	1

Table has been updated for the Final EIS (bold typeface denotes updated/new values).

Results of AERMOD modeling of operations at the Mesaba Generating Station, Phases I and Phase II, produce the following conclusions:

- **During Phase I normal operation, impacts are above the applicable SILs for all pollutants and all averaging times, except for the annual PM_{10} and 1- and 8-hour CO at the West Range Site, and 1- and 8-hour CO at the East Range Site. During Phase II normal operation,** impacts are above the applicable SIL for all pollutants, and all averaging times, except for **the 1- and** 8-hour CO **at the West Range and East Range Sites**.
- Impacts are generally greatest under normal operating conditions, except for CO; highest CO impacts would occur during **the alternative scenario**.

Wherever modeled pollutant concentration increases exceed the SILs, further modeling is required under PSD rules to ensure that the Class II PSD increment for the area is not violated. Because the highest predicted impacts were significant, increment and NAAQS compliance modeling was necessary for SO_2, PM_{10}, and NO_X. This further evaluation included all sources within 50 kilometers (31 miles) of the project's area of impact. There are no applicable PSD increments for CO. The normal operation scenario was addressed in PSD increment and NAAQS analyses for SO_2, PM_{10}, and NO_X since they represent the highest concentrations. The **alternative flaring** scenario was addressed only for the CO NAAQS demonstration.

The farthest distance from the site where the SILs are exceeded determines the significant impact area. Based on the modeling results, the maximum radius of the significant impact area for each pollutant is **50** kilometers (**31** miles) for SO_2, **2** kilometers (1.**2** miles) for PM_{10}, 3.0 kilometers (1.9 miles) for NO_X, and 0.**8** kilometers (0.**5** miles) for CO. The highest predicted concentrations for any pollutant were found to occur within approximately 1 kilometer (0.6 miles) of **either site**. Thus, impacts of the Mesaba Generating Station would be limited to a small area in close proximity to the site.

PSD Increment Analysis (Near-Field) Modeling

Increment analyses were completed for SO_2, PM_{10}, and NO_X. The modeling included all Phase I and Phase II sources at maximum emission rates in normal operation plus all nearby increment consuming (and expanding) emissions sources. The results of the increment analyses are shown in Table 4.3-9 (updated for Final EIS), along with a comparison to the allowable Class II PSD increments. **Although the emissions for Phase-I only are not presented in the table, it should be noted that the emissions for Phase I would be halved in comparison to the levels that would occur during the combined phase.** The data in Table 4.3-9 demonstrate that the Mesaba Energy Project, in combination with all other nearby and regional PSD sources, would comply with all state and Federal Class II increment limits **for both Phases I-only and Phases I and II combined**. **Note that based on the revised modeling protocol, updated estimates for the West Range Site are presented in Table 4.3-9; additionally, new modeling has been conducted for the East Range Site and is included in the table.**

Table 4.3-9. Results of Class II PSD Increment Analysis for Phases I and II Combined

Pollutant	Averaging Time	Highest* Concentration ($\mu g/m^3$)		PSD Increment Limits ($\mu g/m^3$)
		West Range Site	**East Range Site**	
SO_2	1-hour	**118.2**	**294.3**	512
	3-hour	**71.2**	**200.4**	512
	24-hour	**21.0**	**52.5**	91
	Annual	**4.2**	**2.9**	20
PM_{10}	24-hour	**24.8**	**26.3**	30
	Annual	**1.7**	**0.7**	17
NO_2	Annual	**7.6**	**8.1**	25

*For short-term periods, the highest second-high concentration from 5 years of meteorological data is shown. For annual average, the highest concentration for any of the 5 years is listed. **Note that this table has been revised based on comments on the Draft EIS (bold typeface denotes updated/new values) – the analysis reflects modeling based on a revised modeling protocol (TRC et. al., 2008 and 2009). New modeling results for the East Range Site have been added to the table.**

Class II NAAQS Evaluation

The NAAQS modeling calculated the maximum impact of the Mesaba Generating Station and all other regional sources and compared the highest total impacts, plus background concentrations, to applicable MAAQS and NAAQS. Maximum emission rates in normal operation were modeled for all Mesaba Generating Station sources and pollutants, except in the case of CO for which the startup scenario had the maximum impacts. Excelsior did not quantify or model the $PM_{2.5}$ emissions from the proposed power plant. Research indicates that multipliers in the range of 0.06 to 0.11 can be used to infer or scale $PM_{2.5}$ concentrations from PM_{10} data (USEPA, 2005).

Tables 4.3-10 and 4.3-11 summarize results of the NAAQS model analysis and the $PM_{2.5}$ estimation, respectively. **Although Phase I-only emissions are not presented in these tables, it should be noted that the emissions for Phase I would be halved in comparison to the levels that would occur during the combined phase.** For SO_2, PM_{10}, and NO_X, Table 4.3-10 **(updated for the Final EIS)** shows maximum impacts of the Mesaba Energy Project plus local sources that were explicitly included in the 5-year model runs, all regional sources from FAR modeling of the highest impact days, and **the background values supplied by MPCA**. For CO, no inventory of regional emissions is available. Therefore, the data in Table 4.3-10 shows CO concentrations from the Mesaba Energy Project alone **(using the worst-case flaring scenario)** and conservative total concentration estimates obtained by adding an urban background concentration to predicted Mesaba Generating Station impacts.

Table 4.3-10. Results of Class II NAAQS Modeling for Phases I and II Combined

Pollutant	Averaging Time	Background (ug/m^3)	Total (1) at West Range (ug/m^3)	Total (1) at East Range (ug/m^3)	NAAQS / MAAQS (4) (ug/m^3)
SO_2	1-hour	10	**521.9**	**565.1**	1300
	3-hour	10	**237.6**	**360.4**	915
	24-hour	10	**73.3**	**166.5**	365
	Annual	2	**8.6**	**30.8**	60
PM_{10} (2)	24-hour	20	**126.1**	**112.2**	150
	Annual	10	**37.9**	**32.9**	50
NO_X	Annual	5	**17.0**	**32.5**	100
CO	1-hour	7,000(3)	**8,959**	**11,565**	40,000

(1) Listed Highest Concentrations include Mesaba, all regional sources, and background. They are highest second-high for 1 to 24-hour averaging times except for PM_{10}, which is the highest 6th high from 5 years. Annual average values are the highest for any year.
(2) Although the EPA revoked the annual PM_{10} standard in December 2006, the standard is still in the Minnesota regulations.
(3) Background CO concentrations are very conservative estimates from urban monitors in Minneapolis/St. Paul. No background data exist for the Mesaba Generating Station area.
(4) Value represents the more stringent standard of the two standards.
Table updated for Final EIS (bold typeface denotes updated/new values)

For Phase I-only and Phases I and II combined, all predicted concentrations are below allowable levels, and the results demonstrate compliance with all MAAQS and NAAQS. Data for $PM_{2.5}$ was estimated using PM_{10} concentrations as a basis **for modeled sources and IMPROVE ambient monitoring for background**. **Although the IMPROVE monitors are not federal reference monitors, data from these sources are currently the best available. The IMPROVE monitoring program consists of a national network of air quality monitors designed to support the EPA's Regional Haze Rule program. This data has helped to define baseline natural conditions for the program and will be used in the future to assess the performance of the program. Given its end use by the EPA, the IMPROVE database undergoes extensive quality control and validation, which provides some confidence that the data are representative of monitored PM background.**

The majority of PM_{10} impacts are a result of fugitive emissions. When using a multiplier of 0.11 for relative $PM_{2.5}$ to PM_{10}, the resulting concentrations of 24-hour and annual $PM_{2.5}$, as shown in Table 4.3-11 **(new table added for Final EIS)**, would not exceed their respective NAAQS standards **for the single and combined phases**. Additionally, there are very low impacts of regional sources within the Phase I and II Mesaba Generating Station's significant impact area.

Table 4.3-11. Estimated $PM_{2.5}$ Concentration for Phase I and II Combined (1)

Pollutant	Averaging Time	Background (ug/m^3)	Total (2) at West Range (ug/m^3)	Total (2) at East Range (ug/m^3)	NAAQS (ug/m^3)
$PM_{2.5}$	24-hour	20	31.7	30.1	35
	Annual	5	8.1	7.5	15

(1) $PM_{2.5}$ concentrations are estimated based on the 0.11 ratio of $PM_{2.5}$ to PM_{10}. Ambient concentrations were calculated from IMPROVE ambient monitoring data from nearby Class I areas (BWCAW and VNP), using available data from 2000-2003. Because recent ambient data already includes many sources that were also modeled and, therefore, the results reflect substantial double-counting, these concentration are considered conservative. Note that this table is new for the Final EIS.
(2) Includes Mesaba, all regional sources, and background.

Minnesota and PSD Regulations Monitoring Requirements

Minnesota and Federal PSD regulations specify *de minimis* monitoring concentrations. Under PSD regulations, pre-construction monitoring may be required if projected emissions from the Mesaba Energy Project exceed the *de minimis* threshold and background concentrations related to existing sources in the vicinity of the proposed Mesaba Generating Station are exceeding the *de minimis* levels. The PSD *de minimis* monitoring concentrations are shown in Table 4.3-12 **(updated for Final EIS) for the combined phase (for Phase I-only, the emissions would be half of the estimates shown in the table)**; in addition to the maximum projected Mesaba Energy Project SO_2, PM_{10}, NO_2, and CO concentrations (see also Table 4.3-8). As previously mentioned in Section 4.3.1.2, the Pb and O_3 emissions were not modeled because O_3 is not emitted directly from a combustion source and potential Pb emissions from the proposed project are negligible.

Table 4.3-12. PSD Significant Monitoring Concentrations and Maximum Impacts from Mesaba Energy Project (Phases I and II Combined)

Pollutant	Averaging Time	Highest Impact at West Range Site ($\mu g/m^3$)	Highest Impact at East Range Site ($\mu g/m^3$)	*De Minimis* Monitoring Level ($\mu g/m^3$)
SO_2	24-hour	**31.1**	**62.4**	13
PM_{10}	24-hour	**28.2**	**32.6**	10
NO_2	Annual	**7.2**	**7.9**	14
CO	8-hour	**260**	**635**	575

Table updated for Final EIS **(bold typeface denotes updated/new values)**.

During Phase I-only, levels for NO_2 and CO are below the *de minimis* monitoring concentration levels for both sites. During the combined phase, Table 4.3-12 indicates that **for both sites,** the levels for NO_2 are below the *de minimis* monitoring concentrations and SO_2 and PM_{10} model-predicted levels exceed the threshold monitoring concentrations. **Additionally, CO exceeds the threshold at the East Range Site.** Based on background PM_{10} monitoring data available in northeast Minnesota from Virginia, Duluth, and from an IMPROVE monitoring in the northern Class I areas, background PM_{10} concentrations are below *de minimis* levels. Additionally, limited SO_2 data from Ely, MN and Voyageurs National Park also indicate that background SO_2 concentrations are low in northern Minnesota, and are generally below the *de minimis* monitoring levels. **No CO monitoring data was available near the proposed sites; however, it is assumed that the predicted increase above the *de minimis* monitoring level at the East Range Site would not be a significant impact as only the flaring scenario at the East Range Site exceeded monitoring thresholds.** An application requesting a waiver of the preconstruction monitoring requirements was submitted to the MPCA with the application for a Part 70/New Source Review Construction Authorization Permit. Section 3.3.3 provides existing local and regional air quality data.

The results of the NAAQS compliance analysis (see Table 4.3-10) indicate that the Mesaba Energy Project, Phase I and II, would not violate these standards and total ambient pollutant concentrations levels would remain well below applicable limits. The combination of existing representative regional monitoring data and low predicted ambient pollutant concentration levels, which do not violate any NAAQS standards, indicate that pre-construction monitoring is not necessary and would not contribute to a significant improvement in impact assessment.

Class I Area (Far-Field) Modeling Results

Air quality modeling analyses were conducted to estimate the impact of the Mesaba Energy Project on air quality in Class I areas. The analyses address impacts to the BWCAW, VNP, RLW**, and IRNP**.

The Class I increment analyses address PSD Class I increments for SO_2, PM_{10}, and NO_X and the AQRV analyses address nitrogen and sulfur deposition and visibility.

Class I Impacts and Increment Consumption

The CALPUFF model was used to calculate pollutant impacts from the Mesaba Energy Project for Class I areas. **Supplemental modeling using AERMOD and the methodology described in the near-field modeling approach in Section 4.3.1.4 was conducted for a small number of receptors in the BWCAW that fell within 50 kilometers of the East Range Site.** The two-phase Mesaba Generating Station was modeled **at the worst-case emission rates for both sites** and the results were compared with Class I PSD increments and SILs (see Tables 4.3-13 and 4.3-14). **For both sites, sensitivity analyses were conducted for Phase I, which compared impacts of worst-case flaring emissions versus worst-case normal operation emissions. Modeling results indicate that normal operations would result in higher impacts in all cases except for the 3-hour SO_2. Therefore, the results shown for all non-flaring cases in Table 4.3-13 (updated for the Final EIS) are based on both phases of the West Range Site operating at the "proposed" emission rates. While modeling runs were conducted for other scenarios with lower emissions, these modeled impacts were lower than those for the worst-case scenario as shown below; thus, these other scenarios would be within compliance. Where SILs were exceeded, these maximum values are shown in italics and underlined typeface in the table.**

Table 4.3-13. Class I PSD Increment Modeling Results for West Range Site (Phase I & II at 'Proposed' Emission Levels)

Pollutant	Averaging Period	Year Evaluated			PSD Inc (µg/m³)	PSD Class I SIL (µg/m³)	Max [(3)] (µg/m³)
		2002 [(1)]	2003 [(2)]	2004 [(2)]			
Boundary Waters Canoe Area Wilderness							
SO_2	3-Hour (N*)	**1.74**	**1.42**	**1.93**	**25**	**1**	***1.93***
	3-Hour (2F*)	**2.97**	**2.80**	**3.12**	**25**	**1**	***3.12***
	3-Hour (1F*)	**1.48**	**1.43**	**1.55**	25	1	***1.55***
	24-Hour	**0.39**	**0.35**	**0.56**	5	0.2	***0.56***
	Annual	**0.018**	**0.018**	**0.018**	2	0.1	**0.018**
NO_X	Annual	**0.017**	**0.015**	**0.017**	2.5	0.1	**0.017**
PM_{10}	24-Hour	**0.25**	**0.37**	**0.25**	8	0.3	***0.37***
	Annual	**0.012**	**0.013**	**0.012**	4	0.2	**0.013**
Voyageurs National Park							
SO_2	3-Hour (N*)	**1.28**	**2.05**	**1.77**	**25**	**1**	***2.05***
	3-Hour (2F*)	**2.21**	**3.64**	**3.32**	**25**	**1**	***3.64***
	3-Hour (1F*)	**1.11**	**1.81**	**1.64**	25	1	***1.81***
	24-Hour	**0.33**	**0.40**	**0.64**	5	0.2	***0.64***
	Annual	**0.018**	**0.024**	**0.022**	2	0.1	**0.024**
NO_X	Annual	**0.016**	**0.023**	**0.020**	2.5	0.1	**0.023**
PM_{10}	24-Hour	**0.29**	**0.26**	**0.56**	8	0.3	***0.56***
	Annual	**0.012**	**0.015**	**0.015**	4	0.2	**0.015**

Table 4.3-13. Class I PSD Increment Modeling Results for West Range Site (Phase I & II at 'Proposed' Emission Levels)

Pollutant	Averaging Period	Year Evaluated			PSD Inc (μg/m³)	PSD Class I SIL (μg/m³)	Max [3] (μg/m³)
		2002 [1]	2003 [2]	2004 [2]			
Rainbow Lakes Wilderness							
SO_2	3-Hour (N*)	**0.49**	**0.43**	**0.41**	**25**	**1**	**0.49**
	3-Hour (2F*)	**0.67**	**0.76**	**0.60**	**25**	**1**	**0.76**
	3-Hour (1F*)	**0.33**	**0.38**	**0.31**	25	1	**0.38**
	24-Hour	**0.11**	**0.09**	**0.09**	5	0.2	**0.11**
	Annual	**0.010**	**0.009**	**0.007**	2	0.1	**0.010**
NO_X	Annual	**0.009**	**0.015**	**0.006**	2.5	0.1	**0.015**
PM_{10}	24-Hour	**0.13**	**0.11**	**0.09**	8	0.3	**0.13**
	Annual	**0.008**	**0.008**	**0.006**	4	0.2	**0.008**

* Normal operation ('N'), two-phase flaring ('2F'), and single-phase flaring ('1F') scenarios were analyzed.
(1) 12km MM5 data, 1km CALMET grid resolution
(2) 36km MM5 data, 4km CALMET grid resolution
(3) SILs exceedances are denoted in italicized and underlined typeface.
Table updated for Final EIS (bold typeface denotes updated/new values).

Because the East Range Site is in closer proximity to the Class I areas, the Class I PSD increment modeling for this site was based on assuming that Phase I was operating at the "proposed" emission rates (listed in Appendix B, Table B.2-2) and Phase II was operating at the "enhanced" emission rates (listed in Appendix B, Table B.2-3). The Class I PSD increment modeling results for the East Range Site are shown in Table 4.3-14 **(new table for the Final EIS)**. Where SILs were exceeded, these maximum values are shown in italics and underlined typeface in the table.

Table 4.3-14. Class I PSD Increment Modeling Results for East Range Site (Phase I at 'Proposed' Emission Levels; Phase II at 'Enhanced' Emission Levels)

Pollutant	Averaging Period	Year Evaluated			PSD Class I Inc (μg/m³)	PSD Class I SIL (μg/m³)	Max [3] (μg/m³)
		2002 [1]	2003 [2]	2004 [2]			
Boundary Waters Canoe Area Wilderness							
SO_2	3-Hour (N*)	3.77	3.46	3.49	25	1	<u>*3.77*</u>
	3-Hour (2F*)	7.90	7.75	7.49	25	1	<u>*7.90*</u>
	3-Hour (1F*)	3.96	3.82	3.65	25	1	<u>*3.96*</u>
	24-Hour	0.72	0.73	1.02	5	0.2	<u>*1.02*</u>
	Annual	0.041	0.053	0.044	2	0.1	0.053
NO_X	Annual	0.050	0.067	0.057	2.5	0.1	0.067
PM_{10}	24-Hour	0.77	0.53	0.40	8	0.3	<u>*0.77*</u>
	Annual	0.023	0.026	0.022	4	0.2	0.026

Table 4.3-14. Class I PSD Increment Modeling Results for East Range Site (Phase I at 'Proposed' Emission Levels; Phase II at 'Enhanced' Emission Levels)

Pollutant	Averaging Period	Year Evaluated			PSD Class I Inc (μg/m³)	PSD Class I SIL (μg/m³)	Max [3] (μg/m³)
		2002 [1]	2003 [2]	2004 [2]			
Voyageurs National Park							
SO_2	3-Hour (N*)	1.28	0.89	0.96	25	1	*1.28*
	3-Hour (2F*)	3.20	2.18	2.14	25	1	*3.20*
	3-Hour (1F*)	1.60	1.09	1.07	25	1	*1.60*
	24-Hour	0.26	0.23	0.25	5	0.2	*0.26*
	Annual	0.010	0.011	0.012	2	0.1	0.012
NO_X	Annual	0.010	0.010	0.012	2.5	0.1	0.012
PM_{10}	24-Hour	0.19	0.25	0.20	8	0.3	0.25
	Annual	0.008	0.009	0.009	4	0.2	0.009
Rainbow Lakes Wilderness							
SO_2	3-Hour (N*)	0.72	0.70	0.69	25	1	0.72
	3-Hour (2F*)	1.64	1.80	1.50	25	1	*1.80*
	3-Hour (1F*)	0.79	0.86	0.78	25	1	0.86
	24-Hour	0.17	0.12	0.19	5	0.2	0.19
	Annual	0.008	0.009	0.010	2	0.1	0.010
NO_X	Annual	0.007	0.009	0.010	2.5	0.1	0.010
PM_{10}	24-Hour	0.16	0.11	0.21	8	0.3	0.21
	Annual	0.008	0.008	0.009	4	0.2	0.009
Isle Royale National Park							
SO_2	3-Hour (N*)	0.24	0.27	0.36	25	1	0.36
	3-Hour (2F*)	0.57	0.69	1.01	25	1	*1.01*
	3-Hour (1F*)	0.28	0.34	0.52	25	1	0.52
	24-Hour	0.07	0.05	0.08	5	0.2	0.08
	Annual	0.004	0.004	0.004	2	0.1	0.004
NO_X	Annual	0.005	0.003	0.004	2.5	0.1	0.005
PM_{10}	24-Hour	0.15	0.08	0.07	8	0.3	0.15
	Annual	0.008	0.007	0.006	4	0.2	0.008

Source: Excelsior
* Normal operation ('N'), two-phase flaring ('2F'), and single-phase flaring ('1F') scenarios were analyzed.
[1] 12km MM5 data, 1km CALMET grid resolution
[2] 36km MM5 data, 4km CALMET grid resolution
[3] SILs exceedances are denoted in italicized and underlined typeface.
New table for the Final EIS.

The data indicate that maximum Mesaba Energy Project impacts are below allowable PSD increments for all pollutants in Class I areas **for both the Phase I-only emissions and Phases I and II combined emissions**. Long-term impacts are also below the SILs, indicating that impacts would not be significant, with no further analysis necessary. **However, for the West Range Site, impacts are indicated to exceed the SILs for short-term SO_2 and PM_{10} at BWCAW and VNP (as shown in italicized and underlined typeface in Table 4.3-13). For the East Range Site, impacts are indicated to exceed the SILs for short-term SO_2 and PM_{10} at BWCAW and short-term SO_2 at VNP (Table 4.2-14). These results are consistent with those from the AERMOD modeling for BWCAW receptors within 50 kilometers of the East Range Site – i.e., the same SILs were exceeded.** Because of the 3-hour and 24-hour SO_2 **and 24-hour PM_{10}** projected impacts, it was necessary**, under PSD regulations,** to conduct a cumulative impact analysis, including other regional SO_2 **and PM_{10}** increment sources as well as reasonably foreseeable sources, to quantify total PSD increment consumption **at both sites**. **The cumulative analysis has been updated for the Final EIS, which includes an expanded sources inventory, and is discussed in Section 5.2.2 and Appendix D1.**

While the flaring scenario for the East Range Site also indicated potential impacts above some SILs for RLW and IRNP, a cumulative analysis was not conducted for those Class I areas because cumulative analyses based on infrequent startup/shutdown/malfunction occurrences are not appropriate; the underlying assumption in the cumulative impact analysis is that these conditions would prevail continuously every hour of each year. This scenario is not possible given the limited number of potential hours of flaring events. Also, these occurrences are unlikely to coincide with the maximum impacts shown by other sources.

Class I (Far-Field) Visibility/Regional Haze Analysis

As discussed in Section 4.3.1.4, current FLM guidance specifies the use of CALPOST Method 2 for calculation of visibility impacts. In Method 2, relative humidity data from the nearest surface weather station is used to calculate both source and background light extinction. Since the issuance of Method 2, the FLMs have developed a revised draft FLAG document, referred to as Method 8, for calculating visibility impacts. Therefore, results using both Method 2 and Method 8 are presented in this section. The Method 2 approach relies on the maximum extinction values for comparison to the threshold levels of concern, and focuses on the number of days modeled per year above the 5 percent and 10 percent light extinction thresholds, while Method 8 focuses on the light extinction modeled for the 8th worst day of each year (i.e., the 98th percentile) (see Section 4.3.1.4).

A range of emission scenarios was modeled (Section 4.3.1.4) and the results for visibility impacts are presented in Tables 4.3-14 and 4.3-15 for the West Range Site and East Range Site, respectively (new tables for the Final EIS). The "proposed" and "enhanced" emission rates are listed in Appendix B, Tables B.2-2 and B.2-3, respectively; 'None' in the tables reflects a Phase I-only analysis. As with the PSD increment analyses, while flaring scenarios were modeled, the results were lower than (or essentially the same as) their correlative normal operation scenarios, and therefore, would not represent the worst-case operating scenario and was not considered further. The set of scenarios modeled for the East Range Site includes more controls due to its closer proximity to Class I areas.

At the request of the Forest Service (letter dated July 31, 2009; see Appendix E), total number of days over the three years modeled are included in the tables for Method 2. Typically, however, visibility impacts are reported on an annual basis as this provides additional information on the distribution of events over the modeled period, which is indicative of the potential for particular years of meteorology to dominate the modeling results, especially when the modeled period is comprised of varied meteorological data files. Note that Method 2 does not specify that a certain number of days per year over the reference value is considered an exceedance. With respect to Method 8, current FLAG guidance (2000) specifies the use of annual average background visibility conditions to assess a source's potential visibility impact (values listed under column, *8th high ΔB_{ext} Annual*, in Tables 4.3-14 and 4.3-15). Proposed FLAG guidance (2008) recommends a tiered approach, where the 20 percent best natural background conditions may be used to predict

impacts, if recommended by the FLMs. Therefore, at the request of the Forest Service (letter dated July 31, 2009; see Appendix E), impacts predicted against the 20 percent best natural conditions are included in the table (values listed under column, *8th high ΔB_{ext} 20%*, in Tables 4.3-15 and 4.3-16).

Table 4.3-15. Class I Visibility Modeling Results – West Range Site

Emission Rate		Method 2								Method 8					
Phase I	Phase II	2002 (1)		2003 (2)		2004 (2)		Total (3) (2002-2004)		2002 (1)		2003 (2)		2004 (2)	
		Days ≥ 5%	Days ≥ 10%	Days ≥ 5%	Days ≥ 10%	Days ≥ 5%	Days ≥ 10%	Days ≥ 5%	Days ≥ 10%	8th high ΔB_{ext} Annual (%)	8th high ΔB_{ext} 20% (4) (%)	8th high ΔB_{ext} Annual (%)	8th high ΔB_{ext} 20% (4) (%)	8th high ΔB_{ext} Annual (%)	8th high ΔB_{ext} 20% (4) (%)
Boundary Waters Canoe Area Wilderness															
Proposed	None	1	0	3	0	1	0	5	0	1.80	2.62	2.47	3.55	2.51	3.60
Proposed	Proposed	19	1	21	6	14	6	54	13	5.13	7.40	4.82	6.92	5.04	7.22
Proposed	Enhanced	9	0	15	3	11	0	35	3	3.86	5.57	3.62	5.17	4.04	5.75
Voyageurs National Park															
Proposed	None	1	0	2	0	6	1	9	1	1.98	2.86	2.99	4.31	2.71	3.88
Proposed	Proposed	13	3	16	2	22	7	51	12	4.80	6.89	5.95	8.57	5.46	7.82
Proposed	Enhanced	6	0	7	2	15	4	28	6	3.73	5.33	4.63	6.64	4.23	6.08

(1) 12km MM5 data, 1km CALMET grid resolution
(2) 36km MM5 data, 4km CALMET grid resolution;
(3) Total number of days over the three years modeled are included in the table at the request of the Forest Service (letter dated July 31, 2009; see Appendix E); however, note that Method 2 does not specify that a certain number of days per year over the reference value is considered an exceedance. The number of days exceeded over the reference value is typically reported by year.
(4) Current FLAG guidance (2000) specifies the use of annual average background visibility conditions to assess a source's potential visibility impact. Proposed FLAG guidance (2008) recommends a tiered approach, where the 20% best natural background conditions may be used to predict impacts, if recommended by the FLMs. Therefore, impacts predicted against the 20% best natural conditions are included in the table at the request of the Forest Service (letter dated July 31, 2009; see Appendix E).
New table for Final EIS.

Regarding the results of Method 2, the visibility modeling analysis results for the West Range Site shown in Table 4.3-15 indicate that impacts greater than 5 or 10 percent light extinction could occur at some point within BWCAW and VNP. Depending on the operating scenario and the Class I area, the number of days per year with greater than 5 percent light extinction ranges from 1 to 22; the number of days greater than 10 percent light extinction ranges from 0 to 7. The Method 8 results (based on annual average background conditions) indicate that only for the scenario with the highest potential emissions, i.e., the "proposed" emission rates for both Phase I and Phase II, would any 8th highest values be above the 5 percent extinction threshold, and then, for only 2 of the 3 years modeled in each Class I area. The operating scenario for Phase I-only with "proposed" control and the operating scenario for Phase I with "proposed" control and Phase II with "enhanced" control, are both predicted to result in 8th highest values below the 5 percent threshold.

Based on correspondence from the Forest Service dated July 31, 2009 (see Appendix E), DOE understands that the Forest Service feels that the modeled impacts to visibility at either site require mitigation. Therefore, DOE would consider such mitigation as a condition of the Record of Decision, pending progress in negotiations between Excelsior and MPCA regarding the BACT decision.

Table 4.3-16. Class I Visibility Modeling Results – East Range Site

Emission Rate		Method 2								Method 8					
Phase I	Phase II	2002 (1)		2003 (2)		2004 (2)		Total (3) (2002-2004)		2002 (1)		2003 (2)		2004 (2)	
		Days ≥ 5%	Days ≥ 10%	Days ≥ 5%	Days ≥ 10%	Days ≥ 5%	Days ≥ 10%	Days ≥ 5%	Days ≥ 10%	8th high ΔB_{ext} Annual (%)	8th high ΔB_{ext} 20% (4) (%)	8th high ΔB_{ext} Annual (%)	8th high ΔB_{ext} 20% (4) (%)	8th high ΔB_{ext} Annual (%)	8th high ΔB_{ext} 20% (4) (%)
Boundary Waters Canoe Area Wilderness															
Proposed	None	46	7	15	0	10	0	71	7	6.23	8.97	6.16	8.80	5.30	7.62
Proposed	Proposed	86	29	60	9	47	5	193	43	9.89	14.14	10.28	14.69	8.63	12.31
Proposed	Enhanced	50	8	34	1	19	0	103	9	7.42	10.43	7.42	10.53	6.29	8.92
Voyageurs National Park															
Proposed	None	1	0	2	0	3	1	6	1	1.94	2.81	2.45	3.52	2.50	3.59
Proposed	Proposed	3	1	4	0	7	2	14	3	2.98	4.28	3.81	5.49	3.72	5.32
Proposed	Enhanced	1	0	1	0	2	0	4	0	2.07	2.96	2.54	3.61	2.43	3.46
Isle Royale National Park															
Proposed	None	1	0	0	0	0	0	1	0	1.50	2.17	1.24	1.81	1.25	1.80
Proposed	Enhanced	2	1	0	0	0	0	2	1	2.26	3.26	1.82	2.63	1.86	2.65
Enhanced	Enhanced	1	0	0	0	0	0	1	0	1.50	2.17	1.16	1.64	1.24	1.77

(1) 12km MM5 data, 1km CALMET grid resolution
(2) 36km MM5 data, 4km CALMET grid resolution;
(3) Total number of days over the three years modeled are included in the table at the request of the Forest Service (letter dated July 31, 2009; see Appendix E); however, note that Method 2 does not specify that a certain number of days per year over the reference value is considered an exceedance. The number of days exceeded over the reference value is typically reported by year.
(4) Current FLAG guidance (2000) specifies the use of annual average background visibility conditions to assess a source's potential visibility impact. Proposed FLAG guidance (2008) recommends a tiered approach, where the 20% best natural background conditions may be used to predict impacts, if recommended by the FLMs. Therefore, impacts predicted against the 20% best natural conditions are included in the table at the request of the Forest Service (letter dated July 31, 2009; see Appendix E).
New table for Final EIS.

The visibility modeling analysis results for the East Range Site shown in Table 4.3-16 reflect the influence of the site's closer proximity to BWCAW and the commensurate higher predicted number of days with a change in light extinction above 5 and 10 percent for the same operating scenarios. Both the Method 2 and Method 8 results (based on annual average background conditions) indicate that emissions associated with any of the operating scenarios and project phases have the potential to produce impacts above 5 percent light extinction. Depending on the operating scenario and the Class I area, the number of days per year with greater than 5 percent light extinction ranges from 0 to 86; the number of days greater than 10 percent light extinction ranges from 0 to 29. Since even the lowest emission rate case (Phase I "proposed" and Phase II "enhanced") would result in potentially adverse impacts at BWCAW, further refinement of the modeling approach and methodology or mitigation of the predicted impacts would likely be required. A possible mitigation is by offsetting the predicted impacts through the identification and acquisition of sufficient emissions reductions from non-project sources.

Since the East Range Site is within 50 kilometers of BWCAW, some of the predicted visibility impact events discussed above occurred at receptors within 50 kilometers and, per guidance from the FLMs, those receptors were preliminarily subject to analysis using the CALPUFF modeling system. For such receptors, the visibility analyses could be performed using the PLUVUE model to determine the potential plume blight impacts, instead of using the CALPUFF modeling system.

Should the East Range Site be selected, Excelsior would conduct a more refined plume blight impact analysis for these receptors.

Additionally, the predicted visibility impacts could potentially be mitigated by offsetting an equivalent number of visibility events in the Class I area by reducing emissions such as SO_2 from sources not associated with the project. Excelsior has investigated this potential mitigation option and has identified sources of emissions near the East Range Site that may be considered for the mitigation effort. For example, a major source of SO_2 emissions, located less than 3 kilometers from the East Range Site, was investigated to illustrate potential mitigation options. Supplemental modeling analyses of the effectiveness of a sample offset scenario at reducing model-predicted visibility impacts were conducted based on this major source. These analyses were conducted only as examples to provide information and illustrate the concept of mitigation. The discussion and results of the analysis are provided in Section 5.3.2.2. Should the East Range Site be selected for the project, Excelsior would be required to compare the practical feasibility of this mitigation option versus other feasible options. Therefore, use of some combination of appropriate operating scenarios, refined modeling analyses, and acquisition of any necessary emission offsets from nearby sources would be considered for mitigation to reduce any predicted adverse visibility impacts to less than significant.

Based on correspondence from the Forest Service dated July 31, 2009 (see Appendix E), DOE understands that the Forest Service feels that the modeled impacts to visibility at either site require mitigation. Therefore, DOE would consider such mitigation as a condition of the Record of Decision, pending progress in negotiations between MPCA and Excelsior regarding the BACT determination.

The predicted visibility impacts on the other Class I areas evaluated for the East Range Site (VNP and IRNP) would be less than at BWCAW with only a few days per year predicted to be above the 5 percent threshold based on the Method 2 analyses. The Method 8 results show that all 8^{th} high values at both Class I areas are well below the 5 percent light extinction threshold.

Supplemental Visibility Modeling Analysis

As discussed in Section 4.3.1.1, the FLMs provided technical comments on the revised modeling protocol (TRC et. al., 2008) and, after further consultation, the FLMs identified the model settings that they would accept for the Mesaba Energy Project (Bunyak, 2009). The letter also noted that Excelsior could submit supplemental model runs. Therefore, in order to determine whether model settings affected the results and because Excelsior believed that higher resolution modeling would be more technically accurate, supplementary modeling was also conducted for various combinations of MM5 and CALMET grid resolutions as discussed in Section 4.3.1.3. Table 4.3-17 (new table for the Final EIS) compares the results for these modeling variations for 2002 (the only year in which higher-resolution MM5 data is available), using the "proposed" emission rates for Phase I and "enhanced" emission rates for Phase II (as a test case).

Subsequent to the acceptance of the latest modeling protocol by the FLMs, the Forest Service submitted a letter to DOE (dated July 31, 2009; see Appendix E) that referenced a memo issued by the EPA Model Clearinghouse in May 2009 (EPA, 2009b; see Appendix E). This memo provides EPA's comments on an air modeling protocol for an electric generating unit in eastern South Dakota and indicates EPA's concurrence with Region 8's position on the proposed grid resolution (EPA, 2009c). The memo states that use of a finer resolution in CALMET/CALPUFF (i.e., 1-kilometer grid resolution) is not adequately justified given the geographical characteristics of the domain of interest (i.e., South Dakota and Minnesota). The results of the supplemental visibility analysis are included in this EIS since this supplemental modeling had been agreed to by the FLMs prior to the release of the EPA memo and since the supplemental modeling provides a better understanding of the effects of modeling parameters on predicted visibility impacts. However, DOE

understands that the Forest Service now considers the results to be of "little value" (see Forest Service letter in Appendix E).

Table 4.3-17. Class I Visibility Modeling – Comparison of Meteorological Data Resolutions for 2002 - West Range Site / East Range Site (1)

Resolution		Method 2		Method 8
MM5	CALMET	Days ≥ 5%	Days ≥ 10%	8th high ΔB_{ext} (%)
Boundary Waters Canoe Area Wilderness				
12 km	1 km	9 / 86	0 / 29	3.86 / 9.89
36 km	1 km	9 / 90	1 / 33	3.82 / 10.29
36 km	4 km	9 / 83	1/ 24	3.91 / 9.58
Voyageurs National Park				
12 km	1 km	6 / 3	0 / 1	3.73 / 2.98
36 km	1 km	13 / 7	0 / 1	3.50 / 3.39
36 km	4 km	16 / 8	0 / 2	4.48 / 3.77

(1) Emissions: Phase I at 'Proposed' and Phase II at 'Enhanced' emissions levels for both West Range and East Range Sites. Results are presented for both sites in each cell of the table: [West Range result] / [East Range result]. New table for the Final EIS.

For the West Range Site, the predicted visibility impacts on BWCAW in Table 4.3-17 show little change and no trend as a function of the resolution of the meteorological data. In contrast, for the West Range Site impacts on VNP, as the resolution of the meteorological data and grid increases, the visibility impact results show a significant reduction in both the frequency of predicted light extinction events above 5 percent and in the magnitude of the maximum predicted event. For the impacts of the East Range Site on BWCAW, both the maximum frequency of light extinction events above 5 percent and the maximum event occurred using the 36-kilometer MM5 data together with a CALMET grid resolution of 1 kilometer. For the impacts of both the West Range and East Range sites on VNP, both the maximum frequency of light extinction events above 5 percent and the maximum event occurred using the 36-kilometer MM5 data together with a CALMET grid resolution of 4 kilometers.

12-kilometer MM5 data is not available for 2003 and 2004. However, Excelsior conducted additional modeling as supplementary information using 1-kilometer CALMET grid resolution for those years. These results, along with 2002 using 12-kilometer MM5 data, are shown in Tables 4.3-18 and 4.3-19 for the West Range Site and East Range Site, respectively (new tables for the Final EIS).

For the West Range Site, the effects of the higher resolution MM5 data are relatively small and they are partially obscured by the year-to-year variability that apparently occurred in the meteorological data. Nonetheless, the results presented in Table 4.3-18 show that the 2002 meteorological data tended to produce a higher frequency of predicted days with a light extinction above 5 percent, compared to the results for the 2003 and 2004 data, all of which had the same 36-kilometer MM5 and 1-kilometer CALMET grid resolution. In contrast, the more refined 12-kilometer MM5 meteorological data used for 2002 are nearly indistinguishable from the results for the 2003 and 2004 data, which were based on the less refined 36-kilometer MM5 data. Thus, in this instance, the use of the more refined 12-kilometer MM5 data canceled the effect of the year-to-year variability in the meteorological data.

Table 4.3-18. Class I Visibility Supplementary Modeling Results – West Range Site

Emission Rate		Method 2						Method 8		
Phase I	Phase II	2002 (1),(2)		2003 (2)		2004 (2)		2002 (1),(2)	2003 (2)	2004 (2)
		Days ≥ 5%	Days ≥ 10%	Days ≥ 5%	Days ≥ 10%	Days ≥ 5%	Days ≥ 10%	8th high ΔB_{ext} (%)	8th high ΔB_{ext} (%)	8th high ΔB_{ext} (%)
Boundary Waters Canoe Area Wilderness										
Proposed	None	1 / 1	0 / 0	3	0	1	0	1.80 / 2.52	2.17	2.36
Proposed	Enhanced	9 / 9	0 / 1	7	1	5	0	3.86 / 3.82	3.34	3.79
Voyageurs National Park										
Proposed	None	1 / 2	0 / 0	2	0	3	0	1.98 / 2.32	2.46	2.19
Proposed	Enhanced	6 / 13	0 / 0	5	1	7	2	3.73 / 3.50	3.87	3.35

(1) 12-km MM5 data, 1-km CALMET grid resolution
(2) 36-km MM5 data, 1-km CALMET grid resolution
Note, values in 2002 columns are presented for both grid resolutions: [12-km MM5 result] / [36-km MM5 result]. New table for the Final EIS.

Table 4.3-19. Class I Visibility Supplementary Modeling Results – East Range Site

Emission Rate		Method 2						Method 8		
Phase I	Phase II	2002 (1),(2)		2003 (2)		2004 (2)		2002 (1) / (2)	2003 (2)	2004 (2)
		Days ≥ 5%	Days ≥ 10%	Days ≥ 5%	Days ≥ 10%	Days ≥ 5%	Days ≥ 10%	8th high ΔB_{ext} (%)	8th high ΔB_{ext} (%)	8th high ΔB_{ext} (%)
Boundary Waters Canoe Area Wilderness										
Proposed	None	46 / 48	7 / 7	26	3	14	2	6.23 / 6.44	6.54	6.29
Proposed	Enhanced	86 / 90	29 / 33	65	13	49	7	9.89 / 10.29	10.76	9.70
Voyageurs National Park										
Proposed	None	1 / 1	0 / 0	3	0	3	0	1.94 / 2.22	2.12	2.05
Proposed	Enhanced	3 / 7	1 / 1	5	1	6	2	2.98 / 3.39	3.44	3.20

(1) 12-km MM5 data, 1-km CALMET grid resolution
(2) 36-km MM5 data, 1-km CALMET grid resolution
Note, values in 2002 columns are presented for both grid resolutions: [12-km MM5 result] / [36-km MM5 result]. New table for the Final EIS.

In comparison to the West Range Site, the effects of the higher resolution MM5 data at the East Range Site are even smaller and more obscured by the year-to-year variability that apparently occurred in the meteorological data. Similar to the West Range Site, the East Range Site results presented in Table 4.3-19 show that the 2002 meteorological data tended to produce a higher frequency of predicted days with a light extinction above 5 percent, compared to the results for the 2003 and 2004 data, all of which had the same 36-kilometer MM5 and 1-kilometer CALMET grid resolution. In contrast to the results for the West Range Site, results for the East Range Site also

show that the more refined 12-kilometer MM5 meteorological data used for 2002 tended to produce a higher frequency of predicted days with a light extinction above 5 percent, compared to the results for the 2003 and 2004 data, which were based on the less refined 36-kilometer MM5 data. Thus, in this instance, the use of the more refined 12-kilometer MM5 data did not cancel the effect of the year to year variability in the meteorological data.

As discussed previously, in order to provide information and illustrate the concept of mitigation, Excelsior conducted supplemental modeling analyses on the effectiveness of a sample offset scenario at reducing model-predicted visibility impacts for the East Range Site. The results and the mitigation concept are discussed in Section 5.3.2.2.

In addition to the discussion noted above regarding the modeled results and potential mitigation of any adverse impact, it is also important to take into account the draft FLAG Phase I Report, which includes an expanded discussion of the process for adverse impact determination that in the event that initial modeling predicts calculated visibility impacts greater than the defined thresholds (e.g., 5 percent). That report states that further analysis can be conducted and additional contextual factors considered before a project-specific determination is made. According to the draft, the defined threshold does not represent the ultimate test for adverse impact determination, but rather a level at which additional analysis is triggered, similar to the DAT for nitrogen and sulfur deposition, discussed later in this section. The following are examples of other factors to consider:

- **Current pollutant concentrations and AQRV impacts in the Class I area**
- **Air quality trends in the Class I area**
- **Emission changes that have occurred or would occur (i.e., enforceable) by the time the new source begins operation**
- **Whether there are approved SIPs that account for new source growth and demonstrate attainment of national ambient air quality standards and "reasonable progress" toward visibility goals**
- **The expected useful life of the source**
- **The stringency of the emission limits (e.g., Best Available Control Technology)**
- **Other considerations such as options put forth by the applicant that would produce ancillary environmental benefits to AQRVs (e.g., reductions in toxic air contaminants, pollution prevention investments)**
- **Comments received from the public or other agencies during the comment period prior to issuing the permit**

Furthermore, Minnesota is developing a State Implementation Plan for implementing the Regional Haze Rule, which is an additional consideration when evaluating potential visibility impacts (discussed in Section 5.2.2).

Deposition of Nitrogen and Sulfur

Potential impacts to soils, waters, and vegetation in Class I areas were evaluated based on the model-predicted pollutant concentrations and the magnitude of predicted annual deposition of nitrogen and sulfur. Criteria for assessment of deposition impacts are different for Forest Service areas (BWCAW and RLW) and NPS areas (i.e., VNP). The NPS has established a DAT of 0.01 kilograms per hectare per year for both nitrogen and sulfur deposition for Class I areas in the eastern United States. A DAT is the additional amount of nitrogen or sulfur deposition within a Class I area, below which estimated impacts from a proposed, new, or modified source are considered insignificant.

It should be noted that the Forest Service has set screening criteria for potential air pollution impacts on vegetation for SO_2 and another set of criteria for the assessment of sulfur and nitrogen

deposition impacts to terrestrial and aquatic ecosystems. According to the Forest Service Green Line, screening values "were set at levels at which it was reasonably certain that no significant change would be observed in ecosystems that contain large numbers of sensitive components." Potential cumulative nitrogen and sulfur deposition impacts to soils, waters, and vegetation in Class I areas were updated for the Final EIS and are discussed in Section 5.2.2 and Appendix D1. The CALPUFF results for each of the Class I areas were processed with CALPOST to calculate total annual deposition of nitrogen and nitrogen at each receptor as a result of Mesaba Generating Station emissions. Total sulfur deposition is calculated from the wet (rain, snow, fog) and dry (particle, gas) deposition of SO_2 and sulfate; total nitrogen is represented by the sum of nitrogen from wet and dry fluxes of nitric acid, nitrate, ammonium sulfate and ammonium nitrate, and the dry flux of NO_X. Results for the West Range Site and East Range Site are shown in Table 4.3-20 **(new table for the Final EIS)**. **Exceedances above the DAT are denoted in bold typeface in the table.**

Table 4.3-20. Class I Deposition Modeling Results – West Range Site / East Range Site

Emission Rate		Nitrogen Deposition (kg/ha-yr)			Sulfur Deposition (kg/ha-yr)		
Phase I	Phase II	2002 (1)	2003 (2)	2004 (2)	2002 (1)	2003 (2)	2004 (2)
Boundary Waters Canoe Area Wilderness							
Proposed	None	0.0039 / **0.0156**	0.0041 / **0.0176**	0.0038 / **0.0166**	0.0058 / **0.0246**	0.0069 / **0.0255**	0.0057 / **0.0269**
Proposed	Proposed	0.0077 / **0.0219**	0.0082 / **0.0247**	0.0075 / **0.0230**	**0.0115** / **0.0346**	**0.0138** / **0.0359**	**0.0114** / **0.0376**
Proposed	Enhanced	0.0053 / **0.0218**	0.0056 / **0.0144**	0.0052 / **0.0130**	0.0081 / **0.0202**	0.0097 / **0.0211**	0.0080 / **0.0219**
Voyageurs National Park							
Proposed	None	0.0042 / 0.0044	0.0049 / 0.0042	0.0046 / 0.0054	0.0074 / 0.0082	0.0079 / 0.0075	0.0075 / 0.0087
Proposed	Proposed	0.0084 / 0.0061	0.0099 / 0.0059	0.0092 / 0.0074	**0.0146** / **0.0115**	**0.0159** / **0.0105**	**0.0150** / **0.0122**
Proposed	Enhanced	0.0058 / 0.0035	0.0068 / 0.0034	0.0063 / 0.0042	**0.0103** / 0.0067	**0.0112** / 0.0062	**0.0106** / 0.0071
Rainbow Lakes Wilderness							
Proposed	None	0.0020 / 0.0020	0.0021 / 0.0031	0.0020 / 0.0034	0.0030 / 0.0032	0.0033 / 0.0044	0.0029 / 0.0048
Proposed	Proposed	0.0040 / 0.0027	0.0042 / 0.0043	0.0040 / 0.0047	0.0060 / 0.0044	0.0065 / 0.0061	0.0059 / 0.0067
Proposed	Enhanced	0.0027 / 0.0015	0.0029 / 0.0024	0.0027 / 0.0025	0.0042 / 0.0026	0.0046 / 0.0036	0.0041 / 0.0039
Isle Royale National Park (East Range Site only)							
Proposed	None	0.0012	0.0011	0.0012	0.0032	0.0028	0.0034
Proposed	Enhanced	0.0017	0.0015	0.0017	0.0045	0.0040	0.0048
Enhanced	Enhanced	0.0009	0.0008	0.0009	0.0026	0.0023	0.0028

(1) 12km MM5 data, 1km CALMET grid resolution
(2) 36km MM5 data, 4km CALMET grid resolution
Note, this is a new table for the Final EIS; exceedances above the DAT (0.01 kg/ha-yr) are denoted in bold typeface. Values for both the West Range and East Range Sites are included for BWCAW, VNP and RLW - results are presented for both sites in each cell of the table: [West Range result] / [East Range result].

As shown in Table 4.3-20, the CALPUFF modeling results for nitrogen deposition for the West Range Site indicate that there would be no exceedances of the DAT at any of the Class I areas for all operating scenarios. The sulfur deposition modeling results indicate that there would be no DAT

exceedances under the Phase I-only scenario; DAT exceedances would occur at BWCAW for "proposed"/"proposed" scenario and VNP for "proposed"/"proposed" and "proposed"/ "enhanced" scenarios. For the East Range Site, the nitrogen deposition modeling results indicate that DAT exceedances would occur for all operating scenarios at the BWCAW. The sulfur deposition modeling results indicate that DAT exceedances would occur at BWCAW for all operating scenarios and at VNP for the "proposed"/ "proposed" scenario. Note, however, that the deposition analysis is considered conservative as it uses worst-case emissions and 100 percent operation. The DAT represents a screening level to assess any possibility of adverse impact and is not a regulatory limit. Additionally, based on the deposition assessment criteria that the Forest Service uses, the sulfur and nitrogen deposition rates from the Mesaba Energy Project are considered below Green Line criteria at BWCAW (an updated analysis on cumulative sulfur and nitrogen impacts using Green Line criteria is discussed in Section 5.2.2 and Appendix D1).

It is not expected that sulfur and nitrogen deposition would result in any significant impacts to terrestrial and aquatic resources in any of the Class I areas. However, DOE recognizes that the FLMs have the responsibility for determining whether a more refined analysis would be required or whether mitigation of these predicted impacts would be recommended. If mitigation is recommended by the FLMs, DOE would consider such mitigation as a condition of the Record of Decision.

4.3.2.6 Additional Impact Analysis

Additional evaluation and review were performed to assess the impact of the proposed Mesaba Energy Project.

General Conformity Rule

A conformity review was conducted to assess whether a conformity determination is needed for the proposed Mesaba Energy Project. As discussed in Section 3.3.3.1, Itasca and St. Louis Counties, in which the proposed project sites (i.e., West Range Site and East Range Site, respectively) are located, are in attainment or unclassified with the NAAQS. Consequently, no conformity determination is needed to demonstrate that activities associated with the Mesaba Energy Project would conform to regulations to maintain attainment in the area.

Effects on Economic Growth

Although economic growth is sought due to operation of the proposed facility, the impact on air quality from any ancillary operations should be negligible. Construction activities associated with Mesaba Energy Project would provide approximately 1,500 construction jobs during peak construction periods. Operation of the facility would require approximately 180 workers following construction of the Phase II Mesaba Generating Station, which is expected to be completed and fully operational in 2014. To the extent practical and consistent with skill and operational requirements, the project plans to employ people in the local area, and ample housing and infrastructure should be available to support any new workers required by this proposed project. Any air quality impacts due to residential growth would be in the form of automobile and residential (fuel combustion) emissions that would be dispersed over a large area and therefore have negligible impact. Commercial growth would be expected to occur at a gradual rate in the future, and any significant new source of emissions would be required to undergo permitting by the MPCA. Based on the maximum predicted air pollutant concentrations associated with the proposed power plant, the project is not expected to preclude future development, and it is not expected to restrict other sources in the area that may require air quality permits.

Acid Rain

Acid rain or acid deposition can occur from the release of acid precursors such as SO_2 and NO_X into the atmosphere, which then react with oxygen and water in the atmosphere to form acids that can be deposited during precipitation events (Cooper, 1994). Acid rain can cause soil degradation, increased acidity of surface water bodies, and slower growth, injury, or death of forests and aquatic habitats. The Acid Rain Program, established under Title IV of the CAA, requires utility generating units greater than 25 MW to obtain a Phase II Acid Rain Permit and meet the objectives of the program (see Section 3.3.4). **The Acid Rain Program was established as a system of marketable allowances to control emissions that contribute to the formation of acid rain. The purchase of allowances by affected units limit the amount of SO_2 and NO_X that can be produced by any one facility, thereby helping to minimize regional effects.** The proposed Mesaba Energy Project would be required to obtain and comply with a Phase II Acid Rain Permit and would be operated in a manner that is consistent with EPA's overall efforts to reduce emissions of acid precursors. Continuous emissions monitoring for SO_2, NO_X, and CO_2 emissions, as well as volumetric gas flow and opacity is a part of the acid rain regulations and includes requirements for monitoring, recordkeeping, and reporting. Since the proposed Mesaba Energy Project would operate within its prescribed allowance, no appreciable impacts related to acid rain would be expected to occur as a result of facility operations.

Clean Air Mercury Rule

As discussed in Section 3.3.4, the CAMR established "standards of performance" limiting mercury emissions from new coal-fired power plants of more than 25 MWe that serves a generator that produces electricity for sale. **However, in a February 2008 ruling, the D.C. Circuit Court of Appeals vacated the CAMR. On February 6, 2009, the EPA filed a motion to dismiss its case, indicating that it would develop emission standards for power plants under 42 U.S.C. § 7412. Regulation under this section would lead to the establishment of Maximum Achievable Control Technology (MACT) standards for each industry group. For new sources, the minimum standard is equivalent to the average level of control achieved by the top 12 percent of existing sources in that industry group. Although the final MACT is unknown at this time, the Mesaba Energy Project would implement mercury control technology, as described below, which would meet or exceed any anticipated regulatory requirement as activated carbon beds to treat pre-combustion syngas would be state-of-the art technology.**

The maximum potential emissions of mercury from the Mesaba Generating Station (both Phase I and Phase II) would be 0.026 tons per year, which is below the major source threshold for HAPs of 10 tpy. The maximum potential emissions are based on the worst-case scenarios, which reflect the highest heat input rates and a cautious approach regarding the design optimizations that are expected (Excelsior, 2006b). However, for the Mesaba Energy Project, the IGCC Power Plant would include a mercury removal system, which would remove mercury from the syngas.

During syngas clean-up process, fixed beds of activated carbon would be provided to remove residual mercury from the syngas (Excelsior, 2006b). The activated carbon capacity for mercury ranges up to 20 percent by weight of the carbon (Parsons, 2002). The mercury removal system would remove enough mercury from the syngas so that the mercury content of the syngas fuel is no more than 10 percent of the mercury contained in the solid IGCC feedstock. The IGCC technology has an advantage over conventional systems because the gas clean up equipment can be much smaller in size and the residence time for allowing contact between a chemical (like mercury) and an absorbent (like activated carbon) can be increased, thereby providing for greater pollutant removal efficiency (Excelsior, 2006d). This pre-combustion gas clean-up process allows for highly effective mercury removal rates, which in the case of Mesaba Energy Project would result in at least 90 percent reduction of the amount in the feedstock. The contribution of Mesaba Generating Station point sources to mercury emission in the region would be minimal and the Mesaba Energy Project would be able to meet stringent utility MACT and cap-and-trade requirements.

Minnesota is currently in the process of determining how to implement the statewide mercury TMDL, which sets an annual air emission target of 789 pounds by 2025. However, no rules have yet

been finalized nor have draft rules been placed on notice for public review. A mercury offset program has not yet been established and any offset project that Mesaba Energy Project might implement would depend on the specifics of that program. To date, Excelsior has met with the MPCA to discuss how to permit the Mesaba Energy Project while working within the framework of evolving guidelines being established for new and expanding sources. Based on discussions at these meetings, MPCA would take into consideration the innovative nature of the Mesaba Energy Project (i.e., the lack of a robust historical testing database from which emission factors might be generated) and the MPCA would allow Excelsior to establish the project's expected annual emissions using the best information it can assemble from published research studies, expert testimony, and testing results from similar mercury control technologies applied on sources in different industrial sectors (i.e., technology transfer). Discussions between MPCA and Excelsior have focused around developing mercury offsets in the amount that the project's expected actual annual emissions exceed the *de minimis* threshold of three pounds per year. As discussed above, Excelsior has proposed mercury emission control consistent with a minimum removal rate of 90 percent, which meets or exceeds best available controls. The need for any additional offsets would be determined by MPCA in the permitting process and the Mesaba Energy Project would be subject to applicable future requirements as final rules are promulgated.

Deposition of Mercury

As part of the AERA, dispersion modeling of mercury emissions was conducted to assess potential health risks associated with potential ingestion of fish tissue that has been exposed to mercury emissions deposited into lakes from the Mesaba Generating Station. The results of the health risk assessment are provided in Section 4.17. The methodology for the risk analysis is provided in Appendix C. The AERA evaluation was completed for the area within a 3-kilometer radius of the proposed facility emission points (Excelsior, 2006b). Air dispersion modeling for mercury from the site is conducted using AERMOD. AERMOD input files, receptor grids, meteorological data and assumptions are the same as those used for the ambient air quality modeling analysis, with one exception: for the risk assessment dispersion modeling, background deposition is included. A wet and dry-vapor deposition and wet and dry-vapor depletion is specified in the model. The MPCA default for background wet-plus-dry ambient mercury deposition of 12.5 micrograms per square meter-year to lake surfaces and 33.6 micrograms per square meter-year to the rest of the watershed was used in the model and included a 10 percent watershed deposition transported to water body. The AERMOD model estimated that the mercury mass concentrations that would be deposited over lakes and watershed from the Mesaba Generating Station would be 1.3×10^{-5} micrograms per cubic meter. The mercury depositional velocity estimated would be 0.01 centimeters per second over the lake and 0.05 centimeters per second over the rest of the watershed.

The model also indicated that Big Diamond Lake would be within the release plume of future facility emissions (Excelsior, 2006b); therefore, the result of this modeling was used to determine the incremental contribution of mercury in fish tissues caught from Big Diamond Lake (see Section 4.17). The risk analysis indicates that the incremental increase in mercury in fish tissue from the proposed facility is 0.003 parts per million. These estimations of risk associated with fish consumed by adult subsistence fishers on Big Diamond Lake indicated that the predicted increment attributable to the proposed facility emission results in a hazard quotient of 0.06, which is less than the acceptable MPCA risk value of 1.0. Mercury emissions and subsequent deposition would be reduced by the high efficiency IGCC technology combined with the mercury removal carbon absorption beds, to ensure that mercury emissions from the facility would be less than 10 percent of the mercury in the feedstock.

Odor

The State of Minnesota does not have regulations to control odor; however, public protection of nuisance odor emissions is offered through the state's public nuisance statute, Chapter 608.73 (SRF, 2004). The CAA regulates emissions of odorous compounds such as VOC and HAPs based on thresholds for human health impacts not odor. The potential for odors from coal-fired power plants is primarily related to the H_2S and ammonia (NH_3) being produce from the feedstock. In the proposed gasification process, most of the nitrogen and nitrogen in the feedstock would convert to H_2S and NH_3, respectively. In the syngas cooling step of the process, most of the NH_3 and a small portion of CO_2 and H_2S present in the syngas are absorbed in the water that is condensed. The water is collected and sent to the sour water treatment unit. The cooled sour syngas is fed to the AGR system where H_2S is absorb in a solution and sent to the SRU where it is converted to elemental sulfur. The condensed water sent to the sour water treatment unit contains small amounts of dissolved gases (CO_2, NH_3, H_2S, and other trace contaminants). The gases are stripped from the sour water in a two-step process. First, the CO_2 and H_2S are removed in the CO_2-stripper column by steam stripping and directed to the SRU. The rest is treated in an NH_3-stripper column to remove the NH_3 and remaining trace components. The stripped NH_3 is combined with the recycled slurry water. The water that is stripped of the dissolved gases is reused within the plant to minimize water consumption and discharge. Since the SRU and the sour water treatment unit are completely enclosed, there would be no discharges to the atmosphere.

Other odors would be emitted from activities such equipment maintenance, coal pile and coal handling, and sulfur storage and handling. Any of these potential odors should be limited to the immediate site area and should not affect offsite areas. Additionally, reducing VOC and HAP emissions at the facility would have the indirect but added benefit of odor reduction.

4.3.3 Impacts of the No Action Alternative

For the purposes of this EIS, as explained in Section 2.1.1.2, the DOE No Action Alternative is assumed to be equivalent to a “No Build” Alternative. **As a commercial-scale demonstration of the IGCC technology, the Mesaba Energy Project would be a key element in DOE’s research and development effort for IGCC in conjunction with the CCPI Program. Based on an analysis by DOE using the National Emissions Modeling System of the U.S. Energy Information Agency, the No Action Alternative, as a “No-Build” Alternative, would jeopardize potential benefits anticipated from the commercial implementation of IGCC. These benefits include more cost-effective CCS options, progress in reducing greenhouse gas emissions, and cost-effective reductions of emissions of criteria pollutants beyond levels required by regulatory caps in the utility sector. To the extent that IGCC power plants are substituted for existing conventional, coal-fired power plants, commercialization and deployment of the E-Gas technology would contribute to a reduction in visibility impacts attributed to the power plants that are replaced.**

4.3.4 Summary of Impacts

Below is a summary of impacts on air resources based on the criteria discussed in Section 4.3.1.

Basis for Impact	No Action	West Range	East Range
Result in emissions of criteria pollutants and HAPs and conflict with the NSR and PSD regulations	Would not result in emissions of criteria pollutants and HAPs or conflict with NSR and PSD regulations	**For Phases I and II combined,** annual emissions of criteria pollutants from the Mesaba Generating Station (**Table 4.3-7**) would include 1,390 tons of SO_2, 2,872 tons of NO_X, 2,539 tons of CO, 0.03 tons of Pb, **532** tons of PM_{10}, and 197 tons of VOC **(for Phase I-only, levels would be half of those emitted under the combined phase)**. The facility would be a major source of air emissions **for both the single and combined phases** under the PSD regulation because SO_2, NO_X, CO, PM_{10}, and VOC emissions would be greater than **the PSD significance thresholds**. However, process modification and improved work practices would be implemented to limit potential annual emission rates. Based on the result of Class II PSD increment analysis (**Table 4.3-9**), the Mesaba Energy Project would comply with all state and Federal increment limits **for both the single and combined phases**. **Mesaba Generating Station would be below the 10-tpy and 25-tpy for individual and combined major source threshold, respectively, for HAPs for both the single and combined phases.**	**For Phases I and II combined,** annual emissions of criteria pollutants from the Mesaba Generating Station **(Table 4.3-7)** would include 1,390 tons of SO_2, 2,872 tons of NO_X, 2,539 tons of CO, 0.03 tons of Pb, 709 tons of PM_{10}, and 197 tons of VOC **for Phase I-only, levels would be half of those emitted under the combined phase)**. The facility would be a major source of air emissions **for both the single and combined phases** under the PSD regulation because SO_2, NO_X, CO, PM_{10}, and VOC emissions would be greater than **the PSD significance thresholds**. However, process modification and improved work practices would be implemented to limit potential annual emission rates. Based on the result of Class II PSD increment analysis (**Table 4.3-9**), the Mesaba Energy Project would comply with all state and Federal increment limits **for both the single and combined phases**. PM_{10} concentrations would be higher in the East Range Site as a result of higher cooling tower emissions. **Mesaba Generating Station would be below the 10-tpy and 25-tpy for individual and combined major source threshold, respectively, for HAPs for both the single and combined phases.**
Result in changes in air quality related to the NAAQS and MAAQS and conflict with local or regional air quality management plans	Would not result in changes in air quality related to the NAAQS and MAAQS and not conflict with local or regional air quality management plans	Based on the results of Class II NAAQS analysis (**Tables 4.3-10 and 4.3-11**), all predicted concentrations of each the pollutants were below allowable levels and would demonstrate compliance with all NAAQS and MAAQS **for both the single and combined phases**. Therefore, the Mesaba Energy Project would neither result in significant changes air quality that would affect the attainment status of the area nor would it conflict with the local or regional air quality management plans.	**Based on the result of Class II NAAQS analysis (Tables 4.3-10 and 4.3-11), all predicted concentrations of each the pollutants were below allowable levels and would demonstrate compliance with all NAAQS and MAAQS for both the single and combined phases. Therefore, the Mesaba Energy Project would neither result in significant changes air quality that would affect the attainment status of the area nor would it conflict with the local or regional air quality management plans.**

Basis for Impact	No Action	West Range	East Range
Result in consumption of PSD increments, affect visibility, and cause regional haze in Class I areas	Would not result in consumption of PSD increments, affect visibility, or cause regional haze in Class I areas	**Based on the result of Class I areas-related impacts analysis (modeled for "proposed" controls for Phase I and Phase II) (Table 4.3-13), impacts from the Mesaba Energy Project would be below allowable increments of all pollutants in Class I areas and there would be no violation attributable to both the Phase I-only and Phases I and II combined emissions. Long-term impacts would also be below the SILs for all Class I areas, indicating that impacts would be insignificant. However, for short-term SO_2 and PM_{10}, levels are indicated to exceed the SILs in the BWCAW and VNP; thus, a cumulative analysis was conducted and presented in Section 5.2.2.** **The Visibility/regional haze analysis in Class I areas using Method 2 predict that there would be days with ≥5% change in light extinction or ≥10% change in light extinction (Table 4.3-15). Results based on Method 8, indicate that emissions associated with Phases I and II would have the potential to produce impacts above the 5% limit at BWCAW and VNP (Table 4.3-15). The following summarizes the visibility impacts analysis results for both Method 2 and Method 8:** **<u>BWCAW</u>** • **Method 2 (in a given year): 1 to 21 days of ≥5% light extinction and 0 to 6 days of ≥10% light extinction, depending on operating scenario.** • **Method 2 (2002-2004): 5 to 54 days of ≥5% light extinction and 0 to 13 days of ≥10% light extinction, depending on operating scenario.** • **Method 8 (annual): 8th highest values would exceed the 5% limit for "proposed" / "proposed" (highest value, 5.13%).** • **Method 8 (20%): 8th highest values would exceed the 5% limit for "proposed" / "proposed" (highest value, 7.4%) and "proposed" / "enhanced" (highest value, 5.75%).**	**Based on the result of Class I areas-related impacts analysis (modeled for "proposed" controls for Phase I and "enhanced" controls for Phase II) (Table 4.3-14), impacts from the Mesaba Energy Project would be below allowable increments of all pollutants in Class I areas and there would be no violation attributable to both the Phase I-only and Phases I and II combined emissions. Long-term impacts would also be below the SILs, indicating that impacts would be insignificant. However, for short-term SO_2 and PM_{10}, levels are indicated to exceed the SILs in the BWCAW; and short-term SO_2 at VNP; thus, a cumulative analysis was conducted and presented in Section 5.2.2. Additionally, SILs exceeded for short-term SO_2 at IRNP and RLW; however, no cumulative analysis was conducted for these as these occurred for the flaring scenario, which is considered an infrequent event.** **The visibility modeling analysis results for the East Range Site reflect the influence of the site's closer proximity to BWCAW by the commensurate higher predicted number of days with a change in light extinction above 5% and 10% for the same operating scenarios (Table 4.3-16). The following summarizes the visibility impacts analysis results for both Method 2 and Method 8:** **<u>BWCAW</u>** • **Method 2 (in a given year): 10 to 86 days of ≥5% light extinction and 0 to 29 days of ≥10% light extinction, depending on operating scenario.** • **Method 2 (2002-2004): 71 to 193 days of ≥5% light extinction and 7 to 43 days of ≥10% light extinction, depending on operating scenario.** • **Method 8 (annual): 8th highest values would exceed the 5% limit for all operating scenarios modeled (highest value, 10.28%).** • **Method 8 (20%): 8th highest values would exceed the 5% limit for all operating scenarios modeled (highest value, 14.69%).**

Basis for Impact	No Action	West Range	East Range
		<u>VNP</u> • **Method 2 (in a given year): 1 to 22 days of ≥5% light extinction and 0 to 7 days of ≥10% light extinction.** • **Method 2 (2002-2004): 9 to 51 days of ≥5% light extinction and 1 to 12 days of ≥10% light extinction, depending on operating scenario.** • **Method 8 (annual): 8th highest values would exceed the 5% limit for "proposed" / "proposed" (highest value, 5.95%).** • **Method 8 (20%): 8th highest values would exceed the 5% limit for "proposed" / "proposed" (highest value, 8.57%) and "proposed" / "enhanced" (highest value, 6.64%).**	**<u>VNP</u>** • **Method 2 (in a given year): 1 to 7 days of ≥5% light extinction and 0 to 2 days of ≥10% light extinction.** • **Method 2 (2002-2004): 4 to 14 days of ≥5% light extinction and 0 to 3 days of ≥10% light extinction, depending on operating scenario.** • **Method 8 (annual): 8th highest values would exceed the 5% limit for none of the operating scenarios modeled.** • **Method 8 (20%): 8th highest values would exceed the 5% limit for "proposed" / "proposed" (highest value, 5.49%).** **<u>IRNP</u>** • **Method 2 (in a given year): 0 to 2 days of ≥5% light extinction and 0 to 1 days of ≥10% light extinction.** • **Method 2 (2002-2004): 1 to 2 days of ≥5% light extinction and 0 to 1 days of ≥10% light extinction, depending on operating scenario.** • **Method 8 (annual): 8th highest values would exceed the 5% limit for none of the operating scenarios modeled.** • **Method 8 (20%): 8th highest values would exceed the 5% limit for none of the operating scenarios modeled.**
Result in nitrogen and sulfur deposition in Class I areas	Would not result in N and S deposition in Class I areas	**Nitrogen and sulfur deposition modeling results are presented in Table 4.3-20. No exceedances of the DAT for nitrogen would occur at any of the Class I areas for all operating scenarios. No exceedances of the DAT for sulfur would occur under the Phase I-only scenario; exceedances of the DAT for sulfur would occur at BWCAW for "proposed"/"proposed" scenario and VNP for "proposed"/"proposed" and "proposed"/ "enhanced" scenarios.**	**Nitrogen and sulfur deposition modeling results are presented in Table 4.3-20. DAT exceedances for nitrogen would occur at the BWCAW for all operating scenarios. DAT exceedances for sulfur would occur at BWCAW for all operating scenarios and at VNP for the "proposed"/ "proposed" scenario.**

Basis for Impact	No Action	West Range	East Range
Exceed allowable emissions of SO_2 and NO_X under the state and Federal acid rain regulations	Would not exceed allowable emissions of SO_2 and NO_X under the state and Federal acid rain regulations	As a utility plant generating more than 25 MW of electricity, the Mesaba Energy Project would be required to obtain a Phase II Acid Rain Permit. Since the Mesaba Generating Station would be operated within its prescribed allowance, no appreciable impacts related to acid rain would be expected to occur.	The Acid Rain requirements are independent of the potential sites; therefore the impacts in the East Range Site would be similar to those in the West Range Site.
Exceed allowable emissions of mercury under **regulations related to coal-fired electric utilities**	Would not exceed allowable emissions of mercury under **regulations related to coal-fired electric utilities**	**Based on recent developments, EPA has decided to develop emissions standards for power plants consistent with the D.C. Circuit's 2008 ruling to vacate the CAMR. Although the final MACT is unknown at this time, the Mesaba Energy Project would implement mercury control technology, which would meet or exceed any anticipated regulatory requirement as activated carbon beds to treat pre-combustion syngas would be state-of-the art technology**.	**Similar to the West Range Site, the Mesaba Energy Project at the East Range Site would implement mercury control technology, which would meet or exceed any anticipated regulatory requirement as activated carbon beds to treat pre-combustion syngas would be state-of-the art technology.**
Discharge objectionable odors into the air	Would not discharge objectionable odors into the air	The potential for odors from the Mesaba Generating Station is primarily related to H_2S and NH_3 in the feedstock. Other odors would be emitted from activities such as equipment maintenance, coal pile handling, S storage and handling but would be localized. H_2S and NH_3 odor from processes involved in the IGCC power plant operations would be negligible because the processes are completely enclosed, eliminating discharges into the atmosphere.	Potential odor discharge is independent of potential site; therefore the impacts in the East Range Site would be similar to those in the West Range Site.
Result in fugitive dust emissions during construction and operation	Would not result in fugitive dust emissions during construction and operation	Fugitive dust emissions would be increased during construction and operations from vehicle traffic, transportation of materials, and material handling. The impact would be localized and would decrease with distance from the site.	Emissions from construction and operations are independent of the potential site; therefore, the impacts in the East Range Site would be similar to those in the West Range Site.

Basis for Impact	No Action	West Range	East Range
Causes solar loss, fogging, icing, or salt deposition that interferes with quality of life for nearby residents	Does not cause solar loss, fogging, icing, or salt deposition that interferes with quality of life for nearby residents	Because the steam plumes from the cooling tower consist almost entirely of condensed water, they have no adverse effects other than their visual impact. The drift rate of the cooling towers serving Mesaba Generating Station would be very low (0.001 percent of the circulating water) and **78 tpy of PM would result from drift**. Therefore, deposition of these particles on surrounding ground surfaces would be negligible. Given data and experience at other cooling tower installations, it is concluded that there would be no significant fogging, icing, or drift deposition impacts of the Mesaba Generating Station cooling towers on off-site human activities or the environment. The only predicted impacts are the visual impact of steam plumes in cold, moist weather conditions, and occasional very light localized fallout of snow crystals during times of very low temperature.	Because the steam plumes from the cooling tower consist almost entirely of condensed water, they have no adverse effects other than their visual impact. The drift rate of the cooling towers serving Mesaba Generating Station would be very low (0.001 percent of the circulating water) and **256 tpy of PM would result from drift**. Therefore, deposition of these particles on surrounding ground surfaces would be negligible. Given data and experience at other cooling tower installations, it is concluded that there would be no significant fogging, icing, or drift deposition impacts of the Mesaba Generating Station cooling towers on off-site human activities or the environment. The only predicted impacts are the visual impact of steam plumes in cold, moist weather conditions, and occasional very light localized fallout of snow crystals during times of very low temperature.
Result in emissions from transportation	**Would not result in any transportation-related emissions**	**POVs: During peak construction activities, the following daily emission rates (lb/day) during Phases I and II combined would occur (Table 4.3-3): 0.8 NO_x; 11 CO; 0.48 NMOC; and 0.2 PM. Peak traffic counts from project (during Phase I and II construction overlap) would still be minor fraction of existing AADT threshold and, therefore, impacts are considered negligible (Phase I-only emissions would be half of levels occurring under the combined phase).** **Rail: During operation, the following annual emissions would occur (tpy) (Table 4.3-4): 150,000 CO_2; 1.5 SO_2; 2,300 NO_x; 80 PM; and 410 CO (Phase I-only emissions would be half of levels occurring under the combined phase).** **Trucks: During operation, the following annual emissions would occur (tpy) (Table 4.3-5): 7,700 CO_2; 0.1 SO_2; 60 NO_x; 0.8 PM; and 7 CO (Phase I-only emissions would be half of levels occurring under the combined phase).** **Relative to plant-wide emissions and considering sources are mobile, transportation-related emissions are considered negligible for both the single and combined phases.**	**POVs: During peak construction activities, the daily emission rates and impacts would be similar to those of West Range Site (Table 4.3-3).** **Rail: During operation, the following annual emissions would occur (tpy) (Table 4.3-4): 170,000 CO_2; 1.7 SO_2; 2,600 NO_x; 90 PM; and 460 CO (Phase I-only emissions would be half of levels occurring under the combined phase).** **Trucks: During operation, the following annual emissions would occur (tpy) (Table 4.3-5): 8,100 CO_2; 0.1 SO_2; 61 NO_x; 0.8 PM; and 7 CO (Phase I-only emissions would be half of levels occurring under the combined phase).** **Relative to plant-wide emissions and considering sources are mobile, transportation-related emissions are considered negligible for both the single and combined phases**.

4.3.5 Mitigation Issues

Beyond the project's use of inherently high-efficiency and low-polluting IGCC technology, the BACT analysis for the Mesaba Generating Station identified pollution prevention ("P2") techniques, process modifications, and improved work practices as being consistent with the definition of BACT established at 40 CFR 51.166(b)(12) and with the results of other BACT analyses conducted for previously permitted IGCC facilities (Excelsior, 2006d). The following pollution prevention techniques, process modifications, and improved work practices would be implemented:

- NO_X – Use of nitrogen from the air separation unit as a diluent to reduce flame temperature in the CTGs; using fully treated (i.e., clean) syngas or natural gas in the TVBs; incorporating good flare design; flaring only fully treated syngas; implementing good combustion practices (such as a combination of temperature profile, residence time, turbulence, and excess air levels) in the TVBs; limiting the hours of operation of the fire pumps and emergency generators; and using low-sulfur diesel in the fire pumps and emergency generators.
- CO and VOC – Implementing good combustion practices in the CTGs and TVBs; using fully treated syngas or natural gas in the TVBs; incorporating good flare design; flaring only treated syngas; limiting the hours of operation of the fire pumps and emergency generators; and using low-sulfur diesel in the fire pumps and emergency generators.
- SO_2 – Using fully treated syngas in the CTGs; recirculating tail gas from the sulfur recovery unit to the gasifier; using fully treated syngas or natural gas in the TVBs; implementing good combustion practices in the TVBs; incorporating good flare design; flaring only fully treated syngas; limiting the hours of operation of the fire pumps and emergency generators; and using low-sulfur diesel in the fire pumps and emergency generators.
- H_2SO_4 – Using fully treated syngas in the CTGs.
- PM (combustion sources) – Implementing good combustion practices in the CTGs and TVBs; incorporating high efficiency drift eliminators in the cooling towers; using fully treated syngas or natural gas in the TVBs; incorporating good flare design; flaring only treated syngas; limiting the hours of operation of the fire pumps and emergency generators; and using low-sulfur diesel in the fire pumps and emergency generators.
- **PM (material handling) – Enclosing coal conveyors; using dust suppression systems at transfer points; using baghouse filter system to control dust in coal unloading building; applying dust suppressants as needed to reduce windblown dust from active and passive storage piles; minimizing drop heights; imposing speed limits on roadways; and watering unpaved roads as necessary**.

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4.4 GEOLOGY AND SOILS

4.4.1 Approach to Impacts Analysis

4.4.1.1 Regions of Influence

The regions of influence are similarly defined for the West Range and East Range Sites, and include the physical setting for all areas that would be directly and indirectly impacted by construction and operation of the Mesaba Generating Station and its associated HVTL, utility, and transportation corridors. The region of influence includes the IGCC power plant buffer lands, the 100- to 150-foot wide HVTL ROWs and the 150-foot wide pipelines ROW. The majority of the temporary construction impacts would be limited to areas closest to the facility footprint and corridor centerlines.

4.4.1.2 Method of Analysis

The evaluation of potential impacts on the physical setting and physiographic resources considered whether the Proposed Action or an alternative would cause any of the following conditions:

- Soil erosion or loss of topsoil;
- The direct conversion of prime and unique farmland to non-agricultural uses;
- The loss of availability of a known mineral resource that would be of value to the region;
- An on-site or off-site landslide, subsidence, or collapse, potentially resulting from a location on a geologic unit or soil that would be unstable as a result of the project;
- Exposure of people or structures to substantial adverse effects from seismic activity;
- The contamination of soil or mineral resources; or
- The loss of paleontological resources that would be of value to the region.

Impacts to the physical setting were assessed based on map and field resource data. The primary information about geology and soils around the West Range and East Range Sites was compiled using regional geology maps, the Itasca Soil Survey, and preliminary NRCS soil data (Excelsior, 2006b; Jirsa et al., 2005; USDA, 1987). At this time, a soil survey for St. Louis County is not available. The environmental consequences discussion in this section addresses the potential impacts to the geology, mineral resources, soil quality, and from seismic events. Certain impacts to the physical setting are related to other resource concerns, specifically impacts from fugitive dust emissions and soil erosion; these impacts are also discussed in Section 4.3 (Air Quality) and 4.5 (Water Resources), respectively.

The disturbance area describes the maximum area where potential impacts to the physical setting may occur. This area would also include the permanent impacts from structures such as foundations and rail beds. The magnitude of potential impacts from increased erosion and farmland loss are defined by the disturbance area, while the presence or absence of construction-restricting deposits (e.g., glacial till and peat) would determine the potential for collapse.

Minnesota Rule 4400.3450, subpart 4 (“Prime Farmland Exclusion”) provides that “No large electric power generating plant site may be permitted where the developed portion of the plant site, excluding water storage reservoirs and cooling ponds, includes more than 0.5 acres of prime farmland per megawatt of net generating capacity, or where makeup water storage reservoirs or cooling pond facilities include more than 0.5 acres of prime farmland per megawatt of net generating capacity, unless there is no feasible and prudent alternative.” The provision does not apply to areas located within home rule charter or statutory cities, areas located within two miles of home rule charter or statutory cities of the first, second, and third class, or areas designated for orderly annexation under Minnesota Statutes § 414.0325 (Excelsior, 2006a).

4.4.2 Common Impacts of the Proposed Action

The sections below describe the common impacts to the physical setting from the construction and operation of the Proposed Action and alternatives. Since these impacts could occur to some extent at both the West and East Range Sites, they are described in general terms.

4.4.2.1 Impacts of Construction

Direct impacts to the physical setting would occur during construction, which would last three years for Phase I, and an additional two to three years for Phase II. Both the West and East Range Sites would require clear cutting, grading, and basic earthmoving activities during the construction phase. In addition, the network of water (process water, potable water, and sanitary sewers) and natural gas pipelines would primarily require clearing vegetation and trenching. These activities could increase the potential for soil erosion as well as topsoil loss. Implementation of erosion best management practices, such as stockpiling and covering topsoil, installing wind and silt fences, and reseeding the disturbed areas would minimize the long-term impacts from construction. **Prior to construction, Excelsior would use the National Geodetic Survey's website to compare the current location of geodetic markers to the proposed construction corridors. If there were any conflicts, Excelsior would notify the National Geodetic Survey 90 days prior to the markers' potential disturbance by construction.**

Portions of the West Range and East Range structures would be constructed on glacial till. The till is generally a sandy lean clay or clayey sand, which easily retains water, and is generally easily eroded and difficult to re-vegetate, especially when disturbed. Construction activities that disturb glacial till below the topsoil would have the potential to increase erosion. In order to minimize soil erosion and sediment transport, it would be necessary to develop and implement a SWPPP and use techniques as described in the MPCA's *Best Management Practices for Dealing with Storm Water Runoff from Urban, Suburban and Developing Areas of Minnesota* (MPCA, 2000). Establishment of vegetative cover on the till would require placement of topsoil, which would be stockpiled and covered until construction measures were completed. Additional discussions about the potential impacts and mitigation measures on the area vegetation are provided in Section 4.8, Biological Resources.

In areas with a high water table or poor drainage, the saturated glacial till would be unsuitable for building stable foundations. Coarse alluvium consisting of sand and gravel is suitable for use as foundation fill if it is processed to remove cobbles and boulders. Finer grained material would tend to erode easily on slopes if it remains un-vegetated. Alluvial deposits would also need to be compacted to ensure foundation stability, and sand and gravel with high fines content may need to be dewatered if it is too wet. After construction, topsoil replacement over the sand and gravel would improve the establishment of vegetative cover, and reduce the potential erosion impacts.

Organic soils such as peat or muck tend to be spongy and unstable when loaded. These materials are not suitable beneath building or equipment foundations, and they increase the potential for uneven subsidence. To minimize these potential impacts, the peat and muck deposits would be excavated and replaced with competent fill prior to construction of the power station facilities. Excavation of large amounts of peat would contribute to the potential for erosion around the construction site. Along the HVTL corridors, the typical drilled shaft foundation, (e.g., caisson) would not be suitable in the peat deposits, and other foundation types (e.g., helical piles or driven piles) may need to be considered. Peat is also not suitable for support of transmission tower foundations, so the foundations would need to extend through the peat deposit to suitable bearing soils or bedrock. Foundation types and depths would be further evaluated after a geotechnical investigation has been performed in the selected utility corridor.

Peat is also highly compressible and does not support heavy construction equipment; therefore, equipment movement over unstablized organic materials could generate unstable and unsafe conditions. This would be mitigated by use of stabilizing equipment such as crane mats and/or low ground pressure equipment. Construction during the winter months could also reduce the difficulty of construction within areas of peat, and it would minimize erosion impacts to the soft, compressible, wet soils found in the wetlands.

Construction of temporary haul roads would be necessary along the HVTL and other utility corridors to provide access for material delivery and personnel. To minimize the long-term erosion impacts, these haul roads would be removed and vegetation re-established within the ROW.

Both proposed facility sites and corridors would disturb some soils classified as prime farmland soils, as well as soils classified as farmland of statewide importance. These soils require special consideration during construction. The USDA tracks conversions of prime or statewide important soils to other uses through their NRCS. Impacts or direct conversions of prime or statewide important farmland would require completion of a Farmland Conversion Impact Rating, Form AD-1006, by the NRCS in Itasca County and St. Louis County. A soil survey for Itasca County has been completed; however, the NRCS has not completed the soil survey for St. Louis County; therefore, the amount of potentially disturbed farmland soils is not available.

Construction-related impacts to soils could also occur from the accidental release of contaminants such as fuels, lubricants, and antifreeze. These types of materials may be stored in the staging area of the Mesaba Generating Station construction area, and any spills could result in localized soil contamination and could potentially migrate into the groundwater. However, the scale of the project and localized use would preclude large spills. Should a spill occur, prompt response actions (including adequate sampling and remediation) would be performed in accordance with state and Federal regulations.

Standard post-construction restoration activities would reduce the long-term impacts from soil erosion. These activities would include removing and disposing of debris, dismantling all temporary facilities (including staging and lay down areas), leveling or filling tire ruts, employing appropriate erosion control measures, and reseeding areas disturbed by construction activities with vegetation similar to that which was removed. Disturbed areas would be restored to their original condition to the extent practicable.

Route selection and construction of new HVTLs, pipelines, rail alignments, and access roads would be required for the Mesaba Energy Project Phase I. Also, during construction of the Phase I plant, the Phase II footprint would be cleared and prepared as a staging and laydown area for stockpiling of construction materials and storage of equipment, as well as for a cement batch plant. Therefore, the incremental impacts from construction of the Phase II plant would be negligible with respect to the affected site and corridors. With the exception of the temporary use of off-site laydown areas for Phase II construction, which would occur on one or more previously disturbed sites, the impacts on geology and soils would be essentially the same for Phase I as for both phases of the Mesaba Energy Project.

4.4.2.2 Impacts of Operation

The potential impacts to the physical setting from the operation of the Proposed Action would be low when compared to the impacts from construction. The**re is a low** potential of a significant earthquake (Mooney, 1979). Minnesota is located on one of the most stable areas of North America, and earthquakes with a Richter magnitude of 4 or greater are very rare. The lack of high-intensity earthquakes, together with the infrequency of earthquakes in general, implies a low risk level for Minnesota (Mooney, 1979). In addition, the State Building Code considers the state to be in a Seismic Risk Zone 0 (Mooney, 1979) and states that “any seismic earthquake provisions in this code are deleted and not required.” Therefore, no activities from construction or operation of the Proposed Action or alternatives would expose workers or local residents to seismic hazards.

Ground surface disturbances related to repair activities to the pipelines, HVTL, roads, and rail alignments could occur during the operation phase of the power station. However, these disturbances would be temporary, would occur within the areas previously disturbed during construction, and would not result in any additional impacts from those previously discussed for construction activities. Repairs may require clearing vegetation and some soil exposure in order to make the necessary repairs; however, with appropriate grading and re-vegetation practices, potential erosion impacts would be mitigated.

Rail and car traffic would increase the potential for soil contamination around the generating station and rail alignments as a result of spills of hazardous materials. However, such spills would likely be small and related to operation of the rail cars and vehicles, rather than a large container spill. Section 4.16, Materials and Waste Management, describes the impacts related to waste and hazardous materials at the power station.

In the event that the project eventually incorporated carbon capture technology, it is possible that carbon dioxide would be transported by pipeline to a yet undetermined sequestration location. Possible effects on geology and soils of this pipeline cannot be determined at this time.

The incremental impacts on geology and soils from operation of the two-phased generating station would be negligible in comparison to the operation of Phase I only.

4.4.3 Impacts on West Range Site and Corridors

4.4.3.1 Impacts of Construction

Table 4.4-1 summarizes the information about surface disturbance and earthmoving activities due to construction of the IGCC power plant. Construction of the plant would occur exclusively within the West Range Site, approximately **1,708** acres. Prior to construction, clearing and grubbing would clear the existing forest for the power station footprint and staging/lay down areas. The existing topsoil would be removed and stockpiled for later restoration use. Extensive grading would be required, generating a flat area for the temporary staging and lay down areas, and a stable foundation for the plant. Some of the fill would cover existing organic soils.

Table 4.4-1. Areas of Disturbance (West Range Site)

Structure	Area of Disturbance (acres)	Total Prime Farmland Soils and Farmland of Statewide Importance (acres)	Earthwork Cut (cubic yards)	Earthwork Fill (cubic yards)
IGCC Power Plant Footprint Phase I	202[1]	88	3,100,000	2,350,000
IGCC Power Plant Footprint Phase II	---[2]	65	---[2]	---[2]

[1] Area is for both Phase I and Phase II footprints, and does not include the buffer land that would not be disturbed. The area occupied by Phase II would need to be initially cleared to accommodate the laydown of the building materials.
[2] Included in Phase I construction.

Construction of the Mesaba Generating Station would increase the potential for erosion where the soils are disturbed. Some of the glacial material, such as the Nashwauk and Keewatin series till, have the potential to be easily eroded when disturbed. Excavated peat and muck from the site foundations could also be subject to erosion.

Construction of the Mesaba Generating Station would disturb a maximum of **152** acres of “Prime Farmland,” “Prime Farmland if drained” and “Farmland of Statewide Importance” (Table 4.4-1). Soils within the proposed power plant footprint and in the most disturbed areas would be permanently altered. These soils are currently located in a forested area with no current farming production. NRCS would need to complete Form AD-1006, the Farmland Conversion Impact Rating, to calculate the potential impacts to farmland soils. The entire IGCC power plant would be located within the Taconite city limits, and thus, exempted from Minnesota Regulation 4400.3450, described in section 4.4.1.2.

The only **process water** facilities associated with the West Range Site outside the city limits of Taconite and Marble are the LMP pumping station, Segment 1 of the Process Water Supply Pipeline, and the outfall at its point of termination of the Segment 1 pipeline (Excelsior, 2006a).

Table 4.4-2 presents key information about the HVTL alternative corridors for the West Range location. All of these corridors would require minimal grading, as the transmission tower elevations would vary with the topography. Construction along new corridors (for portions of HVTL Alternatives WRA-1 and WRA-1A) would require clearing and grubbing to clear all vegetation.

The proposed HVTL towers would be constructed at existing grade and be supported by a concrete pier foundation. The standard foundation would require an excavation 15 to 55 feet deep and would be 7 to 12 feet in diameter. Along the existing corridors, the previous HVTL towers would be removed and replaced with the new transmission towers that would accommodate both the existing lines and new HVTL. The disturbance of soils would be expected to be limited to those areas around the new transmission towers, as well as any necessary access roads for the construction equipment. The potential for erosion would be reduced by employing pre- and post-construction best management practices.

Table 4.4-2. Areas of Disturbance Associated with HVTL Corridors (West Range Site)

Structure	Area of Disturbance (acres)	Temporary ROW (width in feet)	Total Prime Farmland Soils and Farmland of Statewide importance (acres)		Tower Foundation Excavation requirements
			Temporary ROW area	Permanent disturbed area	
HVTL Alternative WRA-1	134	150	95	0.029	15-55 feet deep 7 to 12 feet diameter
HVTL Alternative WRA-1A	**136**	150	77	0.025	15-55 feet deep 7 to 12 feet diameter
HVTL Phase II Alternative Route WRB-2A	—[1]	—[1]	262	0.049	15-55 feet deep 7 to 12 feet diameter

[1] Data not available

The HVTL corridors would cross a variety of glacial deposits, including till, lacustrine, and alluvium. Organic deposits are also present around areas with low topography and shallow water tables. Construction activities would seek to minimize impacts to the peat and muck deposits by operating in these areas during the winter months, while the ground is frozen. In areas where the frozen ground would not support the weight of the construction equipment, cribbing or matting would be laid on the ground to distribute the weight. In addition, other foundations types (helical piles or driven piles) may be considered in areas of easily compressible and wet organic soils to increase the tower stability.

Construction of temporary haul roads could be necessary along the HVTL corridor in the wetland areas to provide access for material delivery and personnel. These haul roads would be completely removed and vegetation reestablished on the ROW. Erosion control measures and accepted best management practices would be implemented to minimize erosion impacts in these areas during construction.

All of the HVTL alternative corridors would cross “Prime Farmland” soils and “Farmland of Statewide Importance.” The soils would be permanently altered where the transmission tower foundations would be constructed. HVTL Alternative WRA-1 would permanently disturb 0.029 acres, Alternative WRA-1A would disturb 0.025 acres, and the Phase II Alternative would disturb 0.049 acres. Some farmland soils within the HVTL ROW may be temporarily disturbed from construction traffic, but would be restored with vegetation (Table 4.4-2).

The HVTL alternatives would cross sections of the Coleraine Formation south of Taconite. The Coleraine formation is an irregular conglomerate bed found between the older bedrock and the glacial deposits. Preserved marine shells and shark and reptile teeth have been recovered from excavated rock from this formation in mine tailing piles around the towns of Coleraine and Bovey. The Hill-Mine Annex State Park also holds fossil hunts in the excavated material. However, most of the Coleraine Formation bedrock in this area is 150 feet or more below the ground surface, which is well below the bottom of the proposed HVTL tower foundations, and no impacts to the fossils are anticipated.

Several pipeline corridors would be constructed as part the West Range IGCC power plant. Table 4.4-3 summarizes the key information used to describe the impacts from the construction of these pipelines. Some pipeline corridors would be constructed within previously undisturbed areas. Portions of the Process Water Segment 3 would require extensive clearing and grubbing activities for the new corridors. Some corridors (Process Water Segment 2, Sewer and Water Pipelines) would follow **CR 7 and would** connect **with** the Mesaba Generating Station **via the ROW for Access Road 3,** which would require **some** additional clearing **in the corridor**. Other corridors (e.g., Process Water Segment 1 pipeline) would cross areas already disturbed from past mining activities. **[Text in the Draft EIS pertaining to Cooling Tower Blowdown Outfalls has been eliminated in this paragraph and Table 4.4-3 based on the proposed use of an enhanced ZLD system at the West Range Site.]**

Construction on the pipeline corridors would attempt to mitigate erosion impacts around steep terrain and areas with poor drainage. On steep terrain or in wet areas, the ROWs may be graded at two elevations or diversion dams may be built to facilitate construction, and would be restored to their original conditions upon completion of construction. Excavation and grading will only be undertaken where necessary to increase stability and decrease the gradient of unstable slopes.

Table 4.4-3. Areas of Disturbance Along Proposed Pipeline Corridors (West Range Site)

Structure	Area of Disturbance (acres)	Temporary ROW (width in feet)	Total Prime Farmland Soils and Farmland of Statewide Importance (acres)		Excavation Requirements
			Temporary ROW Area	Permanent Disturbed Area	
Natural Gas Alternative 1	**135**	100	**99**	**76**	16-24" diameter pipe; Trench: 72" deep
Natural Gas Alternative 2	84	100	**64**	**58**	16-24" diameter pipe; Trench: 72" deep
Natural Gas Alternative 3	**99**	100	**64**	**51**	16-24" diameter pipe; Trench: 72" deep
Process Water Segment 1	40	150	**3.0**	**2**.0	Trench: 7-8 feet deep
Process Water Segment 2	**39**	150	**32**	**21**	Trench: 7-8 feet deep
Process Water Segment 3	**88**	150	52	35	Trench: 7-8 feet deep
Sewer and Water Line	**35**	100	**22**	**9**	**Sewer**: 12" diameter, trench graded but no deeper than 8 ft **Water**: 12" diameter trench 60" below surface

Potential construction impacts from unstable ground surface would be similar to those previously described for the HVTL corridors. In areas with large quantities of wet organic soils, construction may need to occur during the winter months. Construction of temporary haul roads may also be necessary along Process Water Segment 3 pipeline in the wetland areas to provide stable access for personnel and material delivery. These roads would be completely removed and re-vegetated after construction is complete.

The natural gas pipeline alternatives would initially travel over a new corridor, and either join one of the HVTL Plan A corridors (Gas Pipeline Alignment Alternative 1 and 2), or travel along US 169 (Gas Pipeline Alternative 3). All three alternatives would require minimal grading, but clearing and grubbing would be necessary through existing forest areas.

The potable water and sewer lines would follow the proposed **Access Road 3** and CR 7 to the main municipal pipelines at US 169. Trees and other vegetation would be cleared along the water and sewer pipeline corridor. Standard best management practices, approved by the MPCA, would reduce the potential for soil erosion in these areas. After construction, the vegetation and the roadway surface would be re-established.

Table 4.4-3 presents the potential impacts from pipeline construction activities to soils classified as “Prime Farmland,” “Prime Farmland if Drained,” and “Farmland of Statewide Importance.” If the farmland soils were excavated, covered, or excessively disturbed, than they would be altered from their original designation and effectively impacted. Soils disturbed through trenching activities are included in the permanent disturbed area. Other farmland soils within the construction ROW may be disturbed by traffic or other construction activities, but not significantly altered. Permanent changes to the amount of farmland soils would be reduced by restricting construction traffic to access roads close to the centerline and re-establishing vegetation to pre-construction conditions.

The rail alignment alternatives and access roads would connect the Mesaba Generating Station area to existing highways and main rail corridors. These corridors would be built at the beginning of the construction phase to facilitate personnel, equipment, and materials transport. Table 4.4-4 presents the key information used to describe the potential impacts from construction activities. **[Rail Alternative 1B was eliminated from further consideration based on the Draft EIS analysis. Therefore, text pertaining to Rail Alternative 1B has been eliminated in the following paragraphs and Table 4.4-4.]**

Construction of Rail Line Alternative 1A or **3B** would cut through existing forest to the cleared areas at the Mesaba Generating Station. Near the southern tip of Big Diamond Lake, the alternatives would generally follow an old railroad grade. In order to avoid a large mine tailings pile, Alternative**s** 1A **and 3B** would turn to the northwest to follow a new corridor between Big Diamond Lake and Dunning Lake. Trees and other vegetation would be cleared along the rail line corridor, and the vegetation would be re-established in areas of temporary disturbance after construction is completed on the rail line.

Rail alignments would require cuts and fills to attain an acceptable grade. Cuts would primarily be through till and coarse alluvium, and in some cases bedrock. The rail alternatives would require filling the low areas located between Big Diamond and Dunning Lake, and cutting through uneven terrain. **The Alternative 3B rail loop would also require additional cuts and fills around a 40-foot tall hill.** The rail loop of Alternative 1A would be located on up to 50 feet of fill material. Some of this fill would bury existing organic soils. Some of the cut material (sorted till, granite bedrock) would be used for the fill. Peat and muck would only be used as fill in constructed wetlands.

In the area between Big Diamond Lake and Dunning Lake and up to the power station, Alternative**s** 1A **and 3B** construction would require cuts of 30 to 78 feet below grade. Embankments as high as 36 feet would be required to cross low areas. If a surplus of fill material occurs, it would be graded around the Mesaba Generating Station, covered in topsoil and re-vegetated.

Table 4.4-4. Areas of Disturbance Along Rail Alignment Alternatives and Access Road (West Range Site)

Structure	Area of Disturbance (acres)	Maximum Temporary ROW (width in feet)	Total Prime Farmland Soils and Farmland of Statewide Importance (acres)		Earthwork Cut (cubic yards)	Earthwork Fill (cubic yards)
			Max temporary ROW	Permanent		
Rail Alignment 1A	**118**	Variable (80-450)	**50**	**22**	**3,725,000**	**610,000**
1A Center Loop	—[1]	—[2]	**25**	**27**	—[2]	—[2]
Rail Alignment 3B	**107**	**Variable (80-450)**	**66**	**33**	**2,620,000**	**620,000**
3B Center Loop	**—**[2]	**—**[2]	**—**[2]	**—**[2]	**—**[2]	**—**[2]
Access Road 3	**20**	**200**	**20**	**12**	**—**[1]	**—**[1]

[1]Data not available
[2]Data are included with the rail alignment

Both rail alignments would cross small sections of peat deposits, **although** most of **Rail Alternative 1A** rail loop would be **built on** wet organic soils. In these areas, special construction techniques would be necessary in order to stabilize the railway. It may be possible to construct railroad embankments over the material if the embankments were built up slowly over time. The determining factor would be the extent of long-term secondary compression of the peat and the impact of that compression on the project feature in question. Another option would be to excavate peat and muck deposits and replace the material with competent fill prior to construction, which would expose more topsoil to erosive processes. During construction, crane mats could also be used to mitigate damage to soft organic soils.

Permanent impacts to the soils classified as "Prime Farmland" or "Farmland of Statewide Importance" would occur below the rail bed, and within the area covered by the IGCC rail loop, as presented in Table 4.4-4.

As described in Section 2.3.1.2, the realignment of CR 7 (Access Road 1) has been deferred by Itasca County because of reduced state funding priority. Access Road 1 would be an extension of CR 7 by Itasca County that would require cuts through previously disturbed and undisturbed areas. Such cuts could be significant and the scenic view would be compromised if the road passed too closely to existing residential properties causing numerous driveways to be visible from the highway.

As described in Section 2.3.1.2, Access Road 2 would be contingent on the realignment of CR 7, which has been deferred by Itasca County since publication of the Draft EIS. Access Road 2 would require clearing of wooded areas in the southern part of the property.

Access Road 3 would be built to connect CR 7 to the Mesaba Generating Station **near the southwestern corner of the property**. This would require clearing vegetation and temporarily disturbing some soils within the construction corridor. After construction, vegetation would be re-established in areas of temporary impact. **[Text pertaining to Access Roads 1 and 2 in the Draft EIS has been eliminated in this paragraph and Table 4.4-4 based on the deferment of the CR 7 realignment project by Itasca County.]**

In areas with wet soil, additional dewatering processes and sediment compaction would be necessary to create a stable foundation for the roadbed. The roadway alignments would also cross organic (peat) soils outside of the plant site. To prevent the potential for subsidence, the peat deposits may either be removed or improved by dewatering processes with reinforced embankments. Additional construction procedures would be required to prevent construction impacts from subsidence on soft soils. Crane mats and/or low ground pressure equipment would be used in these areas. Construction during the winter months may also alleviate impacts due to construction.

During construction of Phase I, materials used for construction would initially be stored in the Phase II footprint, which would be prepared for use as a staging and laydown area. Therefore, the incremental impacts from construction of the Phase II plant would be **negligible on the West Range Site property. For Phase II, Excelsior would establish off-site construction staging and laydown areas on 85 acres of land at potential sites described in Chapter 2 and shown in Figure 2.3-3. The potential Phase II laydown areas have all been disturbed during prior uses by mineral extraction companies. Excelsior would select the appropriate sites for the necessary acreage prior to construction, taking into account the potential effects to soil disturbance. The lands would be cleaned and restored to their pre-existing condition at the end of Phase II construction.**

Because route selection and construction of new HVTLs, pipelines, rail alignments, and access roads would be required for the Mesaba Energy Project Phase I, and the Phase II footprint would be used as a laydown area for Phase I construction, the incremental impacts from construction of the Phase II plant would be negligible with respect to the site and affected corridors. Therefore, except for the temporary use of off-site laydown areas that have been previously disturbed, the impacts on geology and soils would be essentially the same for Phase I as for both phases of the Mesaba Energy Project at the West Range Site.

4.4.3.2 Impacts of Operation

No operational impacts other than those discussed in Section 4.4.2.2 are anticipated.

4.4.4 Impacts on East Range Site and Corridors

4.4.4.1 Impacts of Construction

Potential impacts to the physical setting at the East Range Site from construction would be similar to those described for the West Range Site. Phase I and II construction would occur within the **East Range Site property**, encompassing **1,322** acres**, and cause disturbance as indicated in** Table 4.4-5. Part of the forest within the buffer lands has historically been harvested for timber. Prior to construction, the existing vegetation would be cleared and grubbed. The land would be graded and fill would be added, if needed. Topsoil removed during construction would be stockpiled for use during the restoration phase. These construction activities would disturb the soil and increase the potential for soil erosion, especially on the till deposits, which erode easily when disturbed. Careful grading and proper reseeding of the area surrounding the footprint would mitigate these potential impacts.

No organic deposits are located within the buffer land area. Till compacts poorly when wet, so dewatering may be required to ensure that potential impacts from facility subsidence would not occur.

At this time, NRCS has not completed a soil survey for St. Louis County, which includes the proposed East Range IGCC power plant and associated corridors. From the preliminary information available, there are no soils classified as “Prime Farmland” or “Farmland of Statewide Importance” within the East Range Site (Excelsior, 2006b). To verify the preliminary results prior to construction, the NRCS would complete Form AD-1006, the Farmland Conversion Impact Rating.

The proposed East Range IGCC Power Station Footprint and Buffer Land, as well as many of the Station’s associated facilities are located entirely within the city limits of Hoyt Lakes, a statutory city. The Process Water Supply Pipeline Segment 7 is located within the City of Aurora, also a statutory city. The only associated facilities of the East Range Site that lie outside the city limits of Hoyt Lakes or Aurora are Segment 6 and Segment 8 of the Process Water Supply Pipeline. Therefore, the prime farmland exclusion does not apply to either the East Range IGCC Power Station Footprint, Buffer Land, any of the associated facilities or additional lands except for the two identified Process Water Supply Pipeline Segments. No active farming is currently being conducted at the East Range Site.

Table 4.4-5. Areas of Disturbance (East Range Site)

Structure	Area of Disturbance (acres)	Total Prime Farmland Soils and Farmland of Statewide importance (acres)	Earthwork Cut (cubic yards)	Earthwork Fill (cubic yards)
IGCC Power Plant Footprint & Buffer Land	**182**[1]	0[2]	**3,349,000**	**1,146,000**

[1] **Area is for both Phase I and Phase II footprints, and does not include the buffer land that would not be disturbed. The area occupied by Phase II would need to be initially cleared to accommodate the laydown of the building materials.**
[2] Preliminary soil survey results indicate no Prime Farmland Soils or Farmland of Statewide Importance are located in the buffer land area. This number may change when the soil survey is officially released.
Source: Excelsior, 2006b

In general, the HVTL alternative corridors would follow existing ROWs from the Mesaba Generating Station to the Forbes Substation. The existing HVTL structures would be replaced with taller, single-pole steel towers. One new segment would be built around Eveleth to connect the 39L to the 37L at the Thunderbird Mine Substation. Minimal grading would be required, and vegetation would be cleared in areas around Eveleth to provide equipment access and to expand the existing corridors' ROW. To minimize the potential for increased soil erosion from construction, the towers would be built at the existing grade, and cleared areas would be reseeded. Table 4.4-6 presents the area of disturbance, the HVTL ROW and the foundation excavation requirements. Permanent impacts to the soil would occur directly around the foundations of the HVTL structures and along the corridor centerline.

The HVTL corridors would cross a variety of physiographic features, including wetlands, areas with organic (peat) soils, and shallow or exposed bedrock. These areas would require special construction techniques in order to ensure the HVTL structures are stable. The standard drilled shaft foundations would not be possible in peat deposits, which may require helical or driven piles to stabilize the tower. In areas where the bedrock is close to the surface, post-tensioned rock anchors may need to be bored into the bedrock to stabilize the foundation.

Table 4.4-6. Areas of Disturbance Associated with HVTL Corridors (East Range Site)

Structure	Area of Disturbance (acres)	HVTL ROW (width in feet)	Tower Foundation Excavation Requirements
HVTL Alternative 1	**764**	100	15-55 feet deep 7 to 12 feet diameter
HVTL Alternative 2	**753**	100	15-55 feet deep 7 to 12 feet diameter

Organic deposits such as peat are also highly compressible and do not support heavy construction equipment. Therefore, construction in these areas would require the use of crane mats or low ground pressure equipment. Waiting for the organic deposits to freeze during the winter months may also alleviate the difficulty of construction, and it would minimize impacts to of the soft, compressible, wet soils found in the wetlands. Temporary haul roads may need to be constructed along the HVTL corridor in the wetland areas to provide access for material delivery and personnel. These haul roads would be completely removed when vegetation is re-established on the ROW. Potential impacts to wetlands from construction activities are discussed in Section 4.7.

Around Eveleth, the HVTL Alternative 2 corridor would pass by mine pits and tailings piles. A new corridor would connect the 39L to the 37L at the Thunderbird Mine Substation. Where the new HVTL alignment would encounter mine pits, the corridor would be routed around the pit(s), if necessary. If the corridor crossed a tailings pile, special foundations would be required to accommodate the variable soil and rock material within the pile. Standard best management practices would be used to control erosion of the loose surficial materials during construction on the mine tailing.

The preliminary soil survey datasets are not complete for the areas that would be crossed by the HVTL corridors; therefore, the potential impacts to farmlands cannot be determined at this time. The potential impacts would be determined when NRCS generates a Farmland Conversion Impact Rating.

The proposed pipeline corridors would cross bedrock, wetlands, and disturbed mining areas. **The process water pipeline** network would connect the flooded mine pits on Cliffs-Erie property with the Mesaba Generating Station. A cooling tower blowdown pipeline would not be used and an enhanced ZLD system would be added to the power station to treat the blowdown. The area of disturbance, temporary ROW and excavation requirements from pipeline construction are presented in Table 4.4-7.

All of the natural gas pipelines would be located on existing corridors or on disturbed ground. The natural gas pipeline would be constructed within an existing gas pipeline corridor serving Cliffs-Erie. The process water pipelines would be located on soil disrupted by mining activities. The sewer and potable water lines would be placed along the 43L HVTL corridor to connect to the Hoyt Lakes wastewater and drinking water systems, and would cause similar construction impacts to the HVTL corridors. The pipelines would require minimal grading. Around irregular topography, construction of the natural gas pipeline would use grading and cut-and-fill techniques to minimize the potential erosion impacts.

Table 4.4-7. Areas of Disturbance Along Proposed Pipeline Corridors (East Range Site)

Structure	Area of Disturbance (acres)	Maximum Temporary ROW (width in feet)	Excavation Requirements
Natural Gas Pipeline	**128**	100	16-24" diameter pipe; Trench: 72" deep
Process Water 2WX-SITE	16	150	Trench: 10 feet deep
Process Water 2WX-W	10	150	Trench: 10 feet deep
Process Water 2W-2E	2.9	150	Trench: 10 feet deep
Process Water 3-2E	1**2**	150	Trench: 10 feet deep
Process Water K-2WX	3.4	150	Trench: 10 feet deep
Process Water S-2WX	39	150	Trench: 10 feet deep
Process Water 9S-6	9.6	150	Trench: 10 feet deep
Process Water 9N-6	18	150	Trench: 10 feet deep
Sewer and Water Line	2**0**	100	**Sewer**: 12" diameter; Trench graded but no deeper than 8 feet **Water**: Pipe 6" diameter; Trench: 60" below surface

Trenching in the pipeline corridors would excavate both topsoil and subsoil in two subsequent passes. The soils would be separated and stockpiled, then used to restore the post construction landscape. To minimize any impacts that might occur when crossing water bodies, directional drilling may be used. However, in some cases, open cut and fill procedures would still be used to cross water bodies. The impacts would be reduced by using guidance from the U.S. Fish and Wildlife Service, U.S. Army Corps of Engineers, and the MNDNR. Additional impacts to the water resources from directional drilling are addressed in Section 4.5, Water Resources.

Using preliminary soil survey data, the natural gas pipeline corridor was analyzed qualitatively in the immediate area surrounding the East Range buffer land area. One area of potential impact was identified. The natural gas pipeline will affect an area of Cloquet loam as it has been preliminarily mapped by the NRCS. A rough scale, based on preliminary maps, indicates approximately 0.25 acres of "Farmland of Statewide Importance" could be impacted within the natural gas pipeline permanent ROW (70-foot width). However, because this estimate is based on unconfirmed preliminary mapping data, the NRCS would determine the actual acreage of this impact to soils classified as farmland of statewide importance within the East Range project area when it calculates the Farmland Conversion Impact Rating.

The process water pipelines primarily cross deposits from mining operations. In areas with glacial material remaining (Pipelines 6-S-2WX, K-2WX, 2WX-Site, 2WX-2W), the cleared area would be grubbed and any topsoil would be stockpiled for later use. The till found along these pipelines has an "easily erodes" characteristic, which would be minimized with BMPs. The amount of soils classified as "Prime Farmland" and "Farmland of Statewide Importance" has not been determined around the process water pipelines. However, the pipelines would be located in highly disturbed areas from past mining activities.

The rail alignment alternatives and the access road corridors would cross both upland and wetland areas around the Mesaba Generating Station. Table 4.4-8 presents the key information about the rail alignment alternatives and access road used to determine the potential impacts from construction.

The potential impacts would generally be similar to the ones described above and for the road and rail corridors at the West Range Site. The land within the construction ROW would be cleared and grubbed. BMPs and post-construction reclamation would be required to prevent increased loss of topsoil and till. The rail alignment Alternatives 1 and 2 would require filling some of the wetlands to attain the appropriate grade. To maintain stability, muck and peat may need to be removed from these wetlands. Prime Farmland Soil impacts would be calculated when NRCS reviews the NEPA process.

The access road would approach the IGCC facility from the **east**. **It** would primarily cross till, so any cleared areas would be graded and reseeded to minimize the potential for increased erosion. Preliminary soil maps of the area indicate that no soils classified as "Prime Farmland" or "Farmland of Statewide Importance" would be disturbed by the access road construction.

Table 4.4-8. Areas of Disturbance Along Rail Alignment Alternatives and Access Road (East Range Site)

Structure	Area of Disturbance (acres)	Maximum Temporary ROW (width in feet)	Earthwork Cut (cubic yards)	Earthwork Fill (cubic yards)
Rail Alignment Alternative 1	**53**	Variable (75-490)	2,3**9**0,000	**123**,000
Alternative 1 Center Loop	10**5**	—[1]	—[2]	—[2]
Rail Alignment Alternative 2	**58**	Variable (75-490)	2,1**8**0,000	**11**6,000
Access Road	**46**	200	—[1]	—[1]

[1] Data not available
[2] Data are included with the rail alignment

During construction of Phase I, materials used for construction would initially be stored in the Phase II footprint, which would be prepared for use as a staging and laydown area. Therefore, the incremental impacts from construction of the Phase II plant would be **negligible on the East Range Site property. For Phase II, Excelsior would establish off-site construction staging and laydown areas on 85 acres of land at potential sites described in Chapter 2 and shown in Figure 2.3-5. The potential Phase II laydown areas have all been disturbed during prior uses by mineral extraction companies. Excelsior would select the appropriate sites for the necessary acreage prior to construction, taking into account the potential effects to soil disturbance. The lands would be cleaned and restored to their pre-existing condition at the end of Phase II construction.**

Because route selection and construction of new HVTLs, pipelines, rail alignments, and access roads would be required for the Mesaba Energy Project Phase I, and the Phase II footprint would be used as a laydown area for Phase I construction, the incremental impacts from construction of the Phase II plant would be negligible with respect to the site and affected corridors. Therefore, except for the temporary use of off-site laydown areas that have been previously disturbed, the impacts on geology and soils would be essentially the same for Phase I as for both phases of the Mesaba Energy Project at the East Range Site.

4.4.4.2 Impacts of Operation

No operational impacts other than those discussed in Section 4.4.2.2 are anticipated.

4.4.5 Impacts of the No Action Alternative

For the purposes of this EIS, as explained in Section 2.1.1.2, the DOE No Action Alternative is assumed to be equivalent to a "No Build" Alternative. Therefore, construction and operational impacts associated with the Proposed Action would not occur. Areas within the existing HVTL and pipeline corridors would remain in their current state and would be disturbed by repair activities from ongoing operations. However, areas of disturbance would be smaller than required for the Proposed Action and would be restricted to the existing corridors.

4.4.6 Summary of Impacts

The impacts on geology and soils described below would be essentially the same for the two-phased Mesaba Generating Station as they would for Phase I only.

Basis for Impact	No Action	West Range	East Range
Result in soil erosion or loss of topsoil.	No soil disturbance.	Soils disturbed within construction ROW, may increase erosion.	Soils disturbed within construction ROW, may increase erosion.
Result in direct conversion of prime and unique farmland to non-agricultural uses.	No prime or unique farmland conversion.	The site and buffer lands are exempted from Minnesota Regulation 4400.3450, as they are located within the cities of Taconite and Marble. Only the LMP pumping station, Segment 1 of the Process Water Supply Pipeline, and the outfall at its point of termination of the Segment 1 pipeline have potential for impacting prime farmlands. Depending on which corridors would be selected, approximately **243** to **338** acres of Prime Farmland soils would be disturbed during the construction process.[1]	The site and buffer lands are exempted from Minnesota Regulation 4400.3450, as they are located within the City of Hoyt Lakes. Preliminary information shows no Prime Farmland soils at the East Range power plant site. No soil survey data is currently available for the East Range corridors.
Result in the loss of availability of a known mineral resource that would be of value to the region.	No mineral resource loss.	No mineral resource loss.	No mineral resource loss.
Located on a geologic unit or soil that would be unstable as a result of the project.	Soils remain unmodified.	Portions located on wet glacial till and peat.	Portions located on wet glacial till and peat.
Expose people or structures to adverse effects from seismic activity.	No exposure to seismic activity.	No exposure to seismic activity.	No exposure to seismic activity.
Result in the contamination of soil or mineral resources.	No soil contamination.	Increased potential for spills.	Increased potential for spills.
Result in the loss of paleontological resources.	No loss to paleontological resources.	No loss to paleontological resources.	No loss to paleontological resources.

[1] This range was calculated from the maximum and minimum Prime Farmland values for the West Range power plant site and corridors, found in tables 4.4-1 through 4.4-4. Permanent loss of farmland acreage would occur on the footprints of aboveground structures only. **Pipelines that share corridors would reduce the overall disturbance to prime farmland soils.**

4.5 WATER RESOURCES

4.5.1 Approach to Impacts Analysis

4.5.1.1 Region of Influence

The region of influence for surface water resources includes those watersheds and sub-watersheds where the potential footprints and associated rights-of-way of the Mesaba Generating Station as well as the roads, rail lines, HVTLs, process water lines, cooling tower blowdown lines, and utility lines (i.e., potable water, gravity sewer, and natural gas) that would support Mesaba Energy Project operations are located.

4.5.1.2 Method of Analysis

The evaluation of potential impacts on water resources considered whether the Proposed Action or an alternative would cause any of the following conditions:

- Change the availability of surface water resources for current or future uses;
- Conflict with established water rights;
- Modify surface waters such that water quality no longer meets applicable water quality criteria or standards established in accordance with the CWA, state regulations, or permits;
- Conflict with regional water quality management plans or goals;
- Deplete groundwater supplies or interfere with groundwater recharge such that there would be a net deficit in aquifer volume or local water table affecting availability for existing and planned uses;
- Violate any Federal, state, or regional water quality standards or discharge limitations;
- Degrade groundwater quality;
- Conflict with regional aquifer management plans or goals;
- Change stormwater discharges affecting drainage patterns, flooding, and/or erosion and sedimentation;
- Conflict with applicable stormwater management plans or ordinances; or
- Modify Federally and/or state-listed protected water bodies.

Wetlands, rivers, and streams are regulated under the CWA as administered by the EPA, USACE, MNDNR, and the Minnesota Wetland Conservation Act. Wetlands and stream crossings are discussed in Section 4.7.

4.5.2 Common Impacts of the Proposed Action

This section describes potential impacts to surface water resources that would be common to the implementation of the Proposed Action at both the West Range and East Range Sites. The general requirements for water for the various aspects of the Mesaba Generating Station would be the same for the West Range and East Range Sites, as those specified in Section 2.

4.5.2.1 Industrial Wastewater Treatment/Discharges

Zero Liquid Discharge System

After publication of the Draft EIS, Excelsior announced its commitment to implement an enhanced ZLD system for the West Range Site, comparable to the system originally proposed for the East Range Site. The Draft EIS (Section 5.3.2.1, Mitigation Alternative 3, and Appendix H) described implementation of an enhanced ZLD system and potential impacts at the West Range Site. The majority of water quality concerns at the West Range Site as initially described in the Draft EIS were reduced; discharges of process wastewater and cooling tower blowdown into any

water bodies were eliminated, associated blowdown pipelines were eliminated, and water appropriation demand has been reduced by reusing (instead of by discharging blowdown) and by increasing cycles of concentration in the cooling towers. This section contains new text that provides more details on the sour water treatment and the ZLD systems for the treatment of contact and non-contact wastewater. [Text in the Draft EIS relating to potential industrial wastewater discharges at the West Range Site and differences in process water treatment between the East Range and West Range Sites was deleted from this section.]

The enhanced ZLD system is made up of two separate ZLD units that treat two different wastewater streams—contact wastewater (process water from the gasification that has been through sour water treatment) and non-contact wastewater (primarily cooling tower blowdown). Excelsior completed a report – *Final Water Retention, Recovery & Reuse Report* (Granherne, 2009) – that describes the ZLD unit for the treatment of non-contact wastewater and stormwater streams at the West Range Site. This report was added to the Final EIS as Appendix H2.

Sour Water Treatment and ZLD System for Treatment of Contact Water

As discussed in Section 2.2.1.4, water condensed during cooling of the sour syngas contains small amounts of dissolved gases (CO_2, NH_3, H_2S and other trace contaminants). The process water must be treated to remove these dissolved gases before being recycled to the coal grinding and slurry preparation area or being blown down to the ZLD unit. The dissolved gases are driven from the water using steam-stripping. The steam provides heat and a sweeping medium to expel the gases from the water, resulting in a water purification level sufficient for reuse within the plant and/or for blowdown to the ZLD unit. This purification process is called the sour water treatment process and is illustrated in Figure 2.2-9.

The gases are stripped from the sour water (water with dissolved sulfur compounds and other contaminants condensed from the syngas) in a two-step process—first, the CO_2 and most of the H_2S are removed in the CO_2 stripper column by steam stripping and directed to the Sulfur Recovery Unit. The water exits the bottom of this column, is cooled, and a major portion is recycled to feedstock grinding and slurry preparation. The rest is treated in an ammonia stripper column to remove the ammonia and remaining trace components. The stripped ammonia is combined with the recycled slurry water. A portion of the ammonia-stripped water is blown down to the ZLD, with the rest being reused within the plant. Reuse of water within the gasification plant minimizes water consumption and discharge. This unit is a totally enclosed process with no emissions to the atmosphere.

Essentially, the ZLD unit concentrates and evaporates the process condensate. The blowdown stream from the ammonia stripper would be pumped to a brine concentrator**,** which would use steam or vapor compression to indirectly heat and evaporate water from the wastewater stream. The water vapor generated would then be compressed and condensed and the high quality distillate would be recycled to the syngas moisturization system or to other water uses in the plant, reducing fresh water consumption, and, more importantly, concentrating heavy metals and other contaminants of concern into a solid waste stream. The concentrated brine would be further processed in a heated rotary drum dryer/crystallizer. There the remaining water would be vaporized and a solid filter cake material would be collected for proper disposal in existing approved waste management facilities. **Figure 2.2-10 illustrates integration of the ZLD unit to treat the contact wastewater from the gasification process.** The ZLD unit to be used for the Mesaba Generating Station would be the same system that has been successfully employed at the Wabash **River Plant** to control permit exceedances of metals in that plant's discharges. **The Wabash River Plant has never experienced a shutdown due to the ZLD unit not being available (Lynch, 2009).** No wastewater discharges would be generated from the contact wastewater ZLD system.

ZLD Unit for Treatment of Non-Contact Water

All industrial wastewaters (i.e., non-domestic wastewaters) generated beyond those already used in the gasification and slag processing operations, discussed above, would be processed through a separate ZLD unit such that there would be no process-related wastewaters, including non-contact cooling tower blowdown, discharged from the Mesaba Generating Station.

A ZLD report (*Final Water Retention, Recovery & Reuse Report* [Granherne, 2009]) for the West Range Site has been completed as part of Excelsior's NPDES application submittal to MPCA and has been added as Appendix H2 for the Final EIS. The ZLD report identifies the system for treating the project's non-contact wastewater streams. These streams include cooling tower blowdown, smaller flows from water treatment system regeneration, use of service water, and surface runoff streams from the project. The ZLD unit feeds are qualitatively characterized relative to their TDS and TSS levels, which ultimately determine sludge generation rates for off-site disposal. Additional parameters of interest include pH and dissolved and free organics. The following are the feed streams to the ZLD unit:

- Cooling Towers Blowdown - these streams are characterized as having elevated TDS levels due to COC within the cooling tower systems. TSS levels are mitigated by filtered raw water makeup and settling in the cooling tower basin.
- Raw water Multi-Media Pressure Filters Backwash - this stream is characterized as having raw water TDS levels and high TSS levels due to its solids removal from the incoming supply water.
- ZLD Pressure Filters Backwash - this stream is characterized as having generally the level of TDS and TSS from the cooling tower blowdown streams since these are the predominant flows.
- Oil-Water Separator Underflow - this stream is characterized as clarified and filtered raw water with minimal oil and grease content.
- Mixed Bed Polisher Regeneration Flows - this stream is characterized as having high TDS and little to no TSS levels.
- Stormwater and snowmelt flows would carry some TSS, but have very low TDS.

Figure 4.5-1 is a conceptual representation of the ZLD unit. See Appendix H2 for a more detailed description on the process components as labeled in the figure.

Pollutants and Water Quality

Implementation of the enhanced ZLD system for the West Range Site would eliminate discharges of process water and cooling tower blowdown into any water bodies. Thus, no pollutants would be discharged into any surface waters, which would eliminate the majority of water quality concerns at the West Range Site as originally discussed in the Draft EIS, including TDS, thermal, mercury, and phosphorus. However, because water would be pumped into the Canisteo Mine Pit (CMP) from various sources to offset water appropriation, increase in phosphorus concentration in the CMP would result as these sources (mainly the Prairie River) have existing levels of phosphorus and would, therefore, add to the existing phosphorus levels in the CMP. Section 4.5.3.2 provides an updated phosphorus analysis for the West Range Site. Sections 4.3 and 4.17 discuss potential impacts from mercury emissions. [Text regarding potential industrial wastewater discharges and associated water quality impacts was deleted from this section.]

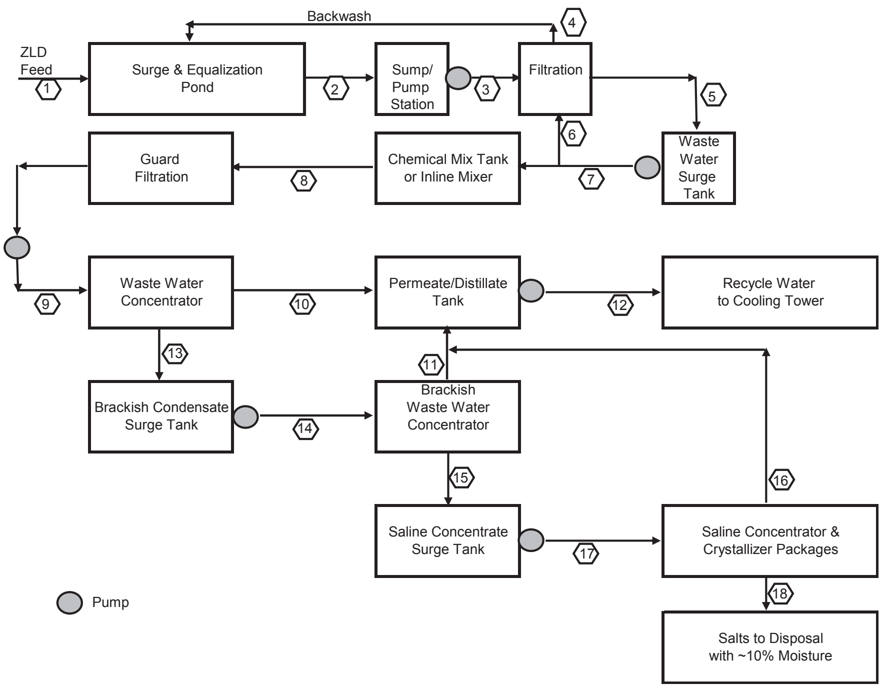

Figure 4.5-1. Conceptual Diagram for ZLD Unit for Treatment of Non-Contact Water (Granherne, 2009) (added for Final EIS)

4.5.2.2 Process Water Requirements

As presented in Section 2.2.2.3, process water is required at the Mesaba Generating Station for cooling in the power cycle, for slurrying the coal feedstock to the gasifier, and for various other contact/non-contact cooling purposes. Figure 2.2-10 provides a generalized flow diagram of process water sources and components within the IGCC power plant.

By using the enhanced ZLD system, the average annual water appropriation rate has been reduced by 900 gallons per minute (gpm) per phase (1,800 gpm total) and has eliminated blowdown discharge. Table 4.5-1 defines the average and peak water requirements (added in Final EIS). Peak rates would occur on hot, humid days. Note that water demand would be similar for both the West Range and East Range Sites.

Table 4.5-1. Process Water Requirements, Phases I and Phases I & II

Phase	West Range Site and East Range Site	
	Average Annual Demand (gpm [cfs])	Peak Demand (gpm [cfs])
Mesaba Energy Project (Phase I)	3,500 (7.8)	5,000 (11.1)
Mesaba Generating Station (Phases I & II)	7,000 (15.6)	10,000 (22.3)

New table added in Final EIS to reflect implementation of an enhanced ZLD system at the West Range Site.
gpm – gallons per minute; cfs – cubic feet per second

The largest share of the water appropriated is consumed by evaporative cooling. The annual average rate of evaporative loss would be about 3,320 gpm for Phase I (evaporative losses from Phase II would be expected to be identical). Peak evaporative losses for each phase of the Mesaba Generating Station are identified in the NPDES permit application as approaching 3,500 gpm. Peak utilization rates would occur on hot summer days. Most of the water lost to evaporation would come from mine pits that currently do not have an outflow (e.g., no discharge of overflow water) into local streams or rivers. These mines pits have been filling with water since the cessation of mining activities, generally 10 to 20 years ago. Some water that is currently part of the water balance for the watersheds would be lost to evaporation (water from the Prairie River, dewatering of the Hill Annex Mine Pit Complex, withdrawals from Colby Lake), but these losses are relatively small in comparison to the average flows of the Prairie and Swan Rivers (discussed later in Section 4.5.3.1).

The maximum appropriation of water from the resources at either site would be dependent upon many factors, including the COC in the cooling towers, the fuel consumed, ambient conditions, the extent to which cooling tower blowdown is treated to remove total dissolved solids, the chemistry of the receiving waters, and the water quality criteria standards applied to those waters. The COC in the cooling towers would be dependent upon source water chemistry, including the concentrations of mercury, total dissolved solids and hardness. In general, if the source water is relatively low in TDS, the COC in the Mesaba Generating Station's cooling towers can be increased, resulting in lower make-up rates. Availability of water for these processes is analyzed in Sections 4.5.3.1 and 4.5.4.1 for the West Range and East Range Sites, respectively.

4.5.2.3 Sanitary Discharges

Sanitary wastewaters produced during the operation of the Mesaba Generating Station would be relatively small (about 30 gallons per person per day) and would be discharged to a nearby POTW. In the case of the West Range Site, the closest POTW is the CBT regional WWTF located in Bovey. This system would be accessed via the City of Taconite's sanitary sewer system. In the case of the East Range Site, the closest POTW is the Hoyt Lakes WWTF. The Hoyt Lakes WWTF would be accessed near the Syl Laskin Energy Center, where the City would be responsible for constructing a satellite WWTF there or constructing a new pipeline from that point to the City's existing WWTF. As an alternative, sanitary wastewaters from plant activities could be managed on site via a septic system or stand-alone wastewater treatment system. Specific impacts of sanitary discharges are discussed in Sections 4.5.3.3 and 4.5.4.2 for the West Range and East Range Sites, respectively. **Since publication of the Draft EIS, Excelsior announced its commitment to make significant capital improvements to the CBT WWTF when construction commences on the proposed power plant (Excelsior, 2008). Section 4.5.3.3 was updated to reflect Excelsior's latest plans for the CBT WWTF.**

4.5.2.4 Water Intakes and Pumping Systems

Since publication of the Draft EIS, findings from an investigation into potential intake structures recommend the use of angle well intakes (Barr, 2008b), and a description of this type of structure has been added to this section. The types of water intake structures and pumping systems would be similar for the West and East Range Sites. **Three** types of intake structures could be employed for water withdrawal: **two** designed for permanent withdrawals and one for seasonal withdrawals. These **three** types of intake structures, caisson**, angle well,** and floating, are depicted in Figure 4.5-2 **(angle well figure added in Final EIS)**.

Process water pumped from a combination of nearby water features would be piped to the Mesaba IGCC Power Station. Raw water from the pipeline would be processed through a micro-filtration system prior to use in the plant. As the engineering and design of the generating station proceeds, the design concepts presented herein would be tailored to each specific circumstance and optimized to reduce power consumption demands.

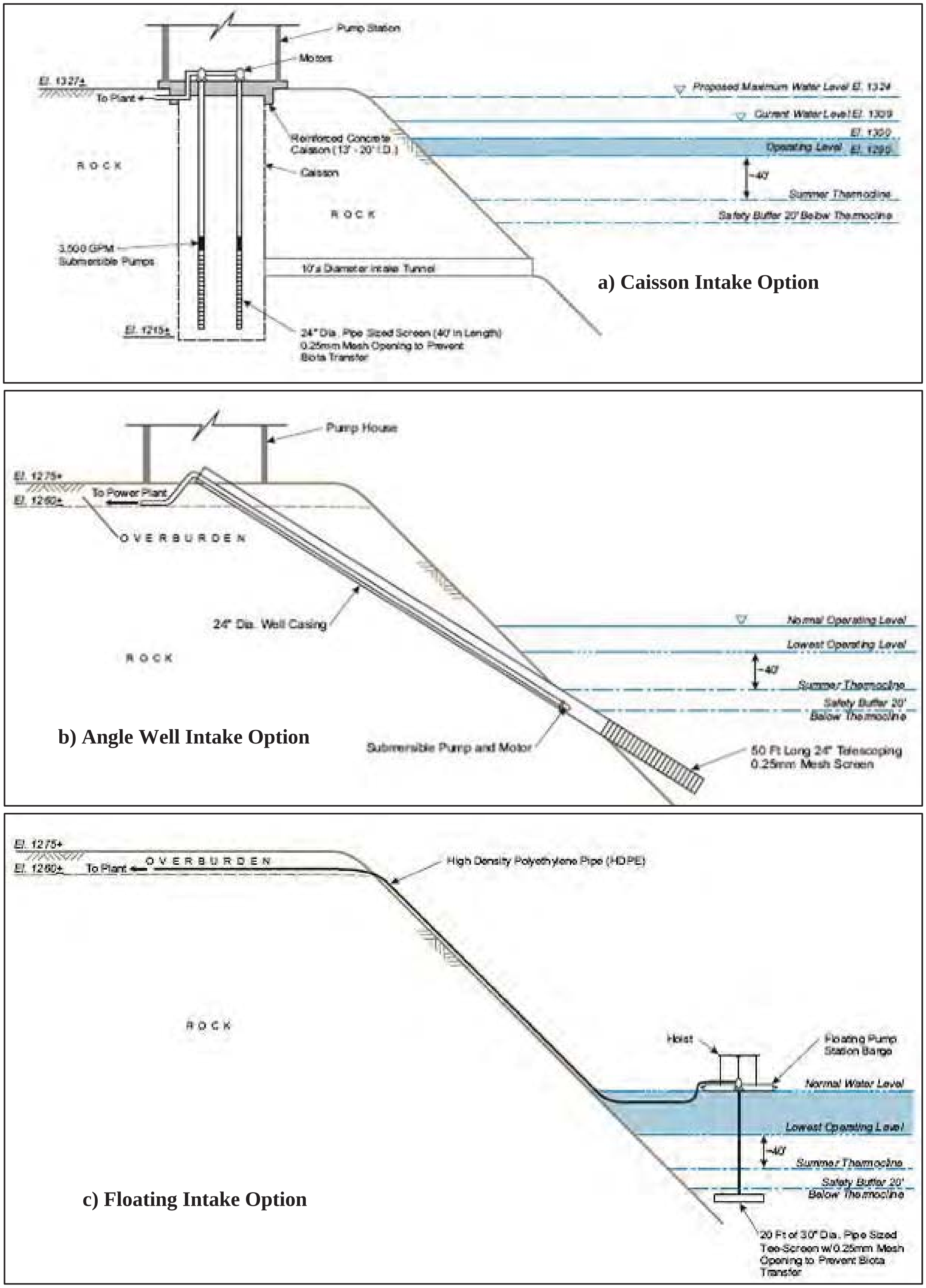

Figure 4.5-2. Water Intake Structures, Conceptual Designs (angle well intake option added in Final EIS)

The caisson intake structure would involve construction of a 13- to 20-foot diameter vertical shaft that would act as a wet well. The actual diameter of the vertical shaft would be based on equipment requirements, such as the number of pumps and the dimensions of the pumping equipment, as well as on constructability issues related to connecting the shaft to the pit. The caisson would be constructed to an elevation necessary to obtain submerged pumping conditions under the lowest anticipated pit water levels, including an emergency buffer. Connecting the shaft to the pit can be accomplished by several methods. One such method includes constructing a large horizontal tunnel (approximately 10 feet in diameter) from the caisson to the pit for water collection.

Water would enter the central caisson through the horizontal tunnel and rise to the normal water elevation. The horizontal tunnel would be constructed using hard rock tunneling techniques. The tunneling would be stopped short of the pit to allow the equipment to be removed prior to flooding of the caisson by pit water. The final opening from the horizontal intake tunnel to the pit would be made by blasting or drilling on the pit side from a barge on the pit water surface. The horizontal tunnel would be sized to limit intake velocities to 0.5 feet per second. With this method, CWA screening requirements of Section 316(b) of the CWA would be met in the caisson using either tee screens or conventional well screens. Pumps in the caisson would be conventional turbine pumps, commonly used in wet well applications.

A second method to withdraw water from the pit, the angle well intake, would rely on diagonal drilling methods to install several smaller diameter holes (approximately 24 inches in diameter) into the pit. Submersible pumps would be used in this configuration. Either the caisson intake method or angle well intake method would implement a system to allow access to the deeper, cooler water if determined to be necessary or cost effective. Both systems would meet CWA Section 316(b) requirements that reflect the best technology available to protect aquatic organisms from impingement or entrainment. Use of an ultra-fine mesh screens (0.25 millimeters in diameter) is expected to prevent biota transfer between basins at all sites. A new supply pipe would be constructed from the intake systems to deliver water to the IGCC Power Station for cooling and other plant needs.

Floating intake structures conducive to fluctuating water levels are available and commonly used by mines for pumping systems. This system includes placing pumps and intake structures on a floating platform in the mine pit. A pipe with wedge wire screen is extended to withdraw water from the desired depth. A sufficient length of screen would be provided to ensure that intake velocities are maintained below 0.5 feet per second and to ensure that thermal stratification is not disrupted. This system would also meet CWA Section 316(b) requirements to protect aquatic organisms from impingement or entrainment. An ultra-fine screen (0.25 millimeters in diameter) is expected to prevent biota transfer between basins at all sites. A supply pipe would be designed to convey water from the floating platform to the proposed facility.

4.5.2.5 Stormwater Management

Pre-Construction

All construction sites greater than 1 acre in size are required to obtain a General Construction Stormwater Permit to discharge stormwater from the MPCA, the agency responsible for the state's stormwater program. Under MPCA requirements, two parties—the owner (Excelsior) and the operator (person, typically the project's general contractor, who has day-to-day operational control or the ability to modify project plans and specifications)—must be covered jointly under the permit. Thus, prior to any construction activities, Excelsior would have to apply for a National Pollutant Discharge Elimination System/State Disposal System (NPDES/SDS) stormwater permit for construction activities, either the general permit or an individual permit. The steps involved in applying for the permit are as follows:

- Identify construction site boundaries, parcel identification, and project schedule;
- Determine if additional permits, beyond the stormwater permit, are required;
- Determine if an Environmental Review is needed;
- Understand the requirements of the general permit for stormwater from construction activities;
- Identify waters that have the potential to receive a discharge of stormwater runoff (including special and/or impaired waters);
- Determine if discharges from the construction site would impact other protected resources (i.e., endangered species, historic properties, calcareous fens);
- Prepare a SWPPP;
- Identify discharges;
- Determine eligibility for the Construction Stormwater General Permit; and
- Complete and submit an application form for an MPCA NPDES/SDS stormwater permit for construction activity.

The West Range Site is not within 2,000 feet of any special or impaired waters; however, the HVTL and natural gas corridors would cross the Swan River (impaired) several times. The East Range Site is within 2,000 feet of an impaired water body (Colby Lake) and a special water body (Wyman Creek, a trout stream). Utility corridors would cross the Partridge River (impaired) at multiple points. Special wetlands (calcareous fens), endangered species, and historic properties are discussed in Sections 4.7, 4.8, and 4.9 of this EIS, respectively.

In accordance with 40 CFR Part 122.26(b)(14)(x) and presented above, Excelsior would develop a SWPPP prior to undertaking any construction activities that identifies sediment and erosion control BMPs. The plan would include a description of the nature of the construction activity and address the following:

- Potential for discharging sediment and/or other potential pollutants from the site;
- Location and type of all temporary and permanent erosion prevention and sediment control BMPs, along with procedures for establishing additional temporary BMPs as necessary for the site conditions during construction;
- Site maps with existing and final grades, including dividing lines and direction of flow for all pre- and post-construction stormwater runoff drainage areas located within the project limits. The site map must also include impervious surfaces and soil types;
- Locations of areas not to be disturbed;
- Location of areas where construction would be phased to minimize duration of exposed soil areas;
- All surface waters and existing wetlands, which can be identified on maps such as USGS 7.5 minute quadrangle maps or equivalent maps within 0.5 miles of the project boundaries, which would receive stormwater runoff from the construction site during or after construction; and
- Methods to be used for final stabilization of all exposed soil areas.

The SWPPP would be submitted to the MPCA for approval prior to the initiation of any construction activities. **As discussed above, Excelsior and the designated operator would be responsible for the compliance of construction activities under the SWPPP and provisions of the construction stormwater permits. For either the West Range Site or the East Range Site and prior to operation of the LEPGP, HVTLs, and natural gas pipeline (West Range Site only), Excelsior would apply for coverage under the Minnesota General Permit for Industrial Activity (MN G611000), or would apply for a Certification of No Exposure.**

Construction

Once permit coverage is granted, construction would begin. Initial project site preparation activities would include building access roads, clearing brush and trees, leveling and grading the site, bringing in necessary utilities, and undertaking dewatering activities that may be required. Construction of temporary parking, offices, and material storage areas at this time would involve the use of earthmoving and logging equipment to clear and prepare the site for construction of the plant. Trucks would be required to bring fill material for roadways and the plant, remove harvested timber, remove debris from the site, and stockpile fill material. Gravel and road base would be utilized for the temporary roads, material storage, and parking areas.

Stormwater discharge during construction could affect surface waters because of changes in volume, runoff patterns, and quality. In general, construction activities expose disturbed land and introduce the potential for increased erosion; however, BMPs through the proposed project's erosion and sediment control plan required under the General Permit, would be employed to minimize soil loss and minimize water quality degradation to water resources, including wetlands. Construction of stormwater facilities and site grading would result in the immediate alteration of surface water flow across the construction site. Runoff would be directed to sediment basins on the IGCC Power Station Footprint, where construction activities would result in at least 10 acres draining to a common location. Construction of other, linear project elements is unlikely to exceed this limit.

In general, erosion and sediment control measures and stormwater management would consist of BMPs, including techniques such as grading that would induce positive drainage, hay bales, silt fences, and revegetation to minimize or prevent soil exposed during construction from being carried off-site and deposited in surface waters as sediment. The BMPs would detail the erosion and sediment control measures and accidental spill prevention and control measures. The BMPs would be implemented, inspected, and maintained to minimize the potential for adversely affecting downstream water quality during the construction phase.

During Phase II construction at either project location, temporary off-site staging and laydown areas would be used to stockpile materials and store equipment, and for a cement batch plant. Excelsior would establish these off-site construction staging and laydown areas on 85 acres of land selected from potential sites as described in Sections 2.2.4.1 and 2.3. All of the candidate sites are located on lands that have been disturbed or cleared during prior uses by mineral extraction companies and, therefore, do not contain any surface waters. It is assumed that the entire laydown area would be cleared and high-use portions would be graveled or lined in some manner. Erosion and sediment control measures and stormwater management would also be used at these laydown areas and consist of BMPs, including use of silt fencing around the perimeter of the staging area and entrance stabilization techniques to reduce the transport of dust and soils off site by construction vehicles. At the end of construction for Phase II, disturbed areas would be revegetated and the laydown area would be restored to pre-existing conditions. Therefore, impacts to water resources from use of these laydown areas are considered minor.

Operation

The project would create more than 1 acre of new impervious surfaces, and**,** therefore, a permanent stormwater management system would be required under the NPDES permit. The permanent stormwater management system must provide water quality treatment for ½ inch of runoff from the new impervious surfaces before discharge to surface waters. This treatment may be obtained by construction of wet sedimentation basins, infiltration/filtration, regional ponds, or a combination of practices. Design criteria for wet sedimentation basins can be found in the MPCA NPDES General Permit for Construction Activities.

As part of the planned addition of an enhanced ZLD system at the West Range Site, all stormwater discharges (within a 24-hour, 100-year storm event) would be eliminated, as stormwater would be treated and reused within the plant, primarily for cooling water (see Appendix H2 for more details).

The SWPPP would detail any permanent stormwater management system to be left in place once construction is complete. [Text in the Draft EIS regarding cooling tower blowdown and a permitted outfall has been deleted.] Stormwater generated during the operation of the Mesaba Generating Station would be managed as follows:

- Stormwater with potential to become contaminated with process solids/liquids would be segregated from process equipment by curbs, elevated drain funnels and other means and returned as make-up to the feedstock slurrying system or other process water use.
- Stormwater that could become contaminated with oil (such as water runoff from parking lots) would be routed through an oil/water separator and then directed to a ZLD system.

The on-site storage areas for the feedstock handling system would incorporate dust suppression systems (including covered conveyers and other enclosures, dust suppression sprays, and vent filters) and would be paved, lined, or otherwise controlled to enable collection and treatment of stormwater runoff and to prevent infiltration to groundwater of chemical species leached from feedstock materials and/or flux. The entire feedstock grinding and slurry preparation facility would be paved and curbed to contain spills, leaks, wash-down, and stormwater runoff. A trench system would carry this water to a sump that would pump it into the recycle-water storage tank.

4.5.2.6 Groundwater

Groundwater was considered as a source of water for plant operations at both the West and East Range Sites; however the limited water yield capacity and the large volumes required for cooling water would require over 50 groundwater wells to be installed. Neither of the two proposed sites would involve the installation of groundwater wells for use as process or potable water sources, nor would either site discharge wastewaters into the ground. Local groundwater (that is in very close proximity to or below the plant site) could be affected by a large spill of materials that could percolate into the groundwater. However, the likelihood is limited as the plant would be operating under plans, such as a Spill Prevention Control and Countermeasures Plan, which require engineering controls and BMPs to limit the potential for spills to migrate and affect surface water or groundwater resources, and to ensure that adequate resources are available to respond to a spill.

Current groundwater levels near the mine pits that would be used as process water sources would be influenced by the operation of the power plant. Since the water levels in the mine pits would be lower than their current levels once the proposed plant becomes operational, groundwater levels in close proximity to the pits would be lowered. However, even under drought conditions, the mine pits would contain a substantial amount of water and the water levels would be well above the mine pit floors. Because many of the existing groundwater wells in the vicinity of the mine pits were constructed and in use during the periods when the mine pits were completely dewatered, it is expected that there would be no effect on the local well yields once the mine pits are partially dewatered. Partially lowering the mine pit water levels in the CMP and HAMP Complex (at the West Range Site) would increase the rate at which groundwater flows into the pits, greatly reducing the potential for any outflow from the pits. For these reasons, no adverse impacts to groundwater resources are anticipated for either the West Range or East Range Sites.

4.5.3 Impacts on the West Range Site and Corridors

This section has been updated since publication of the Draft EIS to reflect implementation of an enhanced ZLD system at the West Range Site, which would eliminate discharges of process water

and cooling tower blowdown into any water bodies, eliminate blowdown pipelines, and decrease water appropriation from 10,300 to 7,000 gpm (for combined Phases I and II). Figures 4.5-3 and 4.5-4 were revised to reflect the latest water balance. Note that Outfalls 001 and 002 as shown in the Draft EIS were eliminated.

One of the reasons the West Range Site is a potential location for the generating station is that abundant sources of good quality water are located nearby. Several abandoned mine pits located in proximity to the site are either currently filled with water and overflowing, are being pumped to avoid flooding of important historical resources due to rising water levels, or are threatening to flood due to rising water levels. Specifically, these pits include the CMP, the **Lind Mine Pit (**LMP**)**, and the HAMP Complex. The HAMP Complex is made up of the Arcturus Mine Pit, GMMP, and HAMP. Figures 4.5-3 and 4.5-4 **(revised in Final EIS)** provide an overview of the water balance for each stage of the proposed power plant.

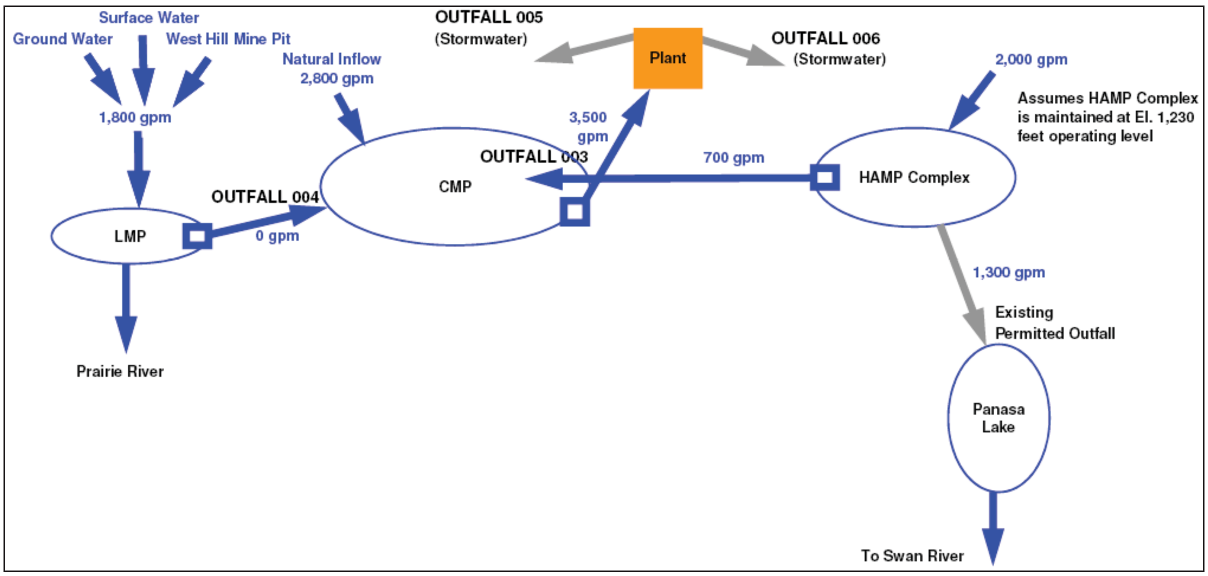

Figure 4.5-3. Phase I Water Balance: West Range IGCC Power Station (revised in Final EIS)

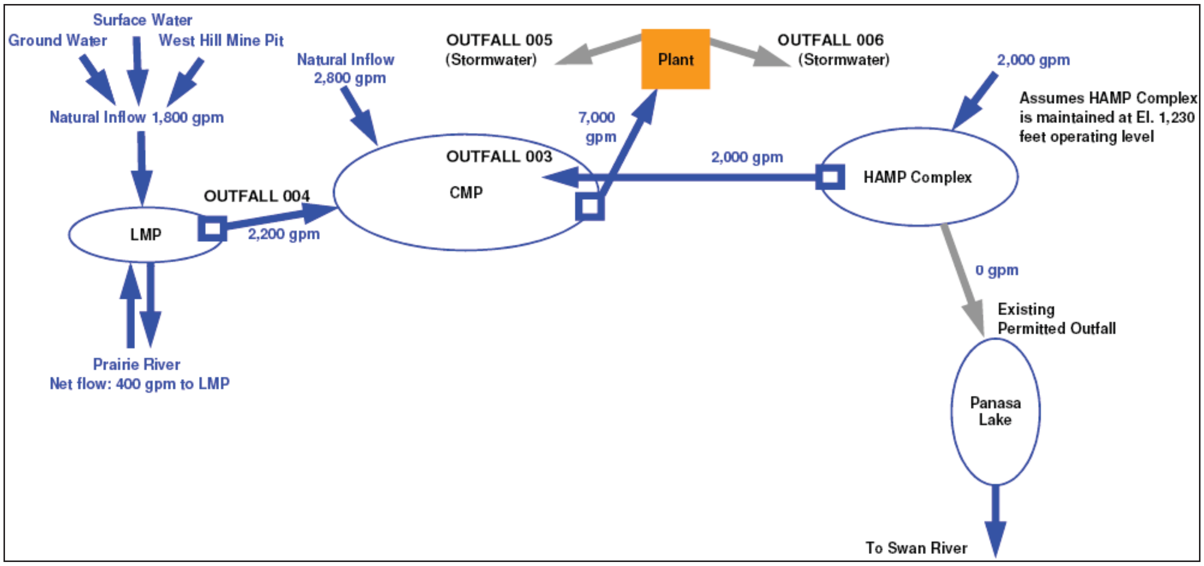

Figure 4.5-4. Phase I and II Water Balance: West Range IGCC Power Station (revised in Final EIS)

4.5.3.1 Process Water Supply Systems

Water Supply Capability

Table 4.5-2 lists the potential sources of process water for operation at the West Range Mesaba Generating Station. The estimated water volumes for these sources are provided in Table 3.5-2 and the chemistry of those potential source waters, where available, is presented in Table 3.5-4. These potential sources of process water are being considered for use in three alternatives. As shown in Table 4.5-2 and Figures 4.5-3 and 4.5-4, process water would be supplied by mine pits and the Prairie River under Alternative 1, Excelsior's preferred alternative. Two additional alternatives for process water were also considered: obtain water from the Mississippi River (Alternative 2); or use groundwater for the process water (Alternative 3).

Table 4.5-2. Process Water Resources Identified for Use at the West Range Site

Potential Resource	Over-Flowing Or Rising?	Information Source	Phase	Alternative
Canisteo Mine Pit	Rising	MNDNR	I/II	1
Hill-Annex Mine Pit Complex[1]	Dewatered on an ongoing basis to avoid flooding of Hill-Annex State Park	MNDNR & Barr	I/II	
Lind Mine Pit	Overflowing	SEH Field Data	**II**	
Prairie River	NA	Minnesota Power	**II**	
Greenway Mine Pit	Overflowing	SEH Field Data	II	Considered as Part of Alternative No. 1, but Rejected on Basis of Cost Effectiveness
Mississippi River	NA	MNDNR	II	2
Groundwater	NA	None	I/II	3

[1] The HAMP Complex includes the Arcturus, Gross-Marble, and Hill-Annex Mine Pits.
NA = Not Applicable

Under Alternative 1, the West Range Site process water would **primarily** be supplied from the mine pits and the recycled process water discharge. **As Table 4.5-2 indicates, the mine pits currently are either filled with water and overflowing, are being pumped to avoid flooding of important historical resources (i.e., the Hill Annex State Park) due to rising water levels, or are under threat of flooding due to rising water levels.**

The estimated water supply capabilities for the potential sources are presented in Table 4.5-3 **(updated to reflect use of the enhanced ZLD system)**. The sustainable supply capability for each water source was estimated using information supplied by the MNDNR, previous engineering studies, and information supplied by local government units. The actual sustainable rates that would be realized are dependent on factors including precipitation, evaporation, pit water levels, and hydrogeological conditions.

Table 4.5-3. Water Source Supply Capability

Water Source	Estimated Range of Flow Available for Withdrawals (gpm)	Assumed Sustainable Withdrawal Flow for Water Balance Modeling (gpm)
Canisteo Mine Pit	810 – 4,190	2,800
HAMP Complex	1,590 – 4,030[1]	2,000[2] **3,500**[3]
Lind Mine Pit	1,600 – 2,000	1,800[4]
Prairie River	0 – 2,470[5]	2,470[6]
Total	4,350 – 16,190	**>9,100 – 10,600**[7]

Table has been revised to reflect use of enhanced ZLD system. Text regarding discharge from Mesaba Generating Station has been deleted.
[1] Maximum flow occurs at minimum operating elevation.
[2] At an operating elevation of 1,230 feet msl.
[3] **At minimum operating elevation, which would require pumping between Hill Annex and Gross Marble mine pits.**
[4] Estimates of flow are based on one summer flow measurement at the LMP outlet and one summer and one winter measurement taken at the West Hill Mine Pit outlet.
[5] Maximum available flow assumed to be 25% of the 7Q10 flow of the Prairie River.
[6] **For water quality modeling purposes, the Prairie River contributions are assumed to be 400 gpm, as it is the least preferred source.**
[7] **The range is dependent upon HAMP operating elevation. The "greater than" symbol (>) is used because the assumed sustainable withdrawal flows are conservative.**
gpm – gallons per minute

For the combined needs of Phases I and II, existing data currently show that flows greater than those presented in Table 4.5-3 for the CMP might be available, as the inflow of water may increase with decreasing water levels in the CMP. To be conservative, Excelsior has not assumed the availability of such potential excess flows. Information available for the HAMP Complex also suggests increased water flows into the HAMP Complex with decreasing water elevations. For example, records show evidence of flows between 3,900 and 4,000 gpm during the initial years following cessation of mining. However, this increased flow is also not used in the sustainable flow values presented in Table 4.5-3.

Table 4.5-4 **(revised to reflect use of enhanced ZLD system)** compares the long-term sustainable water needs for the Mesaba Generating Station with the potential supplies shown in Table 4.5-3. The data in Table 4.5-4 is based on: (1) discussions with the MNDNR regarding the availability of water in each of the above resources; (2) analyzing stage-storage data made available by the MNDNR; (3) reviewing information the MNDNR had published on each such resource (Excelsior, 2006b); and (4) collecting primary data to confirm the available resource. The last column in Table 4.5-4 represents Excelsior's conclusion with regard to the capability of the resources listed to meet the operational requirements of Phases I and II, namely that sufficient water supplies are available to demonstrate the long term, sustainable provision of water for the power plant's needs (Excelsior, 2006a).

Table 4.5-4. Process Water Requirements Matched with Water Supply Capabilities

Phase	Average Annual Requirement (gpm)[1]	Peak Requirement (gpm)[1]	Long Term Sustainable Flow (gpm)[2]	Sufficient to Meet Annual Avg. Flow Requirement (Yes/No)
Mesaba Energy Project (Phase I)	3,500	5,000	> 9,100 – 10,600	Yes
Mesaba Generating Station (Phases I & II)	7,000	10,000	> 9,100 – 10,600	Yes

[1] From Table 2.2-3 **(Table revised to reflect use of enhanced ZLD system.)**
[2] The flow presented is sum of the values in the third column of Table 4.5-3 rounded to two significant figures; "greater than" symbol is applied because quantity does not account for 300 gpm discharged back to the CMP during Phase I operations.
gpm – gallons per minute

Even if Excelsior completely utilized all the water from any single potential resource near the West Range Site, there would be no such resource capable of supplying all of the water requirements for both phases of plant development. Therefore, in consideration of its own needs and to help support solutions to local flooding problems **(from potential mine-pit overflow)** previously described, Excelsior undertook to develop a comprehensive water resource management plan for the West Range Site's Mesaba Generating Station (as discussed in the next section*)*. In doing so, it identified the four sources of water (the CMP, HAMP Complex, LMP, and Prairie River) that would support the full load operation of two phases. The surface elevation for each of the mine pit water resources identified for the West Range Site is lower than that of the Mesaba Generating Station; therefore, conveyance of the process water to the plant would require pumping, also discussed in the next section.

Under Alternative 2, the Mississippi River would be used as a water source for both Phases I and II of the Mesaba Energy Project. A pipeline, approximately 10 miles in length, would be required to pump water from the river to the power plant. This pipeline would require several pump stations, electrical facilities, support structures, and land acquisitions to provide adequate flow for the plant. This alternative would not help resolve the pit flooding issues of CMP and HAMP. For these reasons, Excelsior rejected Alternative 2, because it was determined to be unnecessary and inferior to Alternative 1.

Consideration was also given to supplying process water by drilling a number of groundwater wells and developing those wells (Alternative 3). Excelsior rejected this alternative after review of available information that showed most wells in the area can only likely produce between 200 and 300 gpm. Therefore, this alternative would require the development, operation, and maintenance of up to 50 groundwater wells, pump stations, force mains, electric services, and support structures to provide adequate flow for the Mesaba Generating Station. The geographical breadth of this well field, the effect of the drawdown on other nearby wells, and the connections that would have to be maintained would present insurmountable logistical problems. Alternative 3 also would not address the potential flooding issues at the CMP and HAMP. For these reasons, Excelsior determined that Alternative 3 would be impracticable and inferior to Alternative 1.

Water Resources Management Plan

Under Alternative 1, the preferred alternative, the proposed water supply system for Phases I and II would consist of three mine pits, three pumping stations, and an intake to draw water from the Prairie River. **The Water Management Plan was developed and included in Excelsior's water appropriation permit application, which is available in its Joint Application to the Minnesota Public**

Utilities Commission submitted June 2006. The following provides a brief summary of the Water Management Plan for both phases:

- **Phase I**
  - **CMP pump station would pump water to the IGCC Power Station.**
  - **When the water level in the CMP declines to 1,290 feet, water from the HAMP Complex would be pumped to the CMP via a pump station located in the GMMP.**
- **Phase II**
  - **CMP pump station would pump water to the IGCC Power Station.**
  - **Water from the HAMP Complex would be pumped to the CMP via a pump station located in the GMMP. Existing pumps in the HAMP would likely be used to pump water from the HAMP into the GMMP when water level elevations are lowered to increase inflow rates.**
  - **A pumping station in the LMP would pump water to the CMP. An engineered intake structure would be installed on the Prairie River allowing water to flow by gravity into the LMP.**

Phase I would initially involve pumping of the CMP water to the IGCC Power Station. When the CMP water level were to decline to an elevation of 1,290 feet msl, water from the HAMP Complex would be pumped to the CMP to maintain water levels in the CMP (see Figures 4.5-4 and 4.5-5 for the latest water balance and Figure 2.3-2 for the location of process water pump stations and pipelines). Excess water in the HAMP Complex would be pumped to the Panasa Lakes to maintain the desired water levels in the HAMP, as is the current practice.

For Phase II, additional water from the LMP to the CMP would be pumped to support the water requirements. If necessary, the LMP would be supplemented by the Prairie River when river levels are high, via an engineered intake structure on the Prairie River. Table 4.5-5 (added in Final EIS) summarizes the flow rates to and from the water sources, and the pumping capacities per station are listed in Table 4.5-6 (revised to reflect new water balance).

Table 4.5-5. Flow Rates To/From Water Sources at the West Range Site

Phase	HAMP Complex Flow to CMP (gpm)	Estimated Groundwater Flow to CMP (gpm)	LMP to CMP (gpm)	Prairie River to CMP (gpm)	CMP Flow to Power Plant (gpm)
I	700	2,800	0	0	3,500
I & II	2,000	2,800	2,200	400	7,000

Table added for Final EIS.
gpm – gallons per minute

Table 4.5-6. West Range Pumping Station Capacities

Pump Station Location	Pumping Capacity (gpm)
CMP	14,000
HAMP Complex	5,000
LMP / Prairie River	5,000

Table revised to reflect use of enhanced ZLD system and change in water balance.
gpm – gallons per minute

Each pump station intake would meet the CWA Rule 316(b) requirements for cooling water intake structures**. Proposed operating conditions, including pumping stations, are discussed in greater detail below.**

There are no other competing uses for the water in the CMP and LMP other than aesthetic and recreational uses **(potential conflicts with HAMP are described in subsequent section)**. Use of the water resources by the West Range Mesaba Generating Station in terms of the process water usage and discharges, the Water Appropriation Permit Application, and the NPDES Permit Application (Excelsior, 2006a) would assure that the aesthetic and recreational uses are minimally affected. **Because the hydrological connectivity between the mine pits and nearby water resources are complex and impacts are difficult to analyze at this time, water levels and usage would be monitored during operation of the IGCC Power Station, and Excelsior would continue to refine its water management plan and consult with MNDNR to ensure minimal impacts to water resources.**

Excelsior has stated its need to secure areas of the CMP from potential post-9/11 threats. Though closing of the CMP may not be essential, the project proponent believes that limiting the CMP's recreational use, especially near the intake structure, would protect the security of critical infrastructure elements. However, the proponent recognizes that demands for recreational access to the CMP would affect MNDNR's decision—Excelsior will continue to coordinate with MNDNR to determine whether these security interests and local recreational interests can co-exist. Further discussions will involve identifying additional stakeholders in the decision-making process, formulating post-9/11 security options to protect key infrastructure, and selecting the security option best suited to balance local concerns, water needs, and economic development. In general, the project proponent would work with stakeholders to identify options in providing security measures for the proposed cooling water intake structure and pump house (e.g., establishing a designated exclusion zone within the CMP cordoned off with buoys and posted with "No Entry" signs).

Pumping Stations and Intake Structures

Section 4.5.2.4 discussed implementation of intake structures—Figure 4.5-2a shows the caisson intake option for the CMP; Figure 4.5-2b shows the recommended angle well intake option for the CMP; Figure 4.5-2c shows the floating pump station that would be used at the HAMP and LMP intake structures. An ultra-fine screen (0.25-mm diameter) is proposed to prevent biota transfer between basins at all proposed pumping locations. To ensure compliance with 316(b) requirements, intake flows and velocities were analyzed. Table 4.5-7 (added in Final EIS) provides velocity calculations for the CMP intake, as well as for the HAMP and the LMP intake structures, which would be used to augment CMP water levels.

Table 4.5-7. Through-Screen Velocities for Intake Structures at West Range Site

Intake location	CMP	CMP	LMP	HAMP
Type of intake	Caisson	Angle well	Floating intake	Floating intake
Average annual withdrawal rate (gpm)	7,000	7,000	2,200	2,200
Maximum withdrawal rate (gpm)	10,000	10,000	5,000	5,000
Number of intakes at this location	4	4	2	2
Proposed flow rate per intake (gpm)	3,500	3,500	2,500	2,500
Proposed flow rate per intake (cfs)	7.8	7.8	5.6	5.6
Proposed Screen Diameter	24" pipe sized screen	24" telescoping screen	30" pip sized tee screen	30" pip sized tee screen
Screen slot size	10	10	10	10
Square feet of open area per foot of screen (Johnson Screens literature)	0.42	0.34	0.51	0.51
Minimum screen length needed per intake to limit velocity to <0.5 ft/sec, feet	37	46	22	22
Screen length proposed per intake, feet	40	50	25	25
Actual through screen velocity, ft/sec	0.47	0.46	0.43	0.43

Table added in Final EIS
Source: Barr, 2008b
gpm = gallons per minute, cfs = cubic feet per second

As shown in Table 4.5-7, the proposed screen size and design would result in a maximum through-screen intake velocity of less than 0.5 feet-per-second as required by the applicable regulations. In addition, the regulations require that intake volumes be reduced to a level that can be obtained by a closed-cycle recirculating water system. Because an enhanced ZLD system would be used, the intake volumes for the proposed facility would, by definition, be less than or equal to that which can be obtained by a closed-cycle system. Note that the capacity of each intake is greater than the average annual withdrawal rate in order to provide flexibility for system operation and a factor of safety to the intake design in case a portion of the pumping systems fails, needs repair, or otherwise becomes temporarily out-of-service.

Suppliers of ultra-fine mesh screens for use in cooling water intake structure applications have developed systems to monitor the screens for – and clear them of – accumulated debris and/or organisms that attach to the screen, which could potentially result in localized velocity profiles exceeding the 0.5 feet per second threshold specified under the applicable regulations. Such systems monitor the pressure differential inside the screen versus outside the screen to determine the frequency at which sudden bursts of compressed air are injected inside the screen to clear the outer surface of accumulated material. While this cleaning mechanism is effective, the released burst of air rising rapidly to the surface can result in localized turbulence capable of capsizing small watercraft in the immediate area. To prevent accidents related to such cleaning activities, the area around the intake structure and above the screens would be cordoned off from the public. As previously mentioned, Excelsior will continue to coordinate with MNDNR and stakeholders to identify appropriate security measures without compromising recreational use.

CMP Pumping Station

A series of pumps would provide a pumping capacity between 3,500 gpm and 7,000 gpm for Phase I and between **7,000** gpm and **14,000** gpm for Phases I and II. This capacity would be provided in a permanent pumping station proposed at the southeast corner of the CMP. Process water would be pumped from the CMP directly to the Mesaba Generating Station. Figure 2.3-3 provides the location for the process water pump stations and pipelines. **It is anticipated that withdrawal from the CMP would be restricted if water levels reached the 1,250 feet msl elevation range.**

A standby pump would be incorporated for use during a failure or maintenance of one of the primary pumps. The pump station intake would also meet the Section 316(b) CWA requirements for cooling water intake structures (such requirements are to be addressed as part of the NPDES permitting process). The pipeline that extends from the CMP to the Mesaba Generating Station would be approximately 36 inches in diameter. The length of the pipeline that extends from the CMP to the Mesaba Generating Station would be approximately 11,100 feet.

Following publication of the Draft EIS, MNDNR announced its plans to construct a gravity outflow device from the CMP to the Prairie River that would allow the CMP to be maintained at an MNDNR-determined maximum water level (Scenic Range News Forum, 2009). The proposed outflow would eliminate the need for the Mesaba Energy Project to provide an emergency outfall from the CMP pumping station to Holman Lake as originally discussed in the Draft EIS.

For the Draft EIS, Excelsior originally proposed to preclude transferring smelt larvae from the CMP by withdrawing water at depths greater than 250 feet. However, since publication of the Draft EIS it has been estimated that the amount of oxygen to support smelt larvae is adequate throughout the entire CMP water column (Barr, 2008b; Wenck, 2006). Therefore, use of a 200-foot or deeper intake would not ensure the prevention of smelt transfer. Furthermore, an Alden Research Laboratory analysis indicates that a 0.25-millimeter ultra-fine mesh screen alone would effectively prevent smelt transfer (Alden, 2006).

Therefore, instead of constructing a 200-foot deep caisson intake structure for the CMP, Excelsior proposes to install four angle wells. The wells would be directionally drilled to a depth of approximately 20 feet below the summer thermocline—or approximately 60 feet below the surface of the lowest estimated future water level—using ultra-fine mesh screens, i.e., 0.25- millimeter mesh openings, to prevent any viable stage of smelt from passing through the intake. Recent advances in well drilling technology would allow construction of directionally drilled intake structures in bedrock similar to that found near the CMP (Barr, 2008b). Angle wells would not only be feasible at the CMP, but significantly more cost effective than a caisson installed to the same depth. Figure 4.5-2 illustrates conceptual caisson intake and angle well intake designs that could be used for the CMP.

HAMP Complex and LMP Pumping Stations

A floating pump station would be installed at the GMMP end of the HAMP Complex. This pump station would have a capacity of **5,000** gpm and would direct water into the CMP. A floating intake structure is proposed for these mine pits, as they are conducive to fluctuating water levels and commonly used by mines for pumping systems. This system includes placing pumps and intake structures on a floating platform in the mine pit. A pipe with wedge-wire screen is extended to withdraw water from the desired depth. Sufficient length of screen is provided to ensure that intake velocities are maintained below 0.5 feet per second and to ensure thermal stratification is not negatively disrupted. Flexible supply pipe would be designed to convey water from the floating platform to a permanent conveyance pipeline on land. For the HAMP Complex, the pipeline from the GMMP to the CMP would be approximately 24 inches in diameter and would extend approximately 25,400 feet in length.

A pump station designed in the same manner as the HAMP Complex pumping station with a capacity of **5,000** gpm would be installed in the northeast corner of the LMP, and would direct water to the CMP. The pipeline from the LMP to the CMP would be approximately 24 inches in diameter with a length of 11,300 feet.

Pumping at the GMMP and LMP is expected to occur on a seasonal basis (i.e., no winter pumping). Pumping capacity at the HAMP Complex and the LMP**, under such circumstances,** must allow for the capture of the 12-month average annual water supply on a seasonal basis.

Prairie River Intake

The mean annual flow in the Prairie River is 319 cubic feet per second (cfs), and 5 percent of that flow is equal to 16 cfs. The 7Q10 in the Prairie River was determined to be 22 cfs, and 25 percent of that flow is equal to 5.5 cfs. Since 25 percent of the 7Q10 is the smaller amount, the maximum rate at which water can be appropriated from the Prairie River at one time is 2,468 gpm (5.5 cfs).

An engineered intake structure capable of accepting a maximum rate of 2,470 gpm from the Prairie River would be installed in the river and would direct water into the LMP for storage. This engineered intake structure would allow water to flow by gravity only when the water levels in the river rise to a predetermined level during a high water event. During such events, the water would flow over the top of a concrete structure (weir) located in the river and through a wedge wire screen. The screen would be oriented so that the river flow runs parallel to the wedge wires, allowing the screens to be self cleaning. In addition, the structure would be equipped with a flow control valve that would limit intake velocities to 0.5 feet per second or less, minimizing impingement. **The level in the LMP would be maintained at a low enough level to allow for gravity feed of the flow from the Prairie River. The gravity-flow intake would be located at a point downstream of the Prairie Lake Hydropower Facility to avoid impacts to power production at the hydropower facility.**

Pipeline Infrastructure

Routing for the pipelines would be primarily on public property adjacent to existing transportation corridors. Figures showing the entire length of each segment of pipeline are attached as Appendix B of the project proponent's Water Appropriation Permit Application included in the Joint Application (Excelsior, 2006a). **Since publication of the Draft EIS, Excelsior developed Access Road 3 as the preferred road alternative in response to concerns raised by USACE and other agencies about the need to avoid and minimize wetland impacts identified in the Draft EIS. Thus, pipelines associated with proposed process water (Segment 2), potable water, and sanitary sewer pipelines originally shown routed along the proposed realignment of CR7 and Access Road 1 have been revised to follow the new Access Road 3 alignment (see Figure 2.3-2).**

Stormwater Retention and Use

Stormwater estimates indicate that approximately 30.8 acre-feet of runoff for Phase I and 33.6 acre-feet of runoff for Phase II would occur (see Appendix H2). Runoff from precipitation would be collected in a surge and equalization pond to be recovered and recycled within the proposed IGCC Power Station footprint. Preliminary design estimates indicate that a pond capacity of 35 acre-feet would be required. This capacity is conservative, as it is more than adequate to accommodate a 24-hr, 100-yr storm event coinciding with a plant outage. During normal plant operation, capacity requirements would be reduced by the cooling towers' ability to work off accumulated runoff. The collected runoff would be pumped to the cooling tower basins as makeup water over time or, should it require treatment, be directed into the ZLD system. The water would be transferred from the surge and equalization pond to the cooling towers via pump(s).

<u>*Water Levels and Water Balance During Operations*</u>

[Text in the Draft EIS regarding discharges of cooling water blowdown has been deleted.]Within the context of the permitting process, Excelsior would create a monitoring plan to record levels within the mine pits from which water supplies for the Mesaba Generating Station would be derived and the pumping rates at which waters would be transferred.

Canisteo Mine Pit

The operation of Phases I and II and their impacts on water levels in the CMP have been modeled by Excelsior (Excelsior, 2006a). Modeling results indicate that water levels in the CMP could fluctuate up to 2 feet during a year with average rainfall. Under drought conditions, water levels in the CMP could fluctuate up to 6 feet. Based on the model runs conducted, Excelsior is proposing to operate the CMP within an operating range of 1,260 to 1,290 feet msl during normal weather conditions. Under extreme drought conditions, Excelsior would operate the CMP in the 1,250 to 1,260 feet msl range. Excelsior proposes to operate within the 1,290- to 1,300-foot msl range during extremely wet periods. **[Text regarding an outfall to Holman Lake has been deleted.]**

The CMP contains some land bridges that are below a water surface elevation of approximately 1,260 feet msl. Under conditions of extreme drought, Phases I and II could potentially reduce water levels within the CMP to a point where land bridges that could isolate one part of the CMP from another begin to appear. This would occur in the event of: (1) the absence of any precipitation input into the pit about 5 years in duration; and (2) peak power production from Phases I and II over the entire period. Exposing the land bridges within the CMP would have limited effects on the water capacity and would not occur over long periods of time. However, it is expected that these conditions are not likely to occur. The water surface elevation of the pit would be 1,290 ± 2 feet msl during a typical year. Water from the other pits would help to augment water levels in the CMP, and should help to prevent significant water level changes. **Because water level variations in the CMP would normally be expected to occur very slowly, biological impacts are expected to be minor (see new text in Section 4.8.2.2 regarding potential impacts on lake trout reproduction).**

Currently, water levels in the CMP are rising and, in time, can be expected to overflow **(Business North, 2007)**. **According to the Water Management Plan, water levels in the CMP would be maintained at approximately 1,290 ft msl, which would alleviate the risk of localized flooding from overflowing pit levels (lowest pit wall altitude is 1,324 ft [Jones, 2002]). DOE acknowledges that higher water levels do not constitute the likelihood of pit wall destabilization and agrees with MNDNR that, without additional stabilization measures, some bank erosion would occur at the proposed operation levels due to natural processes, such as direct precipitation and freeze-thaw cycles on the pit walls (PHE, 2008). However, stabilization of the rail line is not within the scope of this EIS. CN Railway owns the rail line along the part of the bank in closest proximity to the track and would be responsible for restoring the rail to service. CN would determine the specific stabilization method in the event the Mesaba Energy Project is constructed on the West Range Site. In general, the method would depend on the water level at the time of bank stabilization and the erosion that occurs in the interim, and could involve riprap or construction of a retaining wall to stabilize the bank at an angle steeper than natural repose, as well as the use of fill material to restore the eroded bank.**

Summer thermal stratification profiles of the CMP were obtained from MNDNR and are shown in Figure 4.5-5 (added in Final EIS). The data indicates a rapid drop in temperature between 5 and 20 meters below the water surface.

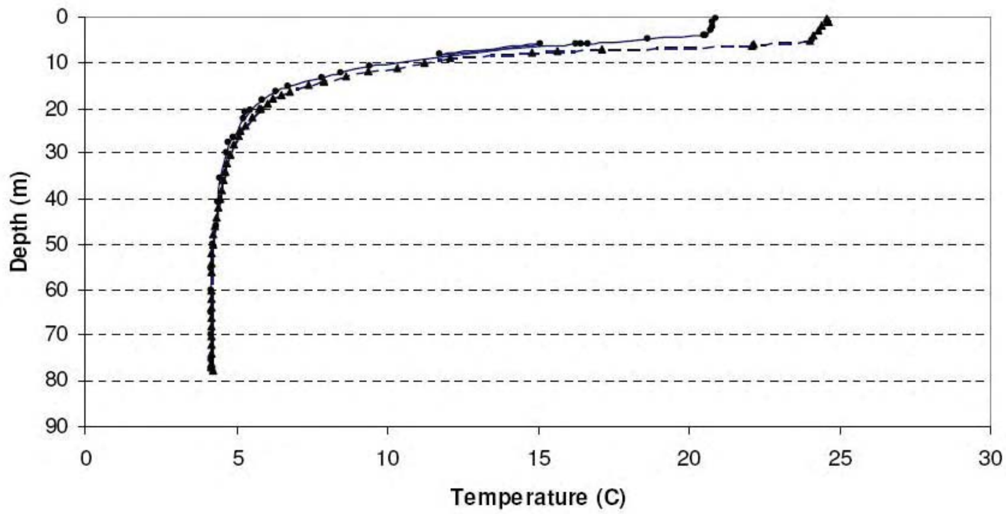

Figure 4.5-5. Temperature Profiles for the Canisteo Mine Pit Using 2006 Data (Barr, 2008b)

Similar lakes in the area with large outlets remain stratified throughout the summer despite having natural outlets (Barr, 2006b). Thermal de-stratification in the CMP is even more unlikely because of its large water volume. Therefore, thermal de-stratification is not expected unless cool water were discharged from the plant onto warmer upper-layer waters. In this case, there would be no thermal discharge from the proposed facility with the implementation of the enhanced ZLD system at the West Range Site. In general, adverse water quality and quantity impacts to the CMP during Phases I and II are considered to be minor. Most of the 3,500 gpm annual evaporative loss associated with Phase I is expected to come from the CMP, which is a mine pit currently with zero to minimal outflow and has not contributed to any overflow to surface waters in nearby subwatersheds since 1985 (i.e., more than twenty years). Thus, the impact of evaporative losses from the CMP to the subwatershed is considered negligible. Annual average evaporative losses of the Mesaba Generating Station would be approximately 7,000 gpm total for the combined Mesaba Phase I and Phase II. Based on estimates provided below, it is expected that this loss would be minor when compared to the existing flows of downstream waterways. Water loss in the CMP from evaporation could have adverse impacts to fish populations and recreational use; however, such impacts are expected to be minor as the water management plan is designed to maintain a stable water level at approximately 1,290 ft under normal operating conditions.

Holman Lake

With implementation of an enhanced ZLD system, the discharge outfall to Holman Lake is no longer required for normal plant operations. Also, MNDNR plans to construct a gravity outflow device from the CMP to the Prairie River that would allow the CMP to be maintained at a water level of approximately 1,313 ft msl (Scenic Range News Forum, 2009). The proposed outflow would eliminate the need for the Mesaba Energy Project to provide an emergency outfall from the CMP pumping station to Holman Lake as originally discussed in the Draft EIS.

Findings from a USGS study conducted in 2002 show that when the CMP's water level is at 1,310 ft (around current levels), approximately 0.01 cfs of groundwater from the CMP outflows to Holman Lake (Jones, 2002). Findings also indicate that groundwater inflow to the CMP is greater when the pit water levels are lower and that at CMP water levels of 1,300 ft or less, no outflow from the CMP to Holman Lake occurs. Additionally, at the time when dewatering activities ended (1985), CMP water levels were at least 300 feet lower than current elevations without any known

significant impacts to Holman Lake. Thus, it is assumed that the proposed operating water levels for the Mesaba Generating Station (i.e., 1,290 ± 2 feet msl during a typical year), could be maintained with minor impacts to Holman Lake.

Trout Lake

The project proponent expects to maintain water levels in the CMP at 1,290 ± 2 feet msl. Therefore, because Trout Lake has a water elevation of approximately 1,288 feet msl (MNDNR, 2009), it is anticipated that there would be minimal impact on Trout Lake water levels under this scenario. In the unlikely circumstance in which no recharge of the CMP would occur over a 5-year period (i.e., drought conditions extend to 5 years), water levels in the CMP could drop to 1,260 feet msl. However, although CMP levels have risen dramatically since cessation of mining activity (from 1,250 feet in 1989 to over 1,310 feet at present), a review of MNDNR records indicate that there has been no discernible impact on Trout Lake water levels, which have remained fairly constant (between 1,287 and 1,289 feet) over the same time period (MNDNR, 2009). Therefore, it is expected that CMP water withdrawal during Mesaba Phases I and II would have minor impacts on Trout Lake water levels.

HAMP Complex, Upper and Lower Panasa Lakes, and Swan River

Initially for Phase I, water would only be pumped from the CMP until the water level is drawn down to 1,290 ft msl (the normal operating level). When the water level in the CMP reaches this elevation, pumping from the HAMP Complex (i.e., GMMP) to the CMP would begin. The addition of an enhanced ZLD system has reduced water demand and changed the water balance for the West Range Site. The average amount of water required from the HAMP Complex has been reduced from 3,500 gpm (as stated in the Draft EIS) to approximately 2,000 gpm for the combined Phases I and II. It is estimated that the GMMP and HAMP are hydrologically connected within the planned operating levels and that this rate of appropriation would be sustainable at current pit levels (additional hydrologic modeling and consultation by Excelsior with MNDNR would be conducted during the water appropriation permitting process to confirm these estimates).

The existing pumping system at the HAMP Complex (including the GMMP, Arcturus Mine Pit, and HAMP) would be maintained to allow pumping to its current permitted discharge point to Upper Lake Panasa and, if necessary, may be modified to pump water into the GMMP. The GMMP would typically be operated in the range of 1,220 to 1,230 feet msl. Excelsior and/or the MNDNR, through an approved mechanism derived during the permitting process, would have the capability to operate the existing pump in the HAMP to manage water levels in the complex during wet periods.

Water has been seasonally pumped out of the HAMP Complex to keep features of past mining operations from being flooded and thereby interfering with State Park tours. **MNDNR has pumped excess water from the HAMP at a rate of up to 6,200 gpm for about half of each year (spring to autumn) to prevent the historical mining infrastructure associated with Hill-Annex State Park from being flooded (MSI, 2008). Table 4.5-8 (added in Final EIS) lists the average annual discharge rates from the HAMP to the Panasa Lakes, as recorded by MNDNR. The average discharge between the years 2003 and 2006 (2,500 gpm) was needed to maintain the HAMP at the desired level.**

Table 4.5-8. Average Annual Discharge to Panasa Lakes

Year	Average Discharge (gpm)[1]	Approximate Elevation (ft)
1999	150	1,230.7[2]
2000	0	N/A
2001	0	N/A
2002	1,200	1,257.1[2]
2003	2,900	N/A
2004	2,600	N/A
2005	2,200	1,247[3]
2006	2,300	N/A

Table added in Final EIS;
N/A – Not Available
Sources: [1]MSI, 2008; [2]MNDNR, 2009; and [3]Excelsior, 2006

Water is pumped from the HAMP into the Panasa Lakes under an NPDES permit, where historically it was considered to have beneficial impacts by mitigating the effects of sewage effluent from the cities of Marble and Calumet. However, operation of a new wastewater treatment plant has mitigated these effects and it is assumed that the pumping of the HAMP, from a water quality standpoint, is not as beneficial to the Panasa Lakes as it may have been prior to construction of the new wastewater facility (MSI, 2008). As shown in Table 4.5-8, discharge rates from the HAMP during the years 1999 and 2002 were near zero or low without any complaints to MNDNR or MPCA regarding water quality in the Panasa Lakes (no water quality data available). Therefore, it is expected that if the HAMP discharge were eliminated from the Panasa Lakes, minor impacts to water quality the HAMP Complex and Panasa Lakes would occur.

As previously mentioned, because the GMMP and HAMP are hydrologically connected within the planned operating levels (the currently submerged land bridge elevation between GMMP and HAMP is approximately 1,215 ft (Excelsior, 2006), it is expected that 2,000 gpm would be available at the proposed pumping location (i.e., GMMP of the HAMP Complex). Minnesota Steel, a neighboring industrial user, has identified a potential need for 1,200 gpm for water augmentation during the later stages of its operations. Significantly higher flows are believed to be available if the water level in the HAMP is reduced below the now-submerged land bridge located between the GMMP and the HAMP. **Thus, the HAMP Complex could meet the needs of both facilities if water levels were maintained at lower elevations. At lower water levels, land bridges would be exposed, which would require pipelines or pumping between pits in the HAMP Complex to balance water levels.** Discussions would be required between Excelsior and the MNDNR to determine whether operation at greatly reduced water levels in the HAMP is advisable and, if so, under what conditions such operation would be desirable.

The Swan River would be impacted to the extent that instead of pumping water out of the HAMP to Upper Panasa Lake (Upper Panasa Lake discharges to Lower Panasa Lake and ultimately into the Swan River), which is MNDNR's current practice, water would be pumped to the CMP during Phases I and II. Based on USGS data during the period 1965-1990, the average flow of the Swan River was 29,000 gpm USGS, 2009). The average and peak pumping rates (2,000 and 5,000 gpm) that would occur during Phases I and II respectively represent 7 and 18 percent of the Swan River average flow. Note that significant mining has taken place within the watershed during the period of record, which could have commensurately caused unnaturally high or low flows to be measured in the river as a result of dewatering and stream augmentation practices conducted. Additionally, smaller quantities of water would likely be diverted from the HAMP

Complex if the CMP yields more water than estimated or if above-normal precipitation occurs. Thus, minor to moderate impacts to augmentation of the Swan River are expected. Updated discussions on the cumulative impacts to the Swan River watershed are included in Section 5.2.4.

Because of the complexities of analyzing water use impacts, water appropriation priorities cannot be confirmed at this time; however, the project proponent will participate in ongoing discussions with MNDNR and other stakeholders, including Minnesota Steel, to ensure that water use conflicts are resolved and impacts to water resources are minimized. Monitoring of water levels would occur during both phases and Excelsior would continue to refine its Water Management Plan and continue consultation with MNDNR to ensure limited impacts. Discussions would be required with MNDNR to understand the planning and operational priorities and under what operating conditions would be allowed for the Mesaba Energy Project. Use of the HAMP would be dependent upon the needs of the MNDNR to control mine pit water levels.

Lind Mine Pit and Prairie River

For Phase II, the LMP and the Prairie River (if required) would supplement the water supply. The LMP would be operated in the range of 1,190 to 1,250 feet msl during a typical year. The operating range in the LMP would allow for storage of water during non-pumping periods. Pumping would be unlikely to occur during the winter or if there is equipment failure or system maintenance needs. **Water usage and levels in the mine pits would be monitored in order to evaluate any immediate needs for temporary or emergency pumping and to minimize environmental impacts. Annual average evaporative losses would be 7,000 gpm total for Phases I and II. The LMP's annual average discharge to the Prairie River was estimated to be 1,800 gpm based on single flow measurements in summer and winter. Under a worst-case scenario, this annual discharge from the LMP to the Prairie River would not occur. The mean annual flow of the Prairie River at the Prairie Lake Dam is approximately 143,200 gpm (or approximately 319 cfs) based on data from Minnesota Power (1998-2004). Thus, the elimination of the LMP's discharge to the Prairie River represents 1.3 percent of the mean annual flow of the river. A worst-case analysis assumes that the annual average discharge from the LMP would be withdrawn at the time of low flow (represented by the 7Q10 flow). The 7Q10 flow in the Prairie River is estimated to be 9,870 gpm (or 22 cfs) based on Minnesota Power data. Under these circumstances, the river's normal low flow at that point of measurement would be reduced by approximately 18 percent. If necessary to protect river flows during such low flow events, the project proponent would curtail direct appropriations from the Prairie River and instead withdraw from stored capacity in other mine pits.**

Some loss of groundwater recharge to the Prairie River could also occur over the 3,000-foot distance the LMP and the Prairie River share in immediate proximity. However, such loss of recharge is expected to be minimal given that the Greenway Mine Pit is located on the river's opposite bank and shares close proximity for approximately 3,400 feet. This shared boundary with the Prairie River begins about 900 feet south of the northern 'shore' of the LMP. The difference in elevation between the Greenway Mine Pit (at an elevation of about 1,260 feet msl) and the Prairie River (at an elevation of about 1,257 feet msl) is such that any lowering of the Prairie River due to loss of recharge from the LMP would be expected to be mostly offset by the movement of groundwater from the Greenway Mine Pit to the Prairie River.

4.5.3.2 Process Water Discharges and Water Quality Criteria

With implementation of an enhanced ZLD system at the West Range Site (announced after publication of the Draft EIS), there would be no process and blowdown water discharges to any water bodies. Additionally, stormwater discharges (within a 24-hour, 100-year storm event) would be eliminated, as stormwater would be treated and reused within the plant, primarily for cooling water. As a result, proposed Outfalls 001 and 002 and much of the water quality concerns at the West Range Site as originally discussed in the Draft EIS are no longer relevant. Because of the

enhanced ZLD system, the original scope of the NPDES/SDS permit for the West Range Site has been reduced and Excelsior has revised its permit application for approval by MPCA, the agency responsible for the state's stormwater program. This section was revised to reflect the use of an enhanced ZLD system and the elimination of discharged pollutants. Water would be pumped into the CMP from various sources to offset water appropriation, which would increase phosphorus levels in the CMP. An updated phosphorus analysis for the West Range Site was added to this section.

The expected average annual flow rate and proposed permitted peak flow rate for each outfall for Phase I and II operations are summarized in Table 4.5-9 **(revised to reflect use of enhanced ZLD system and new water balance)**. The proposed peak discharge rates are typically based on modeled peak rates plus some additional capacity to provide operational flexibility.

Table 4.5-9. Discharge Flow Rates, West Range Site

	Phase I		Phases I & II	
	Average (gpm/MGD)	Peak (gpm/MGD)	Average (gpm/MGD)	Peak (gpm/MGD)
From HAMP to CMP (003)	2,000/2.9	**5,000/5.0**	**2,000/2.9**	**5,000/5.0**
From LMP to CMP (004)	0	0	**2,200/3.2**	**5,000/5.0**

Table has been revised to reflect use of enhanced ZLD system. Note, estimates regarding industrial discharges to receiving waters has been deleted.

[Text in the Draft EIS regarding industrial discharges to receiving waters and associated water quality impacts has been deleted.]

Water quality modeling for phosphorus concentrations was conducted based on the updated water balance (see Table 4.5-5 and Figures 4.5-2 and 4.5-3) and existing phosphorous levels (see Table 4.5-10 below – added in Final EIS) to analyze impacts to water quality in the CMP. As previously mentioned, water from three sources – the HAMP, the LMP, and the Prairie River – would be pumped into the CMP to offset pumping to the proposed facility.

Table 4.5-10. Current Phosphorus Levels, West Range Site

Water Body	Average (mg/L)	Maximum (mg/L)	Minimum (mg/L)	Samples (mg/L)
Canisteo Pit[1]	0.004	0.004	0.003	3
Lind Mine Pit[2]	0.004	0.004	0.003	3
Hill Annex Pit[1]	0.004	0.006	0.003	3
Prairie River[3]	0.036	0.055	0.021	41
Canisteo Groundwater[2]	0.004	0.004	0.003	3

Table added in Final EIS.
[1] ERA Laboratories Report, 12/6/2006
[2] Assumed equal to the current Canisteo Mine Pit water quality.
[3] MPCA Lake Station ID 31-0384 for Prairie Lake, 1981-2006 - (Barr, 2008a and Excelsior, 2009a)

The water quality modeling was based on a mass balance for the CMP assuming that the CMP is well mixed (a conservative assumption as the mine pit is more than 100 feet deep). Pumping rates used to model phosphorus levels in the CMP generally followed the rates presented in Table 4.5-5; however, for conservatism, the phosphorus modeling assumed that the Prairie River would flow directly into the CMP and a pumping rate of 1,800 gpm from the LMP to the CMP under the combined phase was used (representing groundwater inflow into the LMP) instead of the 2,200

gpm shown in Table 4.5-5. Modeling the Prairie River – which has the highest existing phosphorus concentrations compared to the other sources as shown in Table 4.5-10 – water as though it flows directly into the CMP results in more conservative phosphorus levels as dilution in the LMP would slow the mass transfer of phosphorus into the CMP.

The modeling predicted that at the end of the 30-year project life the concentration of phosphorous would increase from 0.0037 mg/L to 0.0057 mg/L (an increase of 0.002 mg/L [or 54 percent]). This increase appears to be significant because existing levels of phosphorous in the CMP are very low; however, this predicted concentration is still well below the state's standard of 1 mg/L and is expected to have minimal impact to biota in the CMP. Although the CMP is not recognized as a natural trout lake, a self-sustaining population of lake trout has been established as described in Section 3.8. Hence, the predicted concentration would still be below the strictest water quality standard for such a lake in northern Minnesota (i.e., 0.012 mg/L for natural trout lakes).

Assuming worst-case operating conditions where appropriation from the Prairie River would near the statutory maximum appropriation (approximately 2,500 gpm) and no water would be appropriated from the HAMP Complex, phosphorus concentrations within the CMP could surpass 0.012 mg/L after 20 years and approach 0.014 mg/L at 30 years of operation. Under these extreme circumstances, the maximum phosphorus levels would be slightly higher than the 0.012 mg/L standard (which is not applicable to CMP). If necessary, as a condition of a water appropriations permit, the proponent could restrict its appropriation of water from the Prairie River to ensure that the average concentration of phosphorus in the CMP would not exceed the standard of 0.012 mg/L. Furthermore, the findings of this analysis are assumed to be conservative, as it is based on the minimum average annual recharge rates assumed for the HAMP and CMP – likely recharge rates are assumed to be higher. If actual recharge rates are closer to the likely rates, appropriation of water from the Prairie River would not be required and phosphorus concentrations would not increase to levels as predicted by the modeling.

4.5.3.3 Domestic Wastewater Treatment

On average, approximately 30,000 gpd of domestic wastewater would be generated during the construction of the proposed Mesaba Generating Station and about 4,500 gpd would be generated from the operational staff at the Mesaba Generating Station. For planning purposes, the daily flows were increased to account for additional non-construction/non-operational persons at the station to 45,000 gpd during construction and 7,500 gpd during operation of the power station. The domestic wastewater would contain 200 to 250 mg/L BOD, 220 to 270 mg/L TSS and 6 to 8 mg/L total phosphorous (TP). During construction the projected daily flow of wastewater would be generated over a period of 10 to 14 hours.

Excelsior has evaluated two options for treating and disposing domestic wastewater produced during construction and operation for both Phases I and II. The first option involves constructing a WWTF to treat domestic wastewater on site. The second option, preferred by Excelsior, would involve connecting to the CBT WWTF at the Taconite pump station located approximately 2 miles south of the West Range Mesaba Generating Station.

Domestic Wastewater Alternative No. 1

The first alternative would consist of constructing a stabilization pond adjacent to and southwest of the Mesaba Generating Station WWTF with the capacity to treat 45,000 gallons of domestic wastewater per day (the maximum projected flow from Phases I and II). Once the Phase I Mesaba Generating Station is placed into operation, the WWTF would receive a maximum of 7,500 gallons of domestic wastewater per day due to the reduced staff required to operate the station relative to that required to construct it. Due to the decrease in domestic wastewater flow, part of the WWTF would be closed and abandoned in accordance with Minnesota Rules. Other modifications would be made to the WWTF at this time to link it to the Mesaba Generating Station's domestic wastewater collection system.

Once treated, effluent from the WWTF would be routed off site through an 8-inch diameter gravity sewer pipeline to Little Diamond Lake (located approximately 1.4 miles south-southeast of the Mesaba Generating Station). **[Text in the Draft EIS relating to the discharge of treated effluent via the blowdown outfalls to CMP and Holman Lake was deleted based on the use of an enhanced ZLD at the West Range Site that would eliminate the outfalls discussed in the Draft EIS.]** Alternative 1 would require a construction ROW 50 feet wide and a permanent ROW 30 feet wide resulting in a total impact of approximately 10 acres and 6 acres, respectively.

The MPCA's preliminary discharge limits for Little Diamond Lake are 25 mg/L BOD, 45 mg/L TSS, and 1 mg/L TP (see Minnesota Rule 7055.0211 Subparts 1, 3B, and 1a, respectively). The stabilization pond facility would be able to meet the BOD and TSS limits. However, to meet the limit for phosphorus, some chemical addition would be required before the effluent is discharged from the WWTF. To remove phosphorus, either ferric chloride or alum would be applied to the pond prior to discharging treated wastewaters. Alternative 1 would require a part-time licensed operator on-site to monitor discharges and assure that the WWTF meets the monitoring and discharge requirements specified in the NPDES permit.

Excelsior would be required to obtain a new NPDES permit to discharge treated domestic wastewaters to Little Diamond Lake. Although treatment to reduce phosphorus levels is available, present uncertainties associated with concerns over new or expanded discharges to waters impaired for phosphorus and DO make this alternative less likely of being approved without controversy. Treated wastewater effluent from the Mesaba Generating Station that would be discharged to Little Diamond Lake could increase the level of these nutrients and cause algae and other aquatic plant growth. Domestic wastewater discharged to Little Diamond Lake (part of the Swan River watershed), also would be subject to the water quality standards for DO and mercury for Swan River (as provided in Table 4.5-11).

Table 4.5-11. Water Quality Criteria Standards for the Swan River

Parameter	Class 2B	Comments
Dissolved Oxygen	5.0 mg/L as a daily minimum	Class 2B standard may be modified on a site-specific basis except that no site-specific standard shall be less than 5 mg/l as a daily average and 4 mg/l as a daily minimum.
Mercury	0.0069 µg/L	Class 2B standard shown is a chronic standard that is far more stringent than either the maximum standard or the final acute value
Applicable Water Quality Standard	Minn. R. 7050.0222 Subp.4	

Swan River

Every 2 years, the CWA requires states to publish an updated list of streams and lakes that are not meeting standards for their designated uses because of excess pollutants. The list, known as the 303(d) list, is based on whether or not the water body meets standards for its designated use. For Minnesota, the MPCA develops the list and submits it to EPA for approval. The most recent draft of the state's list of impaired waters (MPCA, 2006e) indicates that the entire length of the Swan River from Swan Lake to the Mississippi River is listed as impaired for DO and mercury. NPDES permit applications for new or expanded dischargers requesting to use the Swan River as a receiving water must prove their discharges would not cause or contribute to the impaired status under the CWA or the MPCA's Phosphorus Strategy (Minnesota Rule 7050.0211 Subpart 1a).

While there is currently no water quality standard for phosphorus, the MPCA has a current practice of limiting such discharges to 1.0 mg/L at the end-of-the-pipe. In practice, however, a discharger able to meet this limit may still be prohibited by the MPCA from obtaining a permit if the Agency has reason to believe that measurable quantities of phosphorus would be released upstream of a receiving water impaired for DO. The proponents have taken care to avoid the use of phosphorus-containing chemicals to minimize the impact of the Agency's current practice in this regard.

Domestic Wastewater Alternative 2

The second option available to dispose of domestic wastewaters produced by the Mesaba Generating Station would be to connect the Station to the CBT wastewater collection and treatment system. The cities of Taconite, Bovey, and Coleraine have a joint wastewater commission that manages the POTW located in Coleraine, approximately 4 miles southwest of the West Range power plant footprint. The POTW receives wastewater from the three cities and discharges treated effluent to the Swan River. The system has a design capacity of 499,000 gpd and had an average flow of 334,000 gpd during the period from January 1 through May 31, 2005. During the wettest 30-day period, the average flow reached 444,000 gpd, with a peak day of 969,000 gpd. During the wettest period of the year, and under peak construction activities, the Coleraine POTW would be operating at its peak design capacity. **[Discussion in the Draft EIS at this point relating to the effects of wet weather flows in the sewer system has been relocated under Domestic Waster Impacts, below.]**

The CBT WWTF has a capacity available to treat the maximum projected wastewater flow of 30,000 gpd during construction and the 7,500 gpd expected from the operation of Phases I and II that has been projected for the project. The 12-inch sewer pipeline, pump station, and force main would also have ample capacity for these flow rates.

Besides the 12-inch gravity sewer pipeline (approximately 10,000 feet in length), a pump station, and 2,400-foot force main from the West Range IGCC power station would be constructed to convey wastewater to the City of Taconite's main pump station, located in the northeast corner of the city. Domestic Wastewater Alternative 2 would require a construction ROW 50 feet wide and a permanent ROW 30 feet wide resulting in a total impact of approximately 14 acres and 8 acres, respectively. Figure 3.5-1 illustrates the route for the domestic wastewater sewer system to connect to the City of Taconite's system.

Alternative 2 holds several advantages over Alternative 1, the on-site treatment option. First, the gravity sewer system that would be constructed for Alternative 2 would be an asset to the City of Taconite, would utilize the existing capacity of the WWTF and would generate some income for the operation of the WWTF. This sewer system would allow future connections to other residential, commercial or industrial establishments north and east of the City. Also, Excelsior would not be required to hire an operator to monitor the system, and potential concerns surrounding the addition of a new outfall discharging effluent from a domestic wastewater treatment system to public waters impaired for DO and nutrients would be avoided. Therefore, Alternative 2 is **Excelsior's preferred** approach.

Domestic Wastewater Impacts

There would be little net effect from the domestic wastewater discharged from the Mesaba Generating Station. The domestic wastewater would be conveyed to the CBT WWTF, treated at the facility and discharged under the facility's current NPDES permit. The NPDES permit was issued by MPCA and the limits therein were set to protect the Swan River water quality.

One issue concerning Taconite's collection system is the amount of I/I entering the system during periods of rainfall or high groundwater. At such times, excess flow can exceed the capacity of the main wastewater pump station in Taconite, creating a need to bypass untreated wastewater into a wetland upstream of the Swan River. Also, the CBT collection system just north of Trout Lake can become overwhelmed by incoming wastewater during wet weather conditions. At such times, overflow pumps are activated to transfer untreated wastewater into an adjacent holding tank. If the tank's capacity is exceeded, untreated wastewater can overflow into Trout Lake.

Therefore, in its commitment on January 21, 2008, Excelsior agreed to make significant capital improvements to the CBT WWTF when construction commences on the Mesaba Energy Project and to address excessive I/I rates exhibited by the Taconite collection system during periods of high rainfall or high groundwater. Excelsior proposes to help address this concern by expanding I/I studies for Taconite, helping fund efforts to fix major problems, and/or expanding the capacity of the overflow tank.

Also, although the CBT WWTF is equipped for addition of alum to flocculate dissolved phosphorus entering the system, no such additions are currently in practice. Excelsior proposes to fund the addition of such flocculants for as long as the Mesaba Project is operative and the disposal of the biosolids collected. This would significantly reduce phosphorus loading to the Swan River from the CBT WWTF. Finally, Excelsior proposes to fund studies to determine whether sand filters would be effective for reducing mercury concentrations in the CBT WWTF effluent.

4.5.3.4 Surface Water Resource Permits

For the West Range Site, construction, withdrawal, and discharges to surface water resources are protected and monitored by a series of existing and proposed permits. All new permits would contain conditions required to balance competing uses of water resources. The principal permits to be issued for such purposes are discussed below.

Existing Permits

The MNDNR currently holds a Water Appropriations Permit (Permit #042088) and a MPCA NPDES/SDS Permit (Permit #MN00 30198) for the withdrawal and discharge of water for the existing Hill Annex State Park dewatering operation. The ongoing data collection and cooperative study of the mine pit by Excelsior and the MNDNR would be covered under the existing permits.

The HAMP Complex is currently dewatered each year from the end of May to October (5.5 months per year). The withdrawal is permitted under a MNDNR Water Appropriation Permit and the discharge is permitted under a MPCA NPDES/SDS Permit. These permits are currently held by the MNDNR Parks and Recreation Division. An annual Water Use report is completed as required by the MNDNR Water Appropriation Permit. Water quality sampling for TSS and pH is completed and submitted to the MPCA along with water usage volumes on a monthly basis as stipulated in the NPDES/SDS Permit.

The MPCA NPDES/SDS Permit stipulates that the TSS average should be no more than 30 mg/L with a 60-mg/L instantaneous maximum. The Discharge Monitoring Reports indicate that the TSS level is typically less than 1 mg/L. The permit also stipulates that the pH be in the range of 6 to 9. The monitoring reports indicate that the discharge consistently is within the limits required by the MPCA NPDES/SDS permit.

Water pumped from the HAMP Complex flows overland through a series of wetlands and small streams and ultimately discharges into Upper Panasa Lake. The CMP does not currently have an outlet to surface waters.

New Permits

Different types of water-related permits would be required to construct and/or operate the West Range generating station and its associated facilities. This section identifies the types of permits that would be required and introduces the process that would be completed to obtain them. The permits that are issued would be premised on minimizing water-related impacts associated with the construction and operation of Phase I and Phase II. **[Text regarding industrial wastewater discharges, proposed outfalls, surface water quality standards, and impaired waters has been deleted as a result of Excelsior's proposed use of an enhanced ZLD system following publication of the Draft EIS.]**

MNDNR Water Appropriation Permit

An MNDNR Water Appropriation Permit for Non-Irrigation (FORM #A-02623-06) is required for appropriations from the CMP, HAMP, LMP, and the Prairie River. A separate permit application would be submitted for each water source with a request that one permit be issued for appropriation from all such sources. An annual Water Use Report is required by the MNDNR for all Water Appropriations Permits.

MNDNR Public Waters Work Permit

An MNDNR Public Waters Work Permit (FORM #NA-026620-03B) would be required for temporary and permanent impacts to public waters. An MNDNR Public Waters Work Permit would be required for work that takes place in any of the identified public waters. For stream crossings (see Section 4.5.3.5), the MNDNR must review and approve any proposed hydraulic changes to the stream.

The following proposed activities would require coverage under an MNDNR Public Waters Work Permit:

- Gas line crossing of the Swan River (2 locations)
- HVTL crossing of the Swan River (2 locations)
- HVTL crossing of the Lower Panasa Lake Outlet
- HVTL crossing of Snowball Creek
- HVTL crossing of Oxhide Creek
- HVTL crossing of Oxhide Lake
- HVTL crossing of Big Diamond Lake Outlet
- Process water orifice at the Prairie River

More detailed discussions of these water crossings are provided in Section 4.5.3.5.

The CMP and the HAMP are Waters of the State, but are not classified by the MNDNR as Public Waters. Since they are not Public Waters, an MNDNR Public Waters Work Permit would not be required for work within these water bodies.

MPCA NPDES/SDS Permit for Cooling Tower Blowdown

Excelsior has revised its NPDES/SDS permit application in light of the planned implementation of an enhanced ZLD system for eliminating process water and cooling tower blowdown discharges. The MPCA may set effluent limits at or below expected parameter concentrations during the NPDES/SDS permitting process. No residents live on the CMP or Holman Lake, so slight changes in water levels are not expected to be an issue; however, the recreational use of the CMP may be **affected as described in text added to Section 4.5.3.1 under Water Resources Management Plan.**

Cooling Water Intake Structures (Clean Water Act § 316(b))

See Sections 4.5.2.4 and 4.5.3.1 for a discussion of Cooling Water Intake Structure rules applicable to Phases I and II.

Construction Stormwater Permitting

As discussed in Section 4.5.2.5, an NPDES Construction Permit would be required for stormwater discharges associated with construction activity. A SWPPP would be required to address erosion and sediment control during and after construction for each NPDES permit. The SWPPP would address erosion prevention measures, sediment control measures, permanent stormwater management, dewatering, environmental inspection and maintenance, and final stabilization.

4.5.3.5 Utility and Transportation Water Crossings

Lakes and streams near the West Range Site are described in Section 3.5. Utility crossings over, under, or through water bodies listed as protected waters on the MNDNR PWI would require Licenses for Utility Crossings of Public Lands and Waters under Minn. Stat. § 84.415 and Minnesota Rules Chapter 6135. There are no water crossings associated with siting, placement, or construction of the Mesaba Generating Station footprint or on buffer land, the railroad alternatives, sewer and water line, and roads. The following subsections describe the water crossings within the HVTLs, gas pipelines, water supply, and process water discharge lines. Because of their relationships to impacts on wetlands, surface water crossings are included in tables in Section 4.7. **[Text regarding pipelines for cooling water blowdown has been deleted.]**

HTVL Routes

For the HVTL Alternative 1 Route, two river or stream crossings occur, one over the Swan River (perennial) and the other over a perennial stream between Big and Little Diamond Lakes. The perennial stream between Big and Little Diamond Lakes was the only water crossing field surveyed during the 2005 field season. The Swan River is identified as protected water by the MNDNR PWI. The total length of water crossings for the preferred HVTL route is estimated at 123 linear feet.

The HVTL Alternative 1A Route crosses six rivers or streams. Five of these crossings are over the Swan River (perennial) and one crossing is over a perennial stream between Big and Little Diamond Lakes. As with the preferred route, the stream between Big and Little Diamond Lakes was the only water crossing field surveyed, and Swan River is identified as protected water by the MNDNR PWI. The total length of water crossings for this alternative is estimated at 533 linear feet.

The Phase II Plan B Alternative Route (WRB-2A) would have a total of five water crossings: one crossing over the Swan River (perennial); one crossing of its perennial tributaries; and three crossings associated with Snowball and Oxhide Creeks (both perennial) and Oxhide Lake. The total length of water crossings for this route is estimated at 283 linear feet. The Swan River and its tributary, Snowball Creek, and Oxhide Lake are identified as protected waters by the MNDNR PWI. Lakes and wetlands designated as MNDNR Protected Waters or Wetlands receive a unique identification number, but streams and rivers do not. In this case, the PWI identification number for Oxhide Lake is 106P.

As these crossings would be overhead crossings, no adverse impacts are anticipated on the physical characteristics of the stream as no disturbances to stream bank, streambed or stream flow would occur. Removal of vegetation providing canopy or shade over the stream to accommodate these crossings would cause a decrease in stream shading. However, the linear feet of decreased stream shading is anticipated to be minimal and should not adversely affect stream temperatures. Section 4.7 summarizes surface water crossings associated with West Range HVTL alternatives.

Natural Gas Pipelines

There are four river or stream crossings associated with Natural Gas Pipeline Alternative 1. Two of these crossings are over the Swan River (perennial). The other crossings are over a tributary of the Swan River (perennial) and a perennial stream between Big and Little Diamond Lakes. The perennial stream between Big and Little Diamond Lakes was the only water crossing in this alternative that was field surveyed during the 2005 field season due to access limitations. The Swan River is the only water body identified as protected water by the MNDNR PWI.

For the Natural Gas Pipeline Alternative 2, four river or stream crossings are associated with the pipeline. Two of these crossings are over the Swan River (perennial). The other crossings are over the Prairie River (perennial) and a perennial stream between Big and Little Diamond Lakes. The perennial stream between Big and Little Diamond Lakes was the only water crossing in this alternative that was field surveyed during the 2005 field season due to access limitations. The Swan River and Prairie River are both identified as protected waters by the MNDNR PWI.

There are four river or stream crossings associated with the Natural Gas Pipeline Alternative 3 Route. These crossings are over the Prairie River and one of its tributaries, a perennial stream draining to Holman Lake, and a perennial stream between Big and Little Diamond Lakes. The perennial stream between Big and Little Diamond Lakes was the only water crossing in this alternative that was field surveyed. The Prairie River and the perennial stream that drains to Holman Lake are both identified as protected waters by the MNDNR PWI.

As these crossings are anticipated to be directionally drilled, no adverse impacts are anticipated on the physical characteristics of the stream as no disturbances to stream bank, streambed or stream flow would occur. Removal of vegetation providing canopy or shade over the stream to accommodate the new utility corridors would cause a decrease in stream shading. However, the linear feet of decreased stream shading is anticipated to be minimal and should not adversely affect stream temperatures. Section 4.7 summarizes surface water crossings associated with West Range natural gas pipeline alternatives.

Process Water Supply Pipeline

The proposed process water supply pipelines do not cross any water bodies.

Potable Water and Sewer Pipelines

There are no water crossings associated with the potable water or sewer pipelines.

Railroad Lines

No water crossings associated with Rail Alternatives 1A **or 3B were** identified based on NWI, USGS, and MNDNR PWI mapping resources.

West Range Roads

There are no water crossings associated with the Access Roads at this site.

4.5.3.6 Water Crossing Impact Minimization

Water crossings for the natural gas pipeline would be directionally drilled under water bodies starting at approximately 100 feet from the edge of each bank. This would minimize impacts to wetlands associated with water crossings. Impacts from the Natural Gas Pipeline Alternative 1 corridor construction associated with water crossings include 2.32 acres in the temporary ROW and 1.62 acres in the permanent ROW. For the Natural Gas Pipeline Alternative 2, impacts include 1.34 acres in the temporary ROW and 0.94 acres in the permanent ROW, and the Natural Gas Pipeline Alternative 3 involves 2.18 acres in the temporary ROW and 1.53 acres in the permanent ROW. The remainder of the natural gas pipeline would include open trench installation. Where soils and vegetation may become disturbed in the construction areas, these areas would be restored by loosening the soils from compaction and reseeding with grasses and forbs native to the region.

4.5.3.7 Groundwater Resources

Implementation of the enhanced ZLD system would significantly reduce the water quality impacts at the West Range Site originally discussed in the Draft EIS. Therefore, it is expected that water quality impacts to water supply sources and wells would be minimal as a result of the Mesaba Generating Station. No high-capacity groundwater wells would be constructed for the facility's potable water supply or process water needs. The depth to groundwater and groundwater quality and flow direction of the aquifers at the site would not be altered or impacted by operation of the facility. Significant impacts to the local aquifers are not expected from this project. The facility would take precautions and implement the engineering controls necessary and required to prevent a release of hazardous chemicals or substances that could potentially enter the groundwater and impact groundwater quality.

Some groundwater influence may be observed in the Biwabik Formation bedrock aquifer in the immediate vicinity of the CMP and HAMP Complex as water from these pits would be pumped for the facility's process water. As the level of the surface water in these pits is lowered over time, the groundwater levels in the aquifers immediately adjacent to the pit may decrease. Based on static and pumping level information gathered for the local public water supply wells (see Section 3.5.1.3), it is evident that the wells were drilled and produced sufficient quantities of groundwater when the local mines were dewatered and actively mined. Therefore, it is expected that the municipal wells would continue to be productive and function properly for local public water supplies. Since a groundwater high and divide exists on the site, the groundwater flow direction of the shallow sand and gravel aquifers is not expected to change because of the lowering of surface water levels in the CMP and HAMP when water from these pits would be pumped out for the facility's process water.

During construction of the facility, dewatering may be necessary that would temporarily lower the shallow water table aquifer in small localized areas. If the dewatering is expected to exceed 10,000 gpd or 1 million gallons per year, a Water Appropriation Permit would be obtained from the MNDNR.

4.5.4 Impacts on East Range Site and Corridors

For the East Range Site, the cooling tower blowdown that could otherwise be discharged to receiving waters would be processed through a reverse osmosis system to recover water that can be recycled within the plant. The brine wastewater from the **reverse osmosis** system would be processed in a Mechanical Vapor Recompression evaporator/crystallizer that would serve as the principal component of the ZLD system (further described below). Water recovered from the enhanced ZLD system would be recycled for make-up water where needed.

Water appropriations can be reduced by up to 900 gpm per phase using such recycling efforts. The auxiliary power required to operate the enhanced ZLD system is about 2 MW per phase. In addition, the TDS present in the East Range mine pit waters would produce significant quantities of additional solids that must be disposed in an industrial solid waste landfill (discussed in more detail in Section 4.16).

Although the ZLD system's power consumption and solids production would have a negative economic impact on the power generation costs, the enhanced ZLD system allows the Mesaba Generating Station to play a synergistic role with the industrial mining operations seeking to locate on the East Range industrial site. Unlike the West Range Site, the majority of the water available at the East Range is from other industrial activities in the area (from mine pit dewatering or industrial effluent) and the water is expected to be of lesser quality (higher dissolved solids, for example). However, since these other local industrial projects must cope with similar issues regarding stringent regulations for process water discharges in the Lake Superior Basin watershed, the Mesaba Generating Station equipped with the enhanced ZLD system to eliminate cooling tower blowdown may allow Phases I and II to utilize the process wastewaters released by these nearby projects as source water. This feature could integrate well with the proposed industrial mining facilities to be located on **former** CE properties by eliminating wastewaters that would otherwise represent new discharges to impaired waters downstream. Further, the MPCA must cope with the existing rules to license and permit such projects, realizing the socio-economic benefits they would bring.

In the following section, potential opportunities for reusing water (turning what might be considered a waste stream from the mining entities into a source of water for the Mesaba Generating Station) are identified.

4.5.4.1 Process Water Alternatives

Sources of water to meet the needs of Phases I and II on the East Range Site are identified in Table 4.5-12 below. The sustainable supply capability for each water source was estimated using information supplied by the MNDNR, previous engineering studies, and information supplied by local government units. The actual sustainable rates that could be realized would be dependent on several factors, including precipitation, evaporation, pit water level, and hydrogeological conditions.

Water levels in several of the pits are rising, but pose no current threat to public health and/or welfare unlike levels in the HAMP Complex and CMP located near the West Range Site. Unlike the CMP and HAMP Complex, there is no current need to control water levels in any of the pits proposed for use on the East Range Site. Therefore, water supplies from any of the individual East Range pits can be pumped as necessary to meet the demands of Phases I and II **without posing public health risks**. As noted for the West Range Mesaba Generating Station, the water management plan for the East Range Mesaba Generating Station would be subject to environmental review and permitting process approvals. **The base plan is that** Mine Pit 2WX would serve as the reservoir from which the plant would appropriate water to meet its needs. This is similar to the function the CMP serves in the West Range Water Resource Management Plan. A permanent pumping station would be placed within Mine Pit 2WX and would receive input from one or more of the pits identified in Table 4.5-12. In the event of high inflow rates into Colby Lake during spring runoff or during high precipitation events, water would be pumped from Colby Lake into Mine Pit 2WX. **New text was added below which discusses potential conflicts with Mine Pit 2WX and other water sources identified in the Draft EIS. The new text also discusses new water sources identified since publication of the Draft EIS. Table 4.5-12 has been revised to reflect these updates.**

Table 4.5-12. Water Supply Alternatives for the East Range Mesaba IGCC Power Plant

Process Water Source	Estimated Range of Flow (gpm)	Data Source	Average Annual Flow Potentially Available for Mesaba Generating Station (gpm)	Potential Conflicts
Mine Pit 6		1	1,800	**Minnesota Mining/Steel Dynamics proposing to dewater and mine therein; however, no permit acquired yet for use.**
Mine Pit 2WX		1	**0**	**Minnesota Mining/Steel Dynamics proposing to dewater and mine therein and has a permit for standby appropriation; thus, assuming no longer available.**
Mine Pit 2 West		1	900	
Mine Pit 2 East		1	100	
Mine Pit 3	150-450	2	300	
Mine Pit 9 (Donora Mine Pit)	130-380	2	260	
Stephens Mine Pit	190-590	2	390	
Knox Mine Pit	20-70	2	45	
Mine Pit 9S	90-270	2	180	

Table 4.5-12. Water Supply Alternatives for the East Range Mesaba IGCC Power Plant

Process Water Source	Estimated Range of Flow (gpm)	Data Source	Average Annual Flow Potentially Available for Mesaba Generating Station (gpm)	Potential Conflicts
Mine Pit 1 Effluent (Mesabi Nugget's Outfall SD001)	0-1000	3	1,000	
PolyMet Mining Dewatering Operations	2,000-8,000	4	**0**	**PolyMet/NorthMet would use for internal processes; thus, assuming no longer available.**
Mine Pit 5N	**800-850**	**5**	**800**	
Colby Lake	See Note 6	6	**5,600***	**PolyMet/NorthMet plans variable use of Colby Lake**
Total Resource Potentially Available for Mesaba Generating Station (gpm)			**11,375**	

[1] East Range Hydrology Report, MNDNR, Division of Lands and Minerals, Division of Waters, March 2004.
[2] Range of flow based on the surface drainage area to the pit and average yearly rates of runoff. This should be considered a first order approximation as the actual flow rates are likely much more dependent on groundwater components. The groundwater inflow/outflow component in this area can be highly variable as a result of fractures in the bedrock and/or highly pervious tailings dikes. Due to the complexity associated with the groundwater component, groundwater inflow/outflow has not been evaluated.
[3] MPCA NPDES Permit Issued to Mesabi Nugget. Mine Pit 1 effluent represents the wastewater discharged from Mesabi Nugget's permitted operation of Mine Pit 1 in accordance with terms of a NPDES Permit.
[4] North Met Mine Environmental Assessment Worksheet.
[5] **Excelsior meeting with PolyMet, Hoyt Lakes, MN, July 22, 2008.**
[6] MP–Cliffs-Erie **historic use via** Water Appropriation Permit No. 490135; Permitted withdrawal was 12,000 gpm average daily withdrawal over continuous 60-day average; 15,000 gpm peak; and 6,307.2 million gallons per year.
*Approximate average appropriation rate in CY2000 **(2,900 gpm was erroneously presented in the Draft EIS. The total CY2000 appropriation was 2,900 million gallons, which translates to an average appropriation rate of 5,600 gpm. See Table 4.5-13.)**

The total water available in these pits is considerable, having a combined surface area on the order of over 1,300 acres. Excelsior continues to refine its Water Resource Management Plan for the East Range Mesaba Generating Station; however, given the number and volume of water sources near the site, the flexibility of operating them over a wide range of water levels and the capability of supplementing such sources with water from Colby Lake during periods of high flow, the amount of water to sustain Phases I and II over the long term is **expected**. Since these mine pits are not classified as public or protected waters and not used for recreational purposes, the fluctuations in water levels would have a limited impact on these water resources.

Potential Water Use Conflicts

Since publication of the Draft EIS, Excelsior has consulted with MNDNR and representatives of potential users that may conflict with potential water sources at the East Range Site as originally identified in the Draft EIS. The original water management plan for the East Range Site's Mesaba Generating Station was proposed approximately 2 years before Steel Dynamics, Inc.'s (SD) December 3, 2007 announcement to purchase land immediately northwest of the project site. SD intends to reopen an existing taconite mine on the 6,000 acres of property purchased, conduct surface mining of iron deposits thereon, and construct a new facility for concentrating iron ore (SD's concentrating facility [Mesabi Nugget]) beginning in late 2009.

Mesabi Nugget holds a water appropriation permit for Pit 2WX as a "standby source," thus indicating that the 700 gpm identified in the Draft EIS may not be available and is not assumed

available for appropriation. In the event that mining does occur in Mine Pit 2WX, another mine pit (e.g., Stephens Mine Pit) could serve as the reservoir for the Mesaba Generating Station.

Additionally, discussions between Excelsior and PolyMet Mining Corporation (PolyMet) have revealed that the water use plan for the copper and nickel-mining project (located on about 23 square miles of property three miles north of the East Range Site) has changed since publication of the Draft EIS. PolyMet's NorthMet intends to use groundwater and stormwater runoff from dewatering activities as their primary source of process water and eliminate their discharge to local surface waters. Therefore, the 4,000-gpm source of water from PolyMet dewatering activities is no longer assumed to be available for the Mesaba Generating Station.

Table 4.5-12 notes these potential conflicts. Although the potential conflicts result in the uncertainty of particular water sources, other potential sources have come to light, as Excelsior has continued ongoing discussions with MNDNR and other industrial users, and it is expected that the wide range of water sources could still provide enough water for the Mesaba Generating Station, as discussed below.

Other Potential Water Sources

Although the initial water management plan did not envision taconite-mining operations recommencing for many years, the Mesaba Generating Station's design incorporated elements believed to provide future synergies with potential industrial users, such as Mesabi Nugget and PolyMet. The enhanced ZLD system was initially designed to allow for maximum integration with nearby existing mining/processing operations – the system would be capable of using industrial discharges from such operations for the Mesaba Generating Station's cooling, while also providing wastewater treatment for industrial users and, thus, eliminating such discharges to the Lake Superior Basin. Utilizing the enhanced ZLD system could also eliminate the need for industrial users to deal with conditions applied to NPDES permits resulting from variances for pollutants.

For example, Mesabi Nugget is presently under construction in accordance with plans to ensure compliance with its NPDES permit. However, Mesabi Nugget's NPDES permit included variances for four pollutants and mercury treatment by a technology not demonstrated at the scale proposed. In accordance with Minnesota Rules 7052.0280 subpart 5, an NPDES permit containing a variance from water quality standards or criteria must include as a condition a schedule of compliance activities for attaining such standards and/or criteria. Relevant excerpts from Mesabi Nugget's NPDES/SDS permit (MN0067687) are as follows:

- **The effluent from the second MNC Mercury Filter unit will be piped through Outfall SD001 for direct discharge to Second Creek at an average and maximum rate of 1.5 MGD (or 1,065 gpm) and 5.8 MGD (or 4,000 gpm) respectively. Second Creek, a tributary to the Partridge River, is a Class 2B, 3B, 4A, 4B, 5 and 6 water under Minn. R. Ch. 7050.0430 and an Outstanding International Resource Water according to Minn. R. Ch. 7052.**
- **Effluent monitoring of the SD001 discharge, including low-level monitoring for mercury, is required. In addition, low-level monitoring for mercury is required at a number of internal points in the wastewater treatment system to assess the efficacy of the treatment system for mercury removal.**
- **A variance from the Class 3B water quality standard for hardness and the Class 4A water quality standards for specific conductance, TDS, and bicarbonates is included in this permit.**
- **With granting of a variance, the Permittee shall investigate and implement on an ongoing basis actions and technologies to improve effluent quality and to establish a downward trend towards meeting the water quality standards for TDS, specific conductance, and**

bicarbonates (must submit a Source Minimization and Alternate Treatment Technology Evaluation Plan no later than 3 years following issuance of this permit).

- **Stormwater from the plant area and the raw material/product storage areas will be collected and routed to sedimentation basins for solids settling and then to the wastewater treatment system for treatment prior to discharge through Outfall SD001.**

Compliance with Mesabi Nugget's NPDES permit could be achieved by allowing its wastewater discharge to be a source of appropriation for the Mesaba Generating Station. Therefore, the 1,065 gpm average discharge from Outfall SD001 (as well as any stormwater collected on site) could be a source of water for the Mesaba Generating Station and provide pollution prevention concepts that could provide beneficial water quality impacts.

Based on the following assumptions (and the Mesabi Nugget Outfall SD001), it is expected that quantities of water in excess of 5,700 gpm (the majority of the 7,000 gpm annual average needed to support the Mesaba Generating Station) would be available through a combination of resources that includes wastewater discharges, mine pits and/or the resulting quantities of groundwater derived from dewatering operations at the East Range Site (and taking into account Mesabi Nugget and NorthMet's current water requirements), as follows:

- **The pumping of groundwater and mine pit waters (where applicable) will be required to dewater areas SD expects to mine, thus, providing a potential source of water supply.**
- **Based on SD's overall mine plan (specifies SD's year-to-year activities throughout the life of its expected mining operations), Excelsior could coordinate with SD on their overall mine plan to identify when and where on their property the company would expect to begin dewatering activities and the period of time such activities would be ongoing in a particular location,**
- **Potential water may be available in mine pits on and off SD's property and not currently within SD's mine plan – the extent of which would be determined in consultation with SD, NorthMet, and MDNR.**
- **Groundwater and water from mine pits being pumped for purposes of dewatering land for mining would, in part, be made available to the IGCC Power Station.**
- **Quantities of water generated by dewatering mine pits would likely exceed the amount of water indicated in Tables 3.6-5 and 4.5-12 in the Joint Application and Draft EIS, respectively. Where applicable, the amount of water available from the various mine pits listed in the tables noted was assumed equal to the overflow predicted by the MDNR in their "East Range Hydrology Report" (published in March 2004). It is assumed that due to relative differences in head between the mine pit water level and surrounding groundwater levels, the flows listed in the tables are conservative and average flow rates are actually greater.**
- **Excelsior (using the permitted mine plan and in cooperation/coordination with SD), NorthMet and the MDNR, could anticipate which sources of water on site would be accessible via floating pumps, where to place pipelines connecting such sources to the IGCC Power Station, how to plan for transitions between use of mine pit waters via floating pump assemblies and pumping systems used to dewater the same areas, and how existing pits on site could best be sequenced for use as storage reservoirs for the IGCC Power Station.**

Minn. Stat. 103G.261, which dictates water allocation priorities, would be used by the MDNR in concert with stakeholder input to guide appropriations of water for the IGCC Power Station, Mesabi Nugget, SD, and NorthMet.

Water Appropriation from Colby Lake: Potential User Conflicts and Impacts

As discussed in the previous section, it is expected that 5,700 gpm of the 7,000 gpm average annual demand of the Mesaba Generating Station would be available from mining operations and existing mine pits and the remaining balance – 1,300 gpm – would be met from Colby Lake.

Currently, Minnesota Power and Cliffs Erie hold the former LTV Steel Mining Company (LTVSMC) water appropriations permit (Minnesota Water Appropriation Permit No. 49-135), which allows an annual average water appropriation rate of 12,000 gpm from Colby Lake. MNDNR records indicate that LTVSMC averaged a pumping rate of approximately 10,000 gpm and had a short-term permit limit of 15,000 gpm in the past (MNDNR, 2008). These permit holders and PolyMet have submitted a request to MDNR to replace Cliffs Erie with PolyMet on the permit. However, the MNDNR considers this permit to be a remnant-mining permit and invalid given the present circumstances. Ultimately, after negotiations with all stakeholders, separate new permits would be considered for each entity having proposed water appropriations from Colby Lake.

In response to the Draft EIS, MNDNR provided comments to MDOC on January 9, 2008, which stated that PolyMet/NorthMet's water appropriation from Colby Lake would average approximately 4,000 gpm and be as high as 8,000 gpm during drought conditions. Therefore, the combined demand on Colby Lake from PolyMet and the Mesaba Generating Station during normal periods would total approximately 5,300 gpm on an annual average, which would be below the historical 10,000-gpm annual average appropriation rate (see Section 5.2.4.2 for an updated discussion on cumulative impacts to water resources at the East Range Site). While this does not guarantee what appropriations would be granted in the future, the past usage does provide insight into the potential availability of water and indicates that historical effects from that level of water usage were not significant.

The worst-case instantaneous peak demand from Colby Lake would require 8,000 gpm for PolyMet and 4,300 gpm for the Mesaba Generating Station, totaling 12,300 gpm. Again, in comparison, this demand is below the historical 15,000-gpm peak appropriation rate in LTVSMC's permit. Although peak appropriations by NorthMet may overlap peak periods of appropriation by the Mesaba Generating Station, such overlaps would be expected to be intermittent in nature, i.e., during the hottest times of day during the hottest days of the year when: (1) peak electric demand generally occurs; and (2) evaporation in the cooling towers is at its peak. Depending on final water appropriation plans and consultation with MNDNR, NorthMet and the Mesaba Generating Station could implement a water management plan that would be developed to cope with any water use contingencies.

Minnesota Power is required to augment lake levels by pumping water from Whitewater Reservoir when Colby Lake reaches an established minimum allowable level. Thus, it is expected that Minnesota Power would maintain Colby Lake water levels using water from the Whitewater Reservoir. Generally, it is estimated that long-term average appropriations from Colby Lake would have minor adverse impacts to fish populations, boat access and property values, as the combined appropriation is not expected to reach historical levels of appropriation. However, fluctuation would occur in the Whitewater Reservoir, which would cause similar impacts, but to a greater extent, depending on the level of fluctuation.

During historical periods when maximum appropriations from Colby Lake occurred, transfers of water from the reservoir caused short-term water level fluctuations therein of approximately 5 to 10 feet. Such water fluctuations could have adverse effects on fish populations; however, fish populations and sizes have generally increased since stocking began, even while LTVSMC operated during most of that time. Water losses through leaky dikes in Whitewater Reservoir are estimated to be about 9,000 gpm when the water levels in the reservoir are at high levels. An option for mitigating such fluctuations would be to repair its leaky dikes, allowing for water in the reservoir

system be more effectively stored. This would allow both Colby Lake and Whitewater Reservoir to be maintained at higher levels, and may allow Whitewater Reservoir levels to be controlled through the overflow outlet to the St. Louis River, rather than leaving the lake through leakage and required pumping into Colby Lake. Excelsior would conduct further hydrologic modeling and investigations into limiting losses of water from Whitewater Reservoir as part of the water appropriation permit process to demonstrate that Phase I and Phase II of the Mesaba Energy Project would not result in significant adverse impacts to regional water resources. Any credit ultimately ascribed to recovering waters leaking from Whitewater Reservoir would be required to be supported by in-depth studies conducted in conjunction with input from the MNDNR.

East Range Site Water Management Plan

Prior to obtaining a water appropriation permit for the mine pits, access to riparian land would be required before a water permit could be issued. Although the project proponent is not in a position to acquire riparian land at this stage of the project, it is expected that Excelsior would negotiate easements necessary to access all required water sources on mutually agreeable terms with other potential users (e.g., SD/Mesabi Nugget). The water supply pipeline routes are required project facilities for the Mesaba Power Station and are included in the site permit application. If the East Range Site is designated by the Minnesota PUC, Minn. Statute 216B, Subd. 2(a)(3) does grant the power of eminent domain to innovative energy projects (of which the Mesaba Energy Project has been designated) which would secure the required riparian rights to serve the facility. While this approach to acquiring control of riparian land would be a last resort and is an unlikely scenario, it demonstrates the possibility that such access could be obtained for the project.

Although there are some uncertainties regarding exact sources of process water supply for the East Range Site, the preceding discussion indicates that the range of water sources would be adequate to serve the Mesaba Generating Station's annual water demand. With the use of the enhanced ZLD system, Excelsior hopes to identify potential opportunities to work with other industrial users while also providing benefits to the regional water quality and would continue discussions with MNDNR during the water appropriation permit process. The specific implementation of overall water management among the facilities would require detailed study, negotiation, and ongoing consultation with MNDNR and potential industrial users; however, specifics of such a plan cannot be accomplished until a site is selected for the Mesaba Energy Project and mining plans are more fully developed at the East Range Site.

Process Water Discharges and Water Quality Criteria

The East Range Site is located within the Lake Superior Basin watershed and the standards that apply to discharges of BCCs in the Basin effectively preclude wastewater discharges from Phases I and II. The principal reason for this prohibition is that mercury (a BCC) is found in the source waters for the East Range Site at concentrations nearly equal to the water quality criteria standard applied to end-of-the-pipe discharges.

The water quality standard for mercury applied to surface waters in the Lake Superior Basin watershed is 1.3 ng/L. Dischargers to surface waters in the watershed must meet this standard at the end of the discharge pipe (that is, there is no allowance for a mixing zone within which the concentration of mercury is allowed to equilibrate). The background concentration of mercury in the East Range source waters is on the order of 0.5 to 0.9 ng/L, which would result in cooling tower blowdown concentrations of mercury in the range of 1.5 to 9.0 ng/L (assuming that 3 to 10 COC were used in the cooling tower, respectively). Since this range of mercury concentrations present in the cooling tower blowdown discharge would exceed water quality standards, all wastewaters (other than domestic wastewaters) would be processed through a ZLD system such that there would be no process-related wastewaters, including non-contact cooling tower blowdown, discharged from the generating station.

Elimination of cooling tower blowdown – the only process wastewater stream to be generated by the Mesaba Generating Station – would be accomplished via a second ZLD system serving the power block and gasification island cooling towers. The ZLD treatment system for the Station's cooling tower blowdown would consist of three steps to optimize energy consumption: a clarifier for suspended solids removal, a reverse osmosis system to concentrate the dissolved solids, and a brine concentrator/crystallizer to remove water from the dissolved solids.

The most effective solution for dealing with the mercury discharge issue on the East Range Site is to totally eliminate the discharge of cooling tower blowdown. This can be done by enlarging the ZLD system to handle all of the Mesaba Generating Station's non-domestic wastewater streams. In this configuration, the Mesaba Generating Station would be designed to evaporate whatever water cannot be reused in the plant processes and leave only a solid stream of salts for disposal at a licensed treatment/disposal facility. This scheme would significantly increase the cost of the Mesaba Generating Station but would allow for the utilization of the East Range Site.

Alternatives for Managing Cooling Tower Blowdown

Discharge of cooling tower blowdown to any receiving waters in the Lake Superior Basin watershed is likely infeasible in the absence of using an existing permit having sufficient discharge rights and whose operating authority could be transferred to the power plant. Excelsior is not aware of the existence of any such permits.

The Hoyt Lakes POTW was considered as an alternative, but was determined not to have sufficient existing capacity to manage the quantities of cooling tower blowdown that would be produced. In addition, an expansion of the existing system could not be completed without a major non-degradation study. These options, in addition to the unproven prospect of treating the Mesaba Generating Station's cooling tower blowdown to remove mercury, were deemed less likely to be approved than the ZLD system described above.

Expanding the capacity of the ZLD system would leave domestic wastewater as the only effluent discharge from the Mesaba Generating Station on the East Range Site. The alternatives for dealing with this waste stream are identified in the following section.

4.5.4.2 Domestic Wastewater Treatment

The two primary options available for wastewater treatment and disposal for the East Range Mesaba Generating Station include constructing a WWTF to treat domestic wastewaters on site or connecting to the existing Hoyt Lakes wastewater system.

Alternative 1: On-Site Wastewater Treatment

There are many styles of WWTF, but most are categorized as pond systems or mechanical plants (usually activated sludge). A stabilization pond facility would require chemical application to meet the limit for phosphorus. An activated sludge facility can remove phosphorus biologically, which is dramatically cheaper than chemical removal.

This alternative would consist of constructing a stabilization pond facility with the capacity to treat **45,000** gpd at a location near the facility. The stabilization pond facility would consist of three earthen-dike basins that provide a total detention time of 210 days. The basins would require a total area of 12 acres. A 12-inch effluent gravity sewer would be constructed to convey treated effluent to the mine drainage stream running northeast to southwest through the project site. The effluent stream would discharge into Colby Lake. The length of this sewer pipe would be approximately 1,200 feet to reach the stream.

A disadvantage of this alternative is that the treatment facility would require a capacity of **45,000** gpd to meet construction demands, but would receive only about 25 percent of this design flow after the construction of the project is complete. Thus, part of the facility would have to be abandoned and other modifications made to the facility at the completion of Phase II. Another potential concern with the on-site WWTF is that effluent from the system would discharge into Colby Lake, which is the source for the Hoyt Lakes drinking water treatment plant.

The project would be required to obtain an NPDES permit for this discharge and a part-time licensed WWTF operator would be required to manage the treatment system. This staffing requirement would increase annual operating costs. The MPCA has designated Colby Lake and the Partridge River as impaired for mercury and fish consumption (see listings of impaired waters approved by the U.S. EPA and the new 2006 list drafted by the MPCA on the MPCA's web site at http://www.pca.state.mn.us/water/tmdl/index.html#tmdl). However, neither Colby Lake nor the Partridge River are listed as impaired for nutrients or DO. As well, the St. Louis River (of which the Partridge River is a tributary) from its headwaters to its discharge into Lake Superior is not listed as impaired for nutrients or DO. Finally, Lake Superior is not listed as impaired for either nutrients or DO. Therefore, the MPCA's Phosphorus Strategy applies and would require that the proposed WWTF meet a limit of 1 milligram per liter total phosphorus.

For the relatively small treatment facility needed for the volume of wastewater produced by the project, the capital cost and operations and maintenance (O&M) costs for an activated sludge facility would far exceed the cost savings recognized from biological phosphorus removal. Due to the high capital and O&M costs, an activated sludge facility was eliminated as an option.

Alternative 2: Connect to the Hoyt Lakes Wastewater System

The East Range Mesaba Generating Station is located approximately 1.6 miles north of CR 110, the main road entering the City of Hoyt Lakes. The City of Hoyt Lakes owns, operates, and maintains a WWTF comprised of a wastewater collection system and wastewater treatment units. The WWTF receives wastewater from the residential, commercial, and industrial establishments within the city and discharges treated effluent to Whitewater Lake. The system has a design capacity of 680,000 gpd and receives an average flow of approximately 300,000 gpd.

The second alternative for the disposal of domestic wastewater**, which is Excelsior's preferred alternative,** is to connect to the City of Hoyt Lakes' wastewater collection and treatment system. This alternative would require the construction of approximately 9,500 feet of a 12-inch gravity sewer pipeline, a pump station, and about 2,500 feet of a 4-inch force main. The wastewater piping would parallel the existing high voltage power line easement along the west side of the proposed property boundary, south to Colby Lake. A pump station would be located on the north side of Colby Lake. The force main would be directionally drilled beneath Colby Lake and then connected to the existing city gravity sewer near MP on the north end of Colby Lake Road. The 12-inch sewer pipeline would have ample capacity to convey the estimated wastewater flow of 30,000 gpd during construction. The existing Hoyt Lakes WWTF has capacity available to treat the estimated flow from the proposed project.

There are several advantages to this option when compared to on-site treatment. One advantage is ownership of the sewer lines constructed for the project could be turned over to the City of Hoyt Lakes for operation and maintenance. Thus, the only annual operating and maintenance costs for this option would be the sewer use charges from the city. A WWTF operator would not be required to monitor the system.

One disadvantage is that the sewer system has to cross Colby Lake, which would increase the cost and would require a MNDNR permit. The lake is about 10 feet deep where the crossing would be constructed and the sewer is expected to be placed about 15 feet below the lake bottom. If rock is encountered at the lake crossing, then microtunneling would be required in lieu of directional drilling which would increase construction costs. Soil borings would be required to confirm rock elevations along the proposed pipe alignment and at the location of the proposed treatment.

Wastewater Impacts

There would be little net effect from the domestic wastewater discharged from the Mesaba Generating Station. The domestic wastewater would be conveyed to the Hoyt Lakes WWTF, treated at the facility, and discharged under the facility's current NPDES permit. The NPDES permit was issued by MPCA and the limits therein were set to protect the water quality in Whitewater Lake.

Both of the alternatives would require piping, which would have to traverse forested areas, and hilly terrain, which does not preclude either alternative. However, the environmental impact of discharging to Colby Lake, the City's water supply, may preclude the first alternative. The existing Hoyt Lakes POTW has a permit to discharge into Whitewater Lake and that system would not require modification to add the anticipated wastewater flow from Phases I and II.

Construction of a 12-inch gravity sewer pipeline from the generating station Footprint to the City of Hoyt Lakes collection system has tangible advantages over the option of an on-site treatment facility and is Excelsior's preferred approach to handle domestic wastewaters from Phases I and II.

4.5.4.3 Water Withdrawals and Permits

Unlike the CMP and HAMP, there would be no immediate need to control water levels in any of the pits on the East Range Site. Therefore, water supplies from any of the individual East Range pits could be pumped as necessary to meet demands of the project **without posing public health risks**. Existing MNDNR water appropriation permits for East Range surface waters are shown in Table 4.5-13 **(corrected for Final EIS)**.

Table 4.5-13. Existing Water Appropriation Permits for Surface Waters around East Range Site

Permitee	Resource	Permitted		Reported Pumping (Million Gallons)				
		GPM	MG/Y	2000	2001	2002	2003	2004
MP & CE	Colby Lake	12,000	6,307	2,945.7	69.2			
MP	Colby Lake	100,500	50,000	71.4	60.4	63.4	96.1	117.2
MP	Colby Lake	100,500	50,000	23,851.7	24,061.7	24,261.9	24,132.9	22,458.9
MP	Colby Lake	100,500	50,000	21,734.0	24,133.9	24,185.4	24,132.9	23,541.8
MP	Colby Lake	1,005,000	50,000	51.1	4.0	3.4	0.0	21.1
MP	Colby Lake	1,005,000	50,000	4.3	41.6	28.8	0.1	0.4
MP	Colby Lake	1,005,000	50,000	17.3	0.1			
MP	Colby Lake	1,005,000	50,000	474.0	516.4	523.6	525.5	525.1
City of Hoyt Lakes	Colby Lake	1,050	160	123.1	116.4	120.4	122.8	120.4
City of Hoyt Lakes	Partridge River		4	2.4	1.8	1.7	2.2	1.5
CE		3,600	1,155	1,055.4				
CE		3,600	1,155					
CE		3,600	1,155					
CE		1,500	551					
CE		20,000	10,512					
CE		20,000	10,512					
CE		20,000	10,512	1,860.2				
CE		20,000	10,512					

Table 4.5-13. Existing Water Appropriation Permits for Surface Waters around East Range Site

Permitee	Resource	Permitted		Reported Pumping (Million Gallons)				
		GPM	MG/Y	2000	2001	2002	2003	2004
IRRRB	Embarrass Mine Pit	600	50		4.9	22.0	26.3	48.3
City of Aurora		1,020	160	73.7	74.7	81.8	106.5	93.4
CE		5,000	788					
CE		12,000	3,049	316.9				
CE		12,000	3,049					
CE		12,000	3,049					
CE		3,000	1,050					
CE		3,000	1,050	1,807.2				
IRRRB	Wynne Lake	1,800	50	70.7	67.2	56.8	54.9	55.9
IRRRB	Wynne Lake	600	29	51.4	41.3	36.0	37.9	29.0
United Taconite LLC	St. Louis River	7,000	4,010	2,835.6	3,18.0	3,811.7	2,550.8	2,400.0

Table corrected for Final EIS.
GPM = gallons per minute; MG/Y = million gallons per year; MP = Minnesota Power; CE = Cliffs Erie; IRRRB = Iron Range Resources and Rehabilitation Board

The types of permits required for the East Range Site mirror the permits required for the West Range Site.

MNDNR Water Appropriations Permit

A MNDNR Water Appropriations Permit for Non-Irrigation (FORM #A-02623-06) would be required for water appropriations. A separate permit application would be completed for each water source, but the applications and supporting data would be submitted in one package. The MNDNR would issue one permit to Excelsior that covers all of the water sources. An annual Water Use Report would be required by the MNDNR for all Water Appropriations Permits.

MNDNR Public Waters Work Permit

A MNDNR Public Waters Work Permit (FORM #NA-026620-03B) would be required for temporary and permanent impacts to Public Waters. A MNDNR Public Waters Work Permit would be required for work that takes place in any of the identified public waters. For stream crossings (see Section 4.5.4.4), the MNDNR must review and approve any proposed hydraulic changes to the stream.

The following proposed water crossings would require coverage under a MNDNR Public Waters Work Permit:

East Range HVTL

- Embarrass River (two crossings)
- Cedar Island Lake
- Norcund River
- Colby Lake
- Whitewater Lake
- Partridge River (two crossings)
- St. Louis River (three crossings)
- Two River (two crossings)

East Range Gas Pipeline

- Two River
- Unnamed Creek
- Elbow Lake
- Maryt Lake
- Lost Lake
- Forth Lake
- Esquagama Lake
- Unnamed Tributary to St. Louis River
- Colby Lake
- Whitewater Lake
- Partridge River
- First Creek

East Range Rail Line Alternative 1

- Unnamed Creek

East Range Rail Line Alternative 2

- Unnamed Creek
- Colby Lake

MPCA NPDES/SDS Permit

MPCA NPDES Permits would be required for stormwater discharges associated with industrial activity and construction activities. No discharges of cooling tower blowdown would occur; therefore, no NPDES permit for this discharge would be required. Sanitary discharges would be routed to the Hoyt Lakes POTW and would require a permit from the local authority. Such non-industrial discharges do not require an NPDES pre-treatment permit.

Cooling Water Intake Structures (Clean Water Act § 316(b))

These rules are not expected to be applicable to the East Range water resources as there are no established fisheries in any of the abandoned mine pits.

Industrial Stormwater Permitting

Discharge of stormwater associated with industrial activities from the project area to waters of the U.S. and State would be permitted as part of the NPDES/SDS Permit.

Construction Stormwater Permitting

Permitting requirements would mirror those for the West Range Site.

4.5.4.4 Utility and Transportation Water Crossings

Utility crossings over, under, or through water bodies listed as protected waters on the MNDNR PWI for the East Range Site would require Licenses for Utility Crossings of Public Lands and Waters under Minnesota Statutes § 84.415 and Minnesota Rules Chapter 6135. There would be no water crossings associated with siting, placement, or construction on the generating station footprint or on buffer land and roads. The following subsections describe the water crossings within the HVTLs, gas pipelines, water supply, process water discharge lines, sewer and water line, and rail lines. Because of their relationships to impacts on wetlands, surface water crossings are included in tables in Section 4.7.

HTVL Routes

There are a total of 21 crossings of streams or other water bodies associated with the 38L HVTL Route and 20 crossings associated with the 39L/37L HVTL Route. The longest crossing for either route would be over Colby Lake, with a linear crossing of approximately 540 linear feet. Colby Lake, an unnamed pond, and nine other rivers and streams are identified as protected waters by the MNDNR PWI. The total length of water crossings for the 38L HVTL Route is estimated at 1,194 linear feet, whereas the total length of water crossings for the 39L/37L HVTL Route is estimated at 1,760 linear feet.

As these crossings would be overhead crossings, no adverse impacts are anticipated on the physical characteristics of the stream as no disturbances to stream bank, streambed or stream flow would occur. Removal of vegetation providing canopy or shade over the stream to accommodate these crossings would cause a decrease in stream shading. However, the linear footage of decreased stream shading is anticipated to be minimal and should not adversely affect stream temperatures. Section 4.7 summarizes surface water crossings associated with East Range HVTL alternatives.

Natural Gas Pipelines

There are 19 crossings of streams or other water bodies associated with the proposed natural gas pipeline route. The largest water crossing is at Colby Lake, with a linear crossing of approximately 430 feet. The total length of water crossings for this pipeline is estimated at 792 linear feet. Colby Lake and 12 rivers and streams are designated as protected waters by the MNDNR PWI.

As these crossings are anticipated to be directionally drilled, no adverse impacts are anticipated on the physical characteristics of the stream, as no disturbances to stream bank, streambed or stream flow would occur. Removal of vegetation providing canopy or shade over the stream to accommodate the new utility corridors would cause a decrease in stream shading. However, the linear footage of decreased stream shading is anticipated to be minimal and should not adversely affect stream temperatures. Section 4.7 summarizes surface water crossings associated with the East Range natural gas pipeline.

Process Water Supply Pipelines

There are two crossings of streams or other water bodies associated with the process water supply pipeline from Area 6 and Stephens Mine to Area 2WX. The largest water crossing is over Second Creek, with a linear crossing of approximately 30 feet. The total length of water crossings for this alternative is estimated at 33 linear feet. Both Stephens Creek and Second Creek are designated as protected water by the MNDNR PWI.

There is one crossing of a stream or other water body associated with process water supply pipeline from Area 9 South to Area 6. Total length of water crossing for this pipeline is estimated at 3 linear feet. First Creek is designated as protected water by the MNDNR PWI. For Area 9 North (Donora Mine) to Area 6, there is one crossing. The total length of water crossing for this pipeline is estimated at 3 linear feet. Section 4.7 summarizes surface water crossings associated with East Range process water pipelines.

Potable Water and Sewer Pipelines

There is one crossing of a water body associated with the potable water and sewer pipelines. The total length of water crossing for this pipeline is estimated at 460 linear feet through Colby Lake.

This crossing will be directionally drilled under the Lake. BMPs at the drilling locations would reduce or prevent impacts to water quality, and the shoreline would be restored to its original contours and stabilized. Section 4.7 summarizes surface water crossings associated with the East Range potable water and sewer pipelines.

Rail Lines

There are two crossings of streams or other water bodies associated with Rail Line Alternative 1. A tributary to Colby Lake is crossed twice by the center loop for the rail line. The total length of water crossings for Alternative 1 is estimated at 6 linear feet. Rail Line Alternative 2 would involve two crossings of streams or other water bodies; with a total length estimated at 6 linear feet. Both Wyman Creek and the tributary to Colby Lake are designated as protected waters by the MNDNR PWI. While only 6 linear feet of streams would be crossed for either alternative, the disturbed areas within the rights of way could extent up to several hundred feet on either side of the crossing (See Section 4.7, Wetlands).

Appropriate crossing structures would be used to minimize the rail footprint impact on these streams. Short-term impacts during construction include decreased water quality from waterborne sediments. Permanent impacts from the construction of the rail line in the streambeds would be minimized by the use of culverts under the railroad bed. No long-term adverse impacts are anticipated on these streams. Section 4.7 summarizes surface water crossings associated with East Range rail line alternatives.

East Range Roads

There are no stream crossings associated with the roads.

4.5.4.5 Water Crossing Impact Minimization

The following section describes some mitigation measures that may reduce the impacts associated with the water crossings during construction.

HVTL Routes

There are 21 crossings of streams or water bodies associated with HVTL Alternative 1 that would require crossing of 1,194 linear feet of water, and 20 crossings associated with HVTL Alternative 2 that would require crossing of 1,760 linear feet of water. Placement of the power poles supporting the HVTL would be designed to avoid direct impacts to streams, rivers, or other bodies of water within the project area. The average expanse between poles would be approximately 650 feet for HVTL Alternative 1 and 530 feet for HVTL Alternative 2, but in sensitive or otherwise important areas that should be avoided, the expanse between power poles may be shortened to whatever length necessary or lengthened to approximately 1,000 feet. As a result, impacts within the bed of any water bodies would be avoided.

Natural Gas Pipelines

The East Range Natural Gas Pipeline Alternative 1 would cross approximately 792 linear feet of streams and bodies of water, not including adjacent wetland habitat. For water crossings, the natural gas pipeline would be directionally drilled under water bodies starting at approximately 100 feet from the edge of each bank. This would minimize impacts to wetlands associated with water crossings. The remainder of the natural gas pipeline would include open trench installation.

4.5.4.6 Groundwater Resources

No high-capacity groundwater wells would be constructed for the facility's potable water supply or process water needs. The depth to groundwater and groundwater quality and flow direction of the aquifers at the site would not be altered or impacted by operation of the facility. Adverse impacts to the local aquifers are not expected from this project. The facility would take precautions and implement the engineering controls necessary and required to prevent a release of hazardous chemicals or substances that could potentially enter the groundwater and impact groundwater quality.

Public water supply systems of local municipalities may be sensitive to potential contaminant sources and may be hydrologically connected to affected surface water bodies (mine pits). However, as there would be no wastewater discharges associated with the East Range Site (other than domestic wastewater discharged to the local POTW), there would be no potential for contaminated sources affecting surface water bodies.

4.5.5 Impacts of the No Action Alternative

Under the No Action Alternative, the proposed project would not be built. As a result, no project-related development would occur, and consequently, there would be no impact or change in baseline conditions relating to surface water resources.

The primary impact of the No Action Alternative **at the West Range Site** is that the potential **to aid the state in maintaining water levels in mine pits that are currently being pumped (HAMP) or may potentially overflow (CMP) would not occur. Also, I/I studies and planned improvements at the CBT WWTF would not be funded and benefits to water quality of Swan River watershed would not occur. At the East Range Site, beneficial water quality impacts from synergistic use of wastewaters from other industrial users at the East Range Site would not occur—without use of the enhanced ZLD system, treatment of industrial wastewaters from nearby users (e.g., PolyMet) would not be provided.**

4.5.6 Summary of Impacts

Basis for Impact	No Action	West Range	East Range
Affect the capacity and availability of surface water resources for existing and future uses**, including changes in water levels and irreversible consumption of water that could impact uses of water (e.g., recreation)**	No impact on capacity and availability of surface water resources.	Water Resource Management Plan developed to ensure capacity and availability of existing and future withdrawals. Use of the CMP may **limit** its current use as a recreation facility. The pumping of the HAMP would **aid the state in maintaining water levels for the** benefit **of** the park. **Fluctuation of water levels and evaporative losses in waterbodies are expected to result in minor impacts to fish populations and recreational use.** **During Phase I, annual process water demand would not adversely affect water sources. During Phase II, water demand would lower water levels in HAMP Complex and may cause exposure of land bridges. Use of HAMP would require consultation with MNDNR to determine agency's operating priorities and to ensure minimal impacts to water resources. Elimination of LMP's discharge to the Prairie River represents 1.3 percent of river's average annual flow during normal operating conditions for Phase II. During dry seasons, Prairie River's normal low flow could be reduced by approximately 18 percent. If necessary, to protect river flows during such events, Excelsior would curtail direct appropriations from the river and instead withdraw from stored capacity in other mine pits.**	Water Resource Management Plan developed to ensure capacity and availability of existing and future withdrawals. **Long-term average appropriations from Colby Lake would have minor adverse impacts to fish populations, boat access and property values, as the combined appropriation is not expected to reach historical levels of appropriation. However, fluctuation would occur in the Whitewater Reservoir, which would cause similar impacts, but to a greater extent, depending on the level of fluctuation. Excelsior would conduct further hydrologic modeling and investigations into limiting losses of water from Whitewater Reservoir as part of the water appropriation permit process. Any credit ultimately ascribed to recovering waters leaking from Whitewater Reservoir would be required to be supported by in-depth studies conducted in conjunction with input from the MNDNR.**
Conflict with established water rights or allocations	No conflict with water rights.	No conflict with water rights.	No conflict with water rights.
Cause surface waters to exceed water quality criteria or standards established in accordance with the CWA, state regulations, or permits	No impact on water quality.	**No discharges directly to surface waters**. **Beneficial impacts to water quality by providing funding for I/I studies and planned improvements at the CBT WWTF.**	No discharges directly to surface waters. **May provide benefit by using other industrial users' wastewaters and, thus, treating and improving water quality in Lake Superior Basin watershed.**

Basis for Impact	No Action	West Range	East Range
Conflict with regional water quality management plans or goals	No conflict with regional water quality management plans.	No conflict with regional water quality management plans.	No conflict with regional water quality management plans.
Deplete groundwater supplies or interfere with groundwater recharge such that there would be a net deficit in aquifer volume or local water table affecting availability for existing and planned uses.	No effect on groundwater resources.	Lowering the water levels in the mine pits would influence the groundwater levels adjacent to the pits. However, as most groundwater wells near the pits were viable prior to the cessation of mining activities and the mine pits would not be completely dewatered, there should not be a net deficit in aquifer volume or groundwater availability.	Lowering the water levels in the mine pits would influence the groundwater levels adjacent to the pits. However, as most groundwater wells near the pits were viable prior to the cessation of mining activities and the mine pits would not be completely dewatered, there should not be a net deficit in aquifer volume or groundwater availability.
Violate any Federal, state, or regional water quality standards or discharge limitations.	No new discharges would occur.	**No direct discharges of wastewater to receiving waters would occur**. **At the end of the 30-year project life, concentration of phosphorous would increase from 0.0037 mg/L to 0.0057 mg/L; however, this predicted concentration is below the state's standard of 1 mg/L and is expected to have minimal impact to biota in the CMP.** Domestic wastewater discharges to the local POTW would be compatible and within the POTWs capacity to effectively treat the wastewater.	No direct discharges of wastewater to receiving waters would occur. Domestic wastewater discharges to the local POTW would be compatible and within the POTWs capacity to effectively treat the wastewater.
Degrade groundwater quality.	No effect on groundwater quality.	**No effect on groundwater quality**.	No effect on groundwater quality.
Conflict with regional aquifer management plans or goals.	No effect on aquifer management plans or goals.	No effect on aquifer management plans or goals.	No effect on aquifer management plans or goals.
Cause change in stormwater discharges affecting drainage patterns, flooding and/or erosion and sedimentation	No impact on stormwater discharges.	Stormwater discharges from Power Plant site would be managed under a SWPPP. Implementation of BMPs and structural controls would limit sedimentation and erosion impacts.	Stormwater discharges from Power Plant site would be managed under a SWPPP. Implementation of BMPs and structural controls would limit sedimentation and erosion impacts.
Conflict with applicable stormwater management plans or ordinances	No conflict with stormwater management plans.	No conflict with stormwater management plans.	No conflict with stormwater management plans.
Cause changes to Federal and/or state listed protected water bodies	No impact to Federal or state listed protected water bodies.	No impact to Federal or state listed protected water bodies.	No impact to Federal or state listed protected water bodies.

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4.6 FLOODPLAINS

4.6.1 Approach to Impacts Analysis

4.6.1.1 Region of Influence

The region of influence for floodplains includes the potential locations for the Mesaba Generating Station footprint as well as the roads, rail lines, HVTL lines, process water lines, process water blowdown lines, and utility lines (i.e. potable water, gravity sewer, and natural gas), that would be necessary to support Mesaba Energy Project operations.

4.6.1.2 Method of Analysis

The evaluation of potential impacts on floodplains considered whether the Proposed Action or an alternative would cause any of the following conditions:

- Filling of a floodplain in a manner that would expose people or structures to flooding.
- Construction in a floodplain in a manner that would violate National Flood Insurance Program requirements or result in changes that would increase the flood elevation level associated with a 100-year flood event by more than one foot or would increase an existing floodway.
- Construction in a floodplain in a manner that would violate State of Minnesota regulations by causing an increase of an existing 1-percent annual chance flood elevation by more than 0.5 foot.

DOE has completed a floodplain assessment for the project (see Appendix F2) as required by 10 CFR Part 1022.

4.6.2 Common Impacts of the Proposed Action

Neither of the proposed locations for the Mesaba Generating Station is located within the 100-year floodplain, however, some of the utility corridors cross the 100-year floodplain of individual drainage ways. Common impacts to floodplains along the transportation and utility corridors would be in the form of natural gas pipeline crossing 100-year floodplains. Directional drilling beneath the floodplains would be the preferred method of avoiding and minimizing impacts, where feasible. In areas where directional drilling is not feasible, open cut trenching would be the means for crossing the floodplain. Therefore, temporary impacts would be associated with the construction and placement of the natural gas pipelines.

During Phase II construction at either location, temporary off-site staging and laydown areas would be used to stockpile materials and store equipment, and for a cement batch plant. Excelsior would establish these offsite construction staging and laydown areas on 85 acres of land selected from potential sites as described in Section 2.3. None of the candidate sites for Phase II staging and laydown activities is located within or would otherwise affect a 100-year floodplain.

4.6.3 Impacts on West Range Site and Corridors

The West Range IGCC power plant site and buffer land would be located approximately one mile northeast of the nearest 100-year floodplain, which is adjacent to the Prairie River. The following sections describe the floodplain impacts and requirements for the construction and operation of the West Range Site and associated structures (i.e., utility and transportation infrastructure).

4.6.3.1 Impacts of Construction

There would be no anticipated adverse impacts to floodplains for the West Range Site with respect to the placement of the HVTL alternatives, the process water blowdown alternative pipelines, Segments 2 and 3 of the process water supply pipelines, potable water and sewer pipelines, or the transportation corridors, as these structures would be situated outside of the boundaries of any 100-year floodplain areas.

Proposed utilities that could potentially affect floodplains due to their siting within or near 100-year floodplains include the Natural Gas Pipeline Alternatives 1, 2, and 3 (see Figure 3.6-1). Process water supply pipeline – Segment 1 (Lind Pit to Canisteo Pit), would pass near a floodplain, but construction of the pipeline is expected to be outside the 100-year floodplain boundary.

Each of the three potential alternatives for the locations of gas lines would cross at least one 100-year floodplain area. Natural Gas Pipeline Alternative 1 would cross the Swan River and a 100-year floodplain southeast of Trout Lake Township. Natural Gas Pipeline Alternative 2 would cross both the Swan River (in Trout Lake Township) and the Prairie River (in Grand Rapids Township) and adjacent 100-year floodplains. Natural Gas Pipeline Alternative 3 would cross the Prairie River and adjacent 100-year floodplains in Grand Rapids Township at the same location where Alternative 2 would cross. **In the event that Excelsior would negotiate favorable terms with the Nashwauk PUC for natural gas supply from its proposed pipeline permitted in 2008 as described in Section 2.3.1.4, Excelsior would not construct a separate pipeline for the Mesaba Energy Project. In this case, the impacts described above for Alternative 1 would be attributable to the Nashwauk Natural Gas Pipeline Project.**

During the construction phase of the Mesaba Energy Project there may be some temporary impacts to the floodplain areas caused by the installation of necessary pipelines. However, these impacts would be minimized through the use of appropriate engineering procedures and BMPs, which would ensure that river and stream flows be maintained during construction. For example, the natural gas pipelines would be directionally drilled beneath these and all other water body crossings at approximately 100 feet from the edge of each water body. This method would ensure that no permanent impacts would occur to floodplains from the placement of structures within water bodies that could divert or otherwise impede stream flows. It is anticipated that impacts would be temporary. Upon completion of construction activities within the floodway, the construction equipment and stockpiles would be removed, and contours would be restored to their original grade and seeded, stabilized or planted with plants native to the region.

Segment 1 of the process water supply pipeline (Lind Pit to Canisteo Pit) could be in close proximity to the 100-year floodplain adjacent to the Prairie River. There would be no anticipated adverse impacts associated with this pipeline because it would be placed outside of the floodplain area and, most importantly, it would not cross any rivers or streams associated with the neighboring floodplain area, therefore, there would be no alterations to existing stream flow conditions.

Because route selection and construction for utilities and transportation corridors would be required for the Mesaba Energy Project Phase I, the incremental impacts from construction of the Phase II plant would be negligible with respect to these features.

4.6.3.2 Impacts of Operation

At the West Range Site, the IGCC power plant and buffer land lie outside the 100-year and 500-year floodplains; therefore, no impacts to floodplains would be expected. Operational impacts along the transportation and utility corridors would consist of periodic landscape maintenance, in the form of mowing to prevent woody vegetation interfering with the HVTL and the permanent ROW for the buried pipelines. The potential exists for an HVTL structure/tower to be installed within a floodplain, depending upon the width of the floodplain and the maximum distance allowed between HVTL towers. Placement of an HTVL structure/tower would be avoided unless there were no other feasible options. HTVL structure/towers required to be located within the floodplain would have limited impact on the floodplain; their small footprint would not increase the level of the flood elevation or impede the course of the flood.

4.6.4 Impacts on East Range Site and Corridors

The IGCC power plant and buffer land at the East Range Site would be situated approximately 1.3 miles northeast of the nearest 100-year floodplain (Partridge River). The following subsections describe the potential for impacts on floodplains resulting from the construction of the transmission, pipeline, and transportation corridors associated with the East Range Mesaba Generating Station location.

4.6.4.1 Impacts of Construction

There would be no anticipated adverse impacts to floodplains for the East Range Site with respect to the placement of the power plant site, process water supply pipelines, potable water and sewer pipelines, or the transportation corridors because these structures would be situated outside of the boundaries of any 100-year floodplain areas.

Proposed utilities that could potentially affect floodplains due to their potential placement within or near 100-year floodplains include HVTL Alternatives 1 and 2 and the Natural Gas Pipeline Alternative 1 (see Figure 3.6-2).

The HVTL Alternative 1 would cross the Partridge River, Cedar Island Lake, the East Two River, and 100-year floodplains adjacent to each of these surface waters. The HVTL Alternative 2 would cross the Partridge River, the Embarrass River, the East Two River, and 100-year floodplains adjacent to each of these surface waters.

Each of the potential HVTL alignments would utilize existing HVTL corridors with negligible alterations required to the rights-of-way. HVTL Alternative 1 would utilize the existing 38L and HVTL Alternative 2 would use a combination of the existing 39L and 37L. Due to the use of existing lines there would not be any new structures constructed that could cause any alterations to floodway patterns associated with either of these HVTL alignments and, therefore, no impacts to floodplains would be anticipated.

The Natural Gas Pipeline Alternative 1 would cross 100-year floodplains along the Partridge River and an area between Fourth Lake and Esquagama Lake. As previously mentioned in the discussion of the West Range Site (Section 4.6.4.1), the construction of pipelines may cause some moderate, temporary impacts to floodplains, however these impacts would be minimized through the use of appropriate engineering procedures and BMPs to maintain existing river and stream flows. Following construction activities, efforts would be taken to restore floodway contours as closely as possible to their original condition as well as the ROWs. Therefore, no permanent impacts to floodplains would be anticipated.

Because route selection and construction for utilities and transportation corridors would be required for the Mesaba Energy Project Phase I, the incremental impacts from construction of the Phase II plant would be negligible with respect to these features.

4.6.4.2 Impacts of Operation

The East Range Site lies outside the 100-year and 500-year floodplain; therefore, no impacts to flood plains are expected. Operational impacts along the transportation and utility corridors would probably consist of periodic landscape maintenance in the form of mowing to prevent woody vegetation interfering with the HVTL and the permanent ROW for the buried pipelines. The only other potential impact would be an HVTL structure or tower that would be installed within a floodplain, due to the width of the floodplain and the maximum distance between HVTL towers. These towers would not be installed in the floodplain unless there were no other feasible options. If the towers were installed in the floodplain, limited impacts would occur due to the towers small footprint and unlikeliness to increase the level of flood elevation or impede the course of a flood.

4.6.5 Impacts of the No Action Alternative

Under the No Action Alternative, the Mesaba Energy Project would not be constructed or operated. As a result, no construction activities would occur in or near floodplains and there would be no impact or change in baseline conditions relating to the potential for future flooding. While not an existing floodplain, there is the possibility that the CMP may begin to overflow in the near future and cause local flooding in the Coleraine and Bovey areas unless another project is approved to reduce the level of water in the CMP.

4.6.6 Summary of Impacts

Basis for Impact	No Action	West Range	East Range
Filling of a floodplain in a manner that would expose people or structures to flooding.	No filling of floodplains.	No filling of floodplains is expected with either the IGCC footprint or any of the utility corridors.	No filling of floodplains is expected with either the IGCC footprint or any of the utility corridors.
Construction in the floodplain that would violate the National Flood Insurance Program by more than 1 foot or increase the floodway.	No violation to the National Flood Insurance Program.	No violation would occur. Temporary impacts associated with Natural Gas Pipeline Alternatives 1, 2, 3 as a result of trenching, soil stockpiling, and storage of equipment where pipelines would cross floodplains. However, impacts would be mitigated through best management practices, and land contours would be restored after construction. No permanent impacts on flood elevations would occur, because pipelines would be below surface. **No distinguishable differences in impacts for a Phase I only outcome.**	No violation would occur. Temporary impacts associated with HVTL Alternatives 1, 2 where corridors would cross floodplains. No permanent impacts on flood elevations due to small footprint of towers. Construction of Natural Gas Pipeline could affect floodplain temporarily as a result of trenching, soil stockpiling, and storage of equipment where pipeline would cross floodplains. However, impacts would be mitigated through best management practices, and land contours would be restored after construction. No permanent impacts on flood elevations would occur, because pipelines would be below surface.. **No distinguishable differences in impacts for a Phase I only outcome.**
Construction in the floodplain that would violate the Minnesota regulations by causing an increase of the existing 1 percent annual chance flood elevation by more than 0.5 feet.	No violations to the Minnesota flood regulations.	No violation would occur. No permanent impacts on flood elevations.	No violation would occur. No permanent impacts on flood elevations.

4.6.7 Floodplain Mitigation Issues

For each of the floodplain crossings, an assessment would be conducted, per Minnesota Rules, to determine if the crossing would result in an increase of the existing 1 percent annual chance of flood elevation (100-year recurrence interval) by more than 0.5 feet. Based on the type of construction that could occur in a floodplain (the only permanent aboveground structure would be HVTL towers that would have a minimal impact on floodplain levels), it is not expected that any flood elevations (100-year recurrence interval) would increase by 0.5 feet or more. However, if this increase were to occur, then the MNDNR (the state floodplain administrator) and FEMA would become involved. In addition, all affected communities and applicable agencies at the West Range Site, including Itasca County, Minnesota Department of Transportation (Mn/DOT), and MNDNR, would have to be contacted by the project proponent during the design phases of the project to ensure all flood control requirements are met. Likewise, at the East Range Site, St. Louis County, City of Hoyt Lakes, Mn/DOT, and MNDNR would be contacted by the project proponent during the design phases of the project to ensure all flood control requirements are met. It is up to each community's discretion to require flood control measures that go beyond the Federal and state requirements.

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4.7 WETLANDS

4.7.1 Approach to Impacts Analysis

DOE has completed a wetlands assessment for the project (Appendix F2) as required by 10 CFR Part 1022. Appendix F2 describes the process by which all practicable measures were employed to avoid and minimize potential impacts to wetlands and other resource areas. Section 4.7.6 summarizes the potential wetland impacts of the alternatives analyzed in this Final EIS.

Wetland impacts associated with the West Range and East Range Sites and related transportation and utility corridors were identified by superimposing field-delineated wetlands onto geo-rectified aerial photographs and satellite imagery displaying the proposed power station infrastructures and ROWs. The NWI mapping was used to supplement and identify potential wetlands and "other waters" in areas where access was not granted. GIS applications were then used to determine area calculations of **delineated and** potential wetlands **that** would potentially be impacted by the Mesaba Energy Project.

4.7.1.1 Region of Influence

The region of influence for wetland resources included the proposed footprints for the West Range Site and East Range Site and associated infrastructure (i.e., utility and transportation corridors) ROWs for each alternative site.

4.7.1.2 Method of Analysis

Impacts to wetlands and "other waters" of the United States were identified by overlaying the surveyed wetlands and wetlands shown by the NWI maps over graphic illustrations depicting the proposed West and East Range Mesaba Generating Station footprints and their associated transportation and utility corridors. Wetland impacts were characterized as the direct loss of wetlands due to the placement of dredge or fill material, and as **type conversion** impacts, relating to the altering or conversion of wetland function due to the removal of vegetation. **These type conversion impacts could be temporary (e.g., where an emergent or scrub-shrub [woody vegetation less than 20 feet tall] wetland is disturbed and allowed to regenerate) or permanent (e.g., a wetland forest is cleared and allowed to regenerate as an emergent or scrub-shrub wetlands).**

The acreages of wetland areas affected by the Proposed Action at the West and East Range Sites and related infrastructures were calculated using GIS. The types of wetland affected by the Proposed Action were identified based on field observations or by NWI mapping **(sometimes supplemented by soils mapping and aerial photographs)**.

Activities that involve dredging material from waters of the United States, including wetlands, or the placement of fill in wetlands, are considered to have an adverse impact. Dredged material is defined as material that is dredged or excavated from waters of the United States, including wetlands. Fill material is defined as material placed in waters of the U.S., where the material has the effect of either (1) replacing any portion of such waters with dry land or (2) changing the bottom elevation of any portion of such waters.

Activities that involve removal or conversion of wetland vegetation, but do not include the grubbing of stumps or roots or the disturbance of soils, could affect wetland resources. A direct loss of wetlands would not occur in this case; however, if a change in the wetland function would occur through conversion of wetland type (i.e., forested wetland conversion to emergent wetland) the result would be an adverse impact. Permanent impacts to wetlands can be quantified by determining areas that would not experience fill but would be anticipated to experience removal and routine maintenance of vegetation. Activities that would indirectly alter the hydrology of a wetland, such as increased impervious surface adjacent to wetland areas or alteration and/or diversions of surface water flows to or from the wetlands, are also considered to cause impacts. In this case, a change in the hydrological regime would either increase the amount of existing wetlands or cause existing wetlands to convert to upland communities. The degree and magnitude of these impacts on the functional capacity of the wetlands would be less quantifiable than activities that result in the direct placement of fill materials.

4.7.2 Common Impacts of the Proposed Action

Impacts that would be common to the West Range Site and the East Range Site and associated utility and infrastructure corridors as well as minimization measures to avoid impacts are discussed in the following sections (Sections 4.7.2.1 and 4.7.2.5). Potential impacts specific to the West Range Site or the East Range Site and associated utility and infrastructure corridors are discussed in Sections 4.7.3 (West Range Site) and 4.7.4 (East Range Site).

4.7.2.1 Impacts of Construction

Plant Footprint Construction

The Mesaba Generating Station footprint at the West and East Range Sites would be designed to minimize unavoidable wetland impacts to the extent practicable during the preliminary design of the facility. Wetland impact avoidance and minimization would be refined throughout the final design process for this facility and other elements of the project. Compensatory wetland mitigation would be proposed in areas where unavoidable wetland encroachment would occur; this would be addressed during the wetland permitting phase for the Proposed Action and submitted to the regulatory agencies for review.

Potential common impacts among the alternatives that are not directly quantifiable include the change of local hydrology, resulting in increased surface runoff in some areas, while decreasing surface runoff in other areas of the project area. Seasonal groundwater recharge functions could also be lost in some wetland areas, but would continue to occur in adjacent undisturbed upland and wetland areas. Other forms of impacts could be manifested by the permanent loss of wildlife habitat, or wildlife habitat conversion (i.e., forested wetlands converted to wet meadows). In some areas, the Proposed Action could adversely affect flood flow attenuation and produce increased surface water velocities, resulting in localized erosion and potential increased flooding. For example, dense basal vegetation generally functions in obstructing the speed of surface runoff and minimizes potential flooding to the areas downstream of the project area. Similarly, isolated wetlands minimize potential flooding by storing and retaining surface water. The loss of vegetation would result in a net loss of habitat for various wildlife species, and a temporary loss in sediment stabilization/retention and nutrient transformation functions would occur.

Rail Line Construction

The rail alternatives are the only utility or transportation corridors that have designed engineering construction limits. Consequently, all wetland impacts within the construction limits would be considered permanent because grading requirements would permanently alter the wetland hydrology and plant communities. The placement of fill in the ROWs would be necessary to establish the appropriate grade for the areas adjacent to the railroad bed.

The construction of the rail alternatives would permanently alter the hydrology and eliminate the wetland hydrologic regime and plant communities in areas bordering the rail line and the interior rail loop, resulting in habitat fragmentation. This would result in fragmented habitat for wildlife that depends on the forest interior for food and shelter. Habitat conversion would also occur along some portions of the rail line and could contribute to increased temporary erosion, flooding and habitat degradation. BMPs such as sediment ponds, hay bales, or silt fencing would reduce the magnitude of the temporary impacts.

HVTL Tower Construction

The common primary wetland impacts within the ROW of the HVTLs would include the permanent loss of wetlands due to placement of fill through concrete footers placed at the base of HVTL towers. The design criteria for the tower footers including the size of power pole footprints would have a 28-foot base and would be the same for all the HVTL alternatives. The linear distances between the poles would vary from about 500 to 800 feet apart with a possible maximum linear distance of 1,000 feet between poles to avoid and minimize impacts to wetlands.

Placement of the poles supporting the HVTLs would be designed to avoid direct impacts to wetlands or "other waters" of the United States occurring within the proposed ROW. Since the HVTLs would be suspended from tower to tower, there would be no direct impacts resulting from the HVTL crossings and impacts to vegetation and soils would be avoided. Wetland impacts could be further minimized by adjusting the pole placement to avoid wetland areas. BMPs would be employed during construction in wetlands and streams to avoid concrete leachate entering these resources from HVTL footers. Wetlands would be avoided to the extent feasible during the installation of the HVTL; unavoidable wetland impacts would be limited to areas where utility poles would be placed within wetland habitat. With the exception of the unavoidable impacts of the footings, other construction-related impacts to wetlands would be minor and temporary. BMPs such as erosion and sediment control measures, including hay bales and placement of heavy equipment operating within the wetlands during construction on mats, would be used to minimize adverse impacts. Construction of HTVLs would also occur during the winter months to minimize impacts to wetlands and nesting migratory birds.

Aerial stream crossings by the HVTLs would also occur with the Proposed Action; however, these lines would be suspended and have no impact to surface waters.

Pipelines and Access Roads Construction

The majority of the impacts to wetlands relating to the pipelines would be temporary and minor. Temporary impacts would include impacts associated with access to construction laydown and staging areas and construction activities. Impacts would be temporary in nature; wetland soils excavated during construction would be stockpiled for reuse and the area would be restored to its original grade and seeded or planted with native plants after construction. Permanent impacts related to the pipelines would occur in forested and scrub-shrub wetland areas within the permanent ROW that would require routine maintenance of vegetation. This loss of vegetation also affects wildlife habitat. Primary wetland impacts would result from the placement of fill to create access roads. This would result in a permanent loss of wetland communities along with secondary impacts of permanently altering the wetland hydrologic regime and plant communities in areas bordering the access roads.

The proposed pipelines and access roads could also affect streams and other surface water resources. Wetlands situated immediately adjacent to "other waters" of the United States and affected by pipeline alternatives that border areas where the pipeline emerges would be impacted from the construction of the pipelines. Impacts to wetlands adjacent to the water crossings were based on a 100-foot (30-meter) temporary ROW including a 70-foot (21-meter) permanent ROW. Stream impacts could be avoided using directional drilling under the existing water resources, including wetlands. The proposed directional drilling would be implemented for all of the natural gas alternatives beginning at points about 100 feet landward from the wetland/upland edge of the wetland resource.

Impacts to wildlife habitat, flood flow attenuation, and sediment stabilization functions would likely occur because of the pipeline construction. However, BMPs, such as sediment ponds, hay bales or silt fencing, or sediment retention/detention ponds would reduce the temporary impacts to functional capacity for both wetlands and other waters. After installing the pipelines, the disturbed areas would be restored to their original grade and seeded or planted with native plants.

ROW Clearing and Maintenance

Common type-conversion wetland impacts, identified as the conversion from one wetland type into another (primarily forested and scrub shrub wetland conversion into emergent or open water systems), would occur within the 100-foot wide utility and transportation ROWs. The potential for conversion would occur due to the removal of woody vegetation and proposed continual maintenance of vegetation with the 100-foot ROW, which does not involve the removal of below ground biomass (roots) or disturbance of soil,. Initially, wetlands would be converted from one vegetative class into another; scheduled maintenance of the permanent ROW would result in the permanent conversion of the cover types. Consequently, the types and magnitude of wetland functions would change. Typical examples of changed wetland functions could include wildlife habitat, flood flow attenuation, and sediment stabilization and retention functions. Areas affected by the removal of vegetation could also be subjected to increased thermal variations during the summer and winter. During the summer months, the ground surface would be subject to increased temperatures from the loss of shade trees; the area could experience decreased temperatures during the winter months due to increased wind velocities.

4.7.2.2 Impacts of Operation

The majority of impacts to wetlands would be consequences related to construction activities. Impacts to wetlands during operations would generally be limited to the potential for spilled materials to affect a wetland area. General freight shipped on the rail line and access roads could include petroleum, coal or other commodities. Spills of oil or hazardous substances carried as general freight could potentially affect surface waters, including wetlands. If a spill occurred, the potential for contamination to enter flowing surface water would present the greatest risk of a large contaminant migration until spill containment and remediation takes place. The Mesaba Energy Project would comply with existing regulatory requirements regarding remediation for potential spills and the probability of spills is low.

4.7.3 Impacts on West Range Site and Corridors

The following sections describe the wetland impacts specific to the West Range Site and its associated utility and transportation infrastructure.

4.7.3.1 Impacts of Construction

Based upon comments received on the Draft EIS and additional analyses performed, Section 4.7.3.1 in the Draft EIS was deleted in its entirety and replaced with new text and tables. The major changes incorporated in the new section include:

- **A new location of the Mesaba Generating Station and rail loop was analyzed for the West Range;**
- **All fill calculations were done assuming 3:1 side slopes for the fill;**
- **Type conversion impacts were separated into temporary and permanent impacts;**
- **Impacts are described with respect to wetlands as classified by Eggers and Reed, 1997; and**
- **Selected results of the MnRAM analysis (full results in Appendix F3) are included.**

The DOE Wetlands Assessment in Appendix F2 evaluated additional siting and alignment alternatives for the power plant, transportation, and infrastructure components based on comments and recommendations from the USACE and other agencies. This section compares the practicable alternatives resulting from that analysis. Appendix F2 contains additional graphics depicting the impacts described below.

The proposed project includes actions throughout the West Range Site and Corridors, i.e., those within the Mesaba Generating Station Footprint and Buffer Land and the linear corridors along which the power transmission, gas pipeline, and other associated facilities traverse. Section 2.3.1

describes the project elements at the West Range Site. The following sections describe the impacts to wetlands that would result from the construction of each project element. Impacts to wetlands are described as wetland fill, temporary wetland disturbance, and wetland type-conversion resulting from vegetation removal. Section 4.7.6 contains a summary of potential impacts at the West Range Sites and Corridors as well as for the East Range Sites and Corridors.

Mesaba Generating Station Footprint

The Mesaba Generating Station Footprint is located near the center of the West Range site in a topographic saddle and between two large wetland complexes. As a result of the analysis completed in Appendix F2, the Final EIS compares two alternative locations: Excelsior's original preferred location as contained in the Draft EIS (the Central – Draft EIS in Appendix F2, Figure F2-6) and Excelsior's new preferred location in which the plant footprint would be shifted 280 ft to the northwest along the same axis (the Central – Final EIS, Figure 4.7-1 and Figure F2-7). Table 4.7-1 is a summary of impacts to wetlands for each plant phase for the Draft EIS and Final EIS footprints, including grading associated with each plant footprint.

Table 4.7-1. Comparison of Wetland Impacts (acres), New Preferred and Original Plant Site

Site Footprint	Phase I[1]	Phase II	Total
Central - Final EIS	13.62	17.74	31.36
Central - Draft EIS[2]	20.96	13.62	34.58

[1] Impacts due to grading limits for the entire Mesaba Generating Station Footprint are included in the Phase 1 impacts.
[2] The footprints for Phase I and Phase II in the original site plan shown in the Draft EIS are the reverse of the Final EIS.

The new footprint placement minimizes wetland fill within the plant footprint and maintains hydrologic connectivity and the existing flow pattern from northeast to southwest within Wetland A1, thereby avoiding potential indirect impacts affecting 7.3 acres of shrub carr. Construction of the new preferred Mesaba Generating Station footprint would affect about 31 acres of wetland habitat, 3 acres less than the original footprint. The impact footprint includes the plant footprint and grading of the adjacent area at a 3:1 slope to meet the natural grade of the surrounding area. Impacts to wetlands from the Mesaba Generating Station Footprint, including areas of grading limits, are summarized in Tables 4.7-2 (Central – Draft EIS) and 4.7-3 (Central – Final EIS) and shown in Figure 4.7-1.

The IGCC power plant would be constructed in two phases. Mesaba Phase I is expected to be constructed between 2010 and 2014. Construction of Mesaba Phase II is expected to begin in 2012.

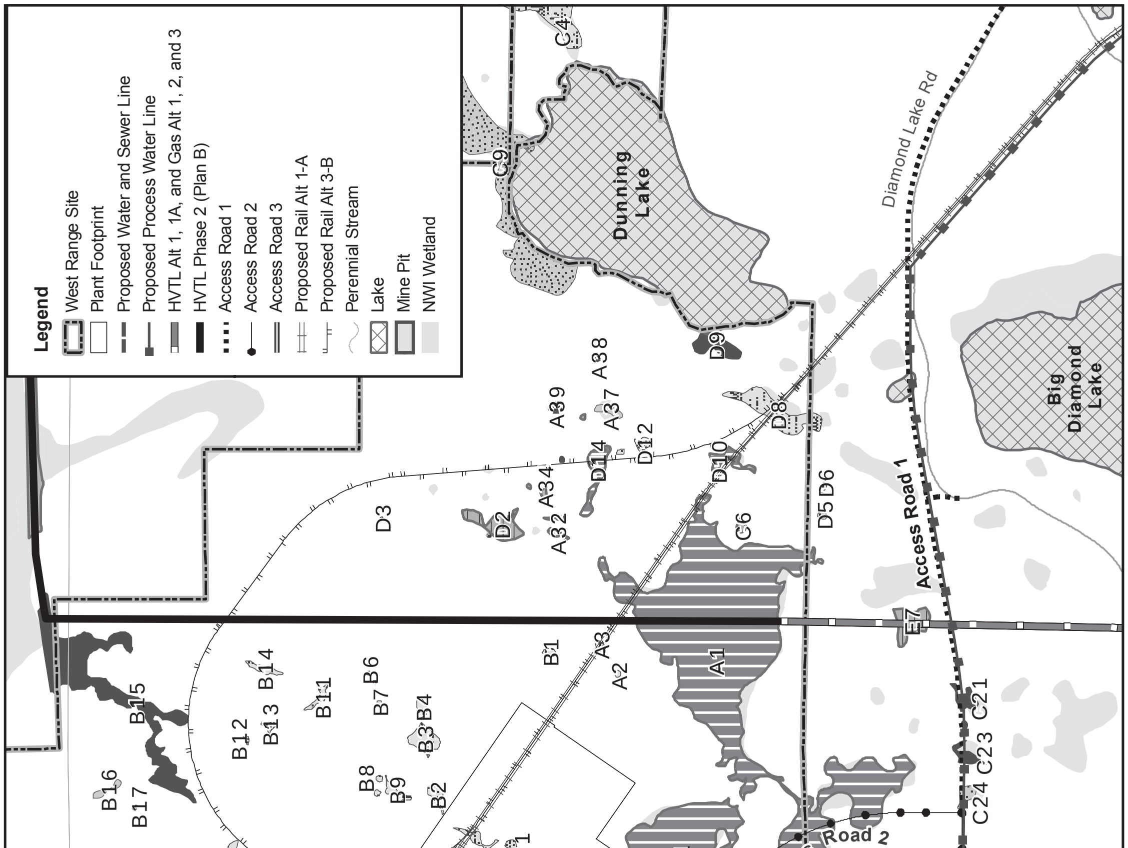

Figure 4.7-1. West Range Eggers and Reed Wetland Classifications

Table 4.7-2. Wetland Fill (acres), Mesaba Generating Station (Central – Draft EIS Footprint) at West Range Site

Basin ID	Wetland Classification			Selected MnRAM Functions[1]		Wetland Fill[2]		
	Cowardin	Circular 39	Eggers and Reed	Vegetative Diversity	Wetland Water Quality	Phase I	Phase II	Total
A1	PEMB/PSS1/PFO4	Type 3/6/8	Shallow Marsh/Shrub Carr/Coniferous Bog	High	Moderate	1.05	11.51	12.56
A4	PFO1C/F	Type 7	Hardwood Swamp	Moderate	High	18.08	1.51	19.59
A13	PFO1B	Type 7	Hardwood Swamp	High	High	0.40	—	0.40
A14	PFO1B	Type 7	Hardwood Swamp	High	High	0.45	—	0.45
A20	PFO1C	Type 7	Hardwood Swamp	High	High	0.19	—	0.19
A21	PEMC/PFO1C	Type 3/7	Shallow Marsh/ Hardwood Swamp	High	High	0.01	—	0.01
A23	PEMC/PFO1C	Type 3/7	Shallow Marsh/ Hardwood Swamp	High	High	0.24	—	0.24
A25	PFO1C	Type 7	Hardwood Swamp	High	High	0.18	—	0.18
A26	PFO1C	Type 7	Hardwood Swamp	High	High	0.03	—	0.03
A27	PFO1C	Type 7	Hardwood Swamp	High	High	0.07	—	0.07
A28	PEMC/PFO1C	Type 3/7	Sedge Meadow/ Hardwood Swamp	High	High	0.22	—	0.22
A29	PEMC/PFO1C	Type 3/7	Sedge Meadow/ Hardwood Swamp	High	High	—	0.08	0.08
A30	PEMC	Type 3	Shallow Marsh	High	High	—	0.04	0.04
A31	PFO1C	Type 7	Hardwood Swamp	High	High	—	0.48	0.48
B2	PFO1A	Type 7	Hardwood Swamp	High	High	0.04	—	0.04
					Total	**20.96**	**13.62**	**34.58**

[1] Complete MnRAM 3.1 Functions and Values Assessment data are included in Appendix F3.
[2] Impacts due to grading limits for the entire plant site are included in the Phase 1 impacts.

Table 4.7-3. Wetland Fill (acres), Mesaba Generating Station (Central – Final EIS Footprint) at West Range Site

Basin ID	Wetland Classification			Selected MnRAM Functions[1]		Wetland Fill[2]		
	Cowardin	Circular 39	Eggers and Reed	Vegetative Diversity	Wetland Water Quality	Phase I	Phase II	Total
A1	PEMB/PSS1/PFO4	Type 3/6/8	Shallow Marsh/Shrub Carr/Coniferous Bog	High	Moderate	7.31	—	7.31
A4	PFO1C/F	Type 7	Hardwood Swamp	Moderate	High	5.36	16.00	21.36
A13	PFO1B	Type 7	Hardwood Swamp	High	High	0.06	0.29	0.35
A14	PFO1B	Type 7	Hardwood Swamp	High	High	—	0.44	0.44
A15	PEMC/PFO1C	Type 3/7	Shallow Marsh/ Hardwood Swamp	High	High	0.01	0.21	0.22
A20	PFO1C	Type 7	Hardwood Swamp	High	High	—	0.19	0.19
A21	PEMC/PFO1C	Type 3/7	Shallow Marsh/ Hardwood Swamp	High	High	—	0.01	0.01
A22	PEMC/PFO1C	Type 3/7	Shallow Marsh/ Hardwood Swamp	High	High	—	0.04	0.04
A23	PEMC/PFO1C	Type 3/7	Shallow Marsh/ Hardwood Swamp	High	High	—	0.24	0.24
A25	PFO1C	Type 7	Hardwood Swamp	High	High	—	0.18	0.18
A26	PFO1C	Type 7	Hardwood Swamp	High	High	—	0.03	0.03
A27	PFO1C	Type 7	Hardwood Swamp	High	High	—	0.07	0.07
A28	PEMC/PFO1C	Type 3/7	Sedge Meadow/ Hardwood Swamp	High	High	0.18	0.04	0.22
A29	PEMC/PFO1C	Type 3/7	Sedge Meadow/ Hardwood Swamp	High	High	0.08	—	0.08
A30	PEMC	Type 3	Shallow Marsh	High	High	0.04	—	0.04
A31	PFO1C	Type 7	Hardwood Swamp	High	High	0.48	—	0.48
B2	PFO1A	Type 7	Hardwood Swamp	High	High	0.10	—	0.10
					Total	**13.62**	**17.74**	**31.36**

[1] Complete MnRAM 3.1 Functions and Values Assessment data are included in Appendix F3.
[2] Impacts due to grading limits for the entire plant site are included in the Phase 1 impacts.

HVTL Alternatives (West Range Site)

Section 2.3.1.5 (Chapter 2) describes the alternatives consider by Excelsior for HVTL service at the West Range Site. Figure 2.3-4 illustrates the alternative corridors.

HVTL Alternative 1

Excelsior's preferred corridor for interconnecting the Mesaba Generating Station with the Blackberry Substation is HVTL Alternative 1 (WRA-1 or WRB-1 alignment). In the event that PUC were to approve this ROW, and MISO were to approve the use of 345-kV circuits (Excelsior's Plan A) to the Blackberry Substation, this is the only HVTL corridor that would be affected for the Mesaba Generating Station Phases I and II. In the event that MISO were to require the use of 230-kV circuits (Excelsior's Plan B), this corridor would likely be developed for HVTL use in either Phase I or Phase II of generating station operation. Therefore, this ROW is the most likely corridor to be developed for the project. The only portion of the HVTL alignment that was accessible for wetland delineation is the segment north of US 169. Wetland impacts along the remainder of the alignment were estimated from the NWI.

Wetland impacts along the HVTL alignment would include wetland fill for power pole placement, temporary impacts to scrub-shrub habitat in temporary workspaces (areas within the construction ROW but outside the permanent ROW), and conversion of scrub-shrub and forested habitat within the permanent ROW.

Wetland Fill

Wetland fill would be limited to those areas where power poles would be placed within wetlands. Each pole would require an estimated 28 square feet of fill. It is assumed that power poles will be placed evenly, every 800 feet along the alignment. Using this assumption, 15 power poles would be placed within wetland habitat and would result in about 0.01 acre of wetland fill, as summarized in Table 4.7-4.

Table 4.7-4. Wetland Impacts (acres), HVTL Alternative 1 (West Range Site)

Basin ID	Wetland Classification			Selected MnRAM Functions[1]		Wetland Fill		Temporary Scrub-Shrub Wetland Impacts[2]	Permanent Wetland Type Conversion[3]
	Cowardin	Circular 39	Eggers and Reed	Vegetative Diversity	Wetland Water Quality	# Poles	Area		
A1	PEMB/PSS1/ PFO4	Type 3/6/8	Shallow Marsh/Shrub Carr/Coniferous Bog	High	Moderate	1	0.0006	0.56 (2.14 already clear)	1.77
E5	PEMH	Type 8	Coniferous Bog	High	Moderate	—	—	0 (already clear)	0 (already clear)
NWI[4]	n/a	Type 6	Assumed Alder Thicket	Unknown	Unknown	4	0.0026	1.77	7.63
NWI[4]	n/a	Type 7	Assumed Hardwood Swamp	Unknown	Unknown	4	0.0026	—	6.84
NWI[4]	n/a	Type 8	Assumed Coniferous Bog	Unknown	Unknown	6	0.0039	—	19.92
					Total	**15**	**0.01**	**2.33**	**36.16**

[1] Complete MnRAM 3.1 Functions and Values Assessment data are included in Appendix F3.
[2] Temporary removal of scrub-shrub vegetation outside the 100-foot permanent ROW. Natural revegetation will be allowed following completion of construction.
[3] Permanent conversion of scrub-shrub vegetation within 100-foot permanent ROW and scrub-shrub and forested vegetation within the 150-foot construction ROW.
[4] NWI (National Wetlands Inventory) basins are those areas that have not been field investigated. Cowardin classifications are taken from the NWI. Circular 39 and Eggers and Reed classifications are assumed from the Cowardin classification, aerial photograph interpretations, and known characteristics of delineated wetlands.
n/a = not available

Wetland Type Conversion (Tree and Shrub Clearing)

Construction across greenfield areas and establishment of new ROWs would require clearing of vegetation in upland and wetland areas. Impacts to wetland vegetation would be of two types, temporary impacts to scrub-shrub habitat in temporary workspaces outside the permanent ROW and permanent conversion of scrub-shrub habitat within the permanent ROW and forested habitat within the permanent ROW. Temporary conversion would include removal of scrub-shrub vegetation in the temporary construction ROW but outside the permanent ROW. These areas would be allowed to revegetate following construction. Permanent conversion would include removal of scrub-shrub vegetation within the permanent ROW and removal of forest vegetation within the construction ROW. The permanent ROW would be maintained free of woody vegetation, resulting in conversion of scrub-shrub and forested wetland to emergent wetland habitat. Although forested wetland cleared outside of the permanent ROW but within the construction, ROW would still be allowed to revegetate, it is considered a permanent type conversion because of the length of time that regeneration would require. Table 4.7-4 also summarizes wetland type conversion that would result from construction of HVTL Alternative 1 (WRA-1 alignment). Construction of HVTL Alternative 1 would temporarily disturb 2.33 acres of shrub-scrub wetlands, which would be expected to naturally reestablish after completion of construction. Thus, these impacts are considered temporary. The construction would create permanent impacts by removal of 36.16 acres of shrub-scrub and forested wetland within the permanent ROW, or by clearing of forested wetlands in the temporary ROW that would not be able to reestablish for many years.

Water Crossings

There are two water crossings associated with the HVTL alignment. These crossings include a perennial stream between Big and Little Diamond Lakes and the Swan River. Wetland impacts

within the bed of either water body would be avoided. The total length of water crossings for the HVTL WRA-1 alignment is estimated at 123 linear feet. Table 4.7-5 provides a summary of the length of each water crossing for the HVTL alignment. Water bodies designated as "MNDNR PWI" are listed on the Public Waters Inventory and would require a license to be crossed.

Table 4.7-5. Water Crossings for HVTL Alternative 1 (West Range Site)

Water Crossing Location	Milepost (mile + linear ft)	MNDNR PWI	Length of Crossing (linear ft)
Perennial stream between Big & Little Diamond Lakes (Basin E1)	0+3980	No	3
Swan River	3+1630	Yes	120
		Total	**123**

HVTL Alternative 1A

In the event that PUC were to approve this ROW instead of HVTL Alternative 1, and MISO were to approve the use of 345-kV circuits (Excelsior's Plan A) to the Blackberry Substation, this is the only HVTL corridor that would be affected for the Mesaba Generating Station Phases I and II. In the event that MISO were to require the use of 230-kV circuits (Excelsior's Plan B), this corridor would likely be developed for HVTL use in either Phase I or Phase II of generating station operation. Therefore, this ROW is the second most likely corridor to be developed for the project. Alternative 1A (WRA-1A or WRB-1A alignment) would share about 3.3 miles of ROW in common with Alterative 1 and parallel about 2 miles of Twin Lakes Road.

Wetland Fill

Wetland fill required for Alternative 1A was determined using the same assumptions as HVTL Alternative 1. Table 4.7-6 indicates that the impacts of the alignment would be comparable to HVTL Alternative 1.

Table 4.7-6. Wetland Impacts (acres), HVTL Alternative 1A (West Range Site)

Basin ID	Wetland Classification			Selected MnRAM Functions[1]		Wetland Fill		Temporary Scrub-Shrub Wetland Impacts[2]	Permanent Wetland Type Conversion[3]
	Cowardin	Circular 39	Eggers and Reed	Vegetative Diversity	Wetland Water Quality	# Poles	Area		
A1	PEMB/PSS1B/PFO4	Type 3/6/8	Shallow Marsh, Shrub Carr, Coniferous Bog	High	Moderate	—	—	1.10	2.30
E5	PEMH	Type 8	Coniferous Bog	High	Moderate	—	—	—	0 (already cleared)
E1	PEMC	Type 3	Shallow Marsh	High	Moderate	1	0.0006	—	—
E2	PEMB	Type 2	Wet Meadow	High	Moderate	1	0.0006	—	—
E4	PEMC	Type 3	Shallow Marsh	Moderate	Moderate	1	0.0006	—	—
NWI[4]	n/a	Type 5	Assumed Shallow Open Water	Unknown	Unknown	1	0.0006	—	—
NWI[4]	n/a	Type 6	Assumed Aspen Thicket	Unknown	Unknown	2	0.0012	2.80	8.26
NWI[4]	n/a	Type 7	Assumed Hardwood Swamp	Unknown	Unknown	3	0.0019	—	4.15
NWI[4]	n/a	Type 8	Assumed Coniferous Bog	Unknown	Unknown	7	0.0045	—	12.93
					Total	**16**	**0.01**	**3.90**	**25.34**

[1] Complete MnRAM 3.1 Functions and Values Assessment data are included in Appendix F3.
[2] Temporary removal of scrub-shrub vegetation outside the 100-foot permanent ROW. Natural revegetation will be allowed following completion of construction.
[3] Permanent conversion of scrub-shrub vegetation within 100-foot permanent ROW and scrub-shrub and forested vegetation within the 150-foot construction ROW.
[4] NWI basins are those areas that have not been field investigated. Cowardin classifications are taken from the NWI. Circular 39 and Eggers and Reed classifications are assumed from the Cowardin classification, aerial photograph interpretations, and known characteristics of delineated wetlands.
n/a = not available

Wetland Type Conversion (Tree and Shrub Clearing)

Impacts resulting from clearing for construction resulting in temporary and permanent conversions of wetlands would be as described for HVTL Alternative 1. Table 4.7-6 summarizes the wetland type conversion that would result from construction of HVTL Alternative 1A (WRA-1 alignment). Construction of HVTL Alternative 1A would temporarily disturb 3.90 acres of shrub-scrub wetlands, which would be expected to naturally reestablish after completion of construction. The construction would permanently remove 25.34 acres of shrub-scrub and forested wetland by permanent removal within the permanent ROW, or by clearing of forested wetlands in the temporary ROW that would not be able to reestablish for many years.

Water Crossings

Six water crossings would occur for HVTL Alternative 1A as listed in Table 4.7-7. The alignment shared with HVTL Alternative 1 would have the same two water crossings. Four additional water crossings over the Swan River would occur along the southern portion of the HVTL Alternative 1A alignment. The total length of water crossings for HVTL Alternative 1A would be about 533 linear feet. Water bodies designated as "MNDNR PWI" are listed on the Public Waters Inventory and would require a license to be crossed.

Table 4.7-7. Water Crossings for HVTL Alternative 1A (West Range Site)

Water Crossing Location	Milepost (mile + linear ft)	MNDNR PWI	Length of Crossing (linear ft)
Perennial stream between Big & Little Diamond Lakes (Basin E1)	0+3980	No	3
Swan River	3+1630	Yes	60
Swan River	3+2960	Yes	60
Swan River	3+3575	Yes	50
Swan River	3+4400	Yes	270
Swan River	4+360	Yes	90
		Total	**533**

HVTL Alternative Phase II Plan B

The alignment for HVTL Alternative Phase II Plan B (WRB-2A) would use the existing MP 45L/28L and MP 62L/63L corridors as shown in Figure 2.3-4. Excelsior would only use this alignment to support Mesaba Generating Station Phase II in the event that MISO were to require the use of 230-kV circuits (Excelsior's Plan B), and the PUC were not to approve the use of both corridors discussed previously (HVTL Alternatives 1 and 1A). Therefore, this alignment is the least likely to be affected by the Mesaba Energy Project. Because this alignment would use an existing, cleared, and maintained HVTL ROW, construction would have negligible potential for additional direct or indirect wetland impacts (estimated at 0.03 acre in aggregate for placement of HVTL towers).

The Phase II Plan B Alternative (WRB-2A alignment) would include five water crossings, all of which would involve protected waters listed in the MNDNR Protected Water Inventory. These crossings include the Swan River and one of its tributaries, as well as Snowball Creek, Oxhide Creek, and Oxhide Lake. As listed in Table 4.7-8, the total length of water crossings for the Phase II Plan B Alternative would be about 283 linear feet. Water bodies designated as "MNDNR PWI" are listed on the Public Waters Inventory and would require a license to be crossed.

Table 4.7-8. Water Crossings for HVTL Alternative Plan B Phase II (West Range Site)

Water Crossing Location	Milepost	MNDNR PWI	Length of Crossing (linear ft)
Swan River	14+0	Yes	190
Tributary of Swan River, outlet of Lower Panasa Lake	12+4640	Yes	3
Snowball Creek	11	Yes	10
Oxhide Lake	8+2220	Yes, PWI 106P	70
Oxhide Creek	9+2880	Yes	10
		Total	**283**

Natural Gas Pipeline Alternatives (West Range Site)

Section 2.3.1.4 describes Natural Gas Pipeline alternatives and Figure 2.3-4 (Chapter 2) shows the alignments.

The natural gas pipeline would be constructed below grade within a 70-foot permanent ROW. Construction of the pipeline would result in temporary impacts to wetlands existing within the 100-foot construction ROW. Wetland fill impacts would be avoided by restoring wetland habitat after

construction. Wetland impacts along the pipeline alignment would include temporary impacts to emergent wetlands within the construction corridor, temporary disturbance of scrub-shrub habitat in temporary workspaces (areas within the construction ROW but outside the permanent ROW), and permanent conversion of scrub-shrub and forested habitat within the permanent ROW where prior disturbance has not removed woody vegetation. Although vegetation outside of the permanent ROW would be allowed to revegetate, impacts to forested wetlands even outside the permanent ROW are considered permanent because of the length of time required for restoration of forested habitat.

Excelsior would determine the location of the temporary construction and permanent ROWs during final design, once the final pipeline alignment is approved. During pipeline design, Excelsior would make adjustments to avoid and minimize wetland habitat.

Natural Gas Pipeline Alternative 1

As explained in Section 2.3.1.4, Minnesota PUC approved a permit for construction of the Nashwauk Natural Gas Pipeline after the Mesaba Draft EIS was published. Excelsior has stated its intent to negotiate with the Nashwauk PUC for purchase of natural gas from the Nashwauk pipeline, which will be constructed along the same corridor as the alignment for Natural Gas Pipeline Alternative 1 proposed for the Mesaba Energy Project. In the event that Excelsior would reach favorable terms for the purchase of natural gas from Nashwauk PUC, the construction of a separate natural gas pipeline for the Mesaba Generating Station would not be necessary, and the impacts described for Alternative 1 would not be directly attributable to the Mesaba Energy Project.

Wetland Impacts

Temporary emergent wetland impacts are impacts to wetland Types 1-5 within the 150-foot temporary construction ROW. Material excavated from the trench would be deposited to one side of the trench or the other (sidecast). Preference would be given to sidecasting outside of wetland areas where practicable. Following pipe installation, soil would be returned to the trench in reverse of the removal (i.e., topsoil would be replaced on the surface). Disturbed wetland (and upland areas) would be reseeded with a native seed mix appropriate to the adjacent vegetative community. Indirect drainage effects to wetlands from groundwater collected and conveyed along the backfilled pipeline trench would be avoided by installation of anti-seepage collars on the pipe in strategic locations. Table 4.7-9 summarizes temporary emergent impacts during construction for Natural Gas Pipeline Alternative 1.

If the Nashwauk Public Utilities Commission natural gas pipeline were not constructed and/or Excelsior's Natural Gas Pipeline Alternative 1 was constructed first, about 11.14 miles of the pipeline would be constructed in new greenfield ROW. Construction across greenfield areas and establishment of new ROW would require clearing of trees and shrubs in upland and wetland areas. Table 4.7-9 provides a summary of wetland type conversion that would result from construction of Natural Gas Pipeline Alternative 1.

Table 4.7-9. Wetland Impacts (acres), Natural Gas Pipeline Alternative 1 (West Range Site)

Basin ID	Wetland Classification			Selected MnRAM Functions[1]		Temporary Emergent Impacts	Temporary Scrub-Shrub Impacts[2]	Permanent Scrub-Shrub and Forested Conversion[3]
	Cowardin	Circular 39	Eggers and Reed	Vegetative Diversity	Wetland Water Quality			
A1	PEMB/PSS 1B/PFO4	Type 3/6/8	Shallow Marsh, Shrub Carr, Coniferous Bog	High	Moderate	—	0.01	1.50
E1	PEMC	Type 3	Shallow Marsh	High	Moderate	0.43	—	—
E2	PEMB	Type 2	Wet Meadow	High	Moderate	0.23	—	—
E4	PEMC	Type 3	Shallow Marsh	Moderate	Moderate	0.08	—	—
E5	PEMH	Type 8	Coniferous Bog	High	Moderate	—	—	0.13
E6	PEMC	Type 3	Shallow Marsh	High	Moderate	0.17	—	—
E7	PEMC	Type 3	Shallow Marsh	High	High	0.33	—	—
NWI[4]	n/a	Type 1	Assumed Floodplain Forest	Unknown	Unknown	0.70	—	—
NWI[4]	n/a	Type 2	Assumed Wet Meadow	Unknown	Unknown	1.75	—	—
NWI[4]	n/a	Type 3	Assumed Shallow Marsh	Unknown	Unknown	0.21	—	—
NWI[4]	n/a	Type 6	Assumed Alder Thicket	Unknown	Unknown	—	0.83	3.00
NWI[4]	n/a	Type 7	Assumed Hardwood Swamp	Unknown	Unknown	—	—	9.16
NWI[4]	n/a	Type 8	Assumed Coniferous Bog	Unknown	Unknown	—	—	2.59
					Total	**3.90**	**0.84**	**16.38**

[1] Complete MnRAM 3.1 Functions and Values Assessment data can be found in Appendix F3.
[2] Temporary removal of scrub-shrub vegetation outside the 70-foot permanent ROW. Natural revegetation will be allowed following completion of construction.
[3] Permanent conversion of scrub-shrub vegetation within 70-foot permanent ROW and scrub-shrub and forested vegetation within the 100-foot construction ROW.
[4] NWI basins are those areas that have not been field investigated. Cowardin classifications are taken from the NWI. Circular 39 and Eggers and Reed classifications are assumed from the Cowardin classification, aerial photograph interpretations, and known characteristics of delineated wetlands.
n/a = not available

Water Crossings

Four water crossings would be associated with Natural Gas Pipeline Alternative 1, as shown in Table 4.7-10. The Natural Gas Pipeline would be directionally drilled under water bodies starting about 100 feet from the edge of each water body. This would minimize impacts to wetlands associated with water crossings. Temporary wetland impacts are limited to those areas on either side of the water body where the pipeline emerges and open cut trenching begins. Water bodies designated as "MNDNR PWI" are listed on the Public Waters Inventory and would require a license to be crossed.

Table 4.7-10. Water Crossings for Natural Gas Pipeline Alternative 1 (West Range Site)

Water Crossing Location	Milepost (mile + linear ft)	MNDNR PWI	Length of Crossing (linear ft)
Swan River	4+2170	Yes	60
Tributary of Swan River	5+1460	No	10
Swan River	9+4560	Yes	60
Perennial stream between Big & Little Diamond Lakes	12+2000	No	3
		Total	**133**

Natural Gas Pipeline Alternative 2

Wetland Impacts

Construction methods, ROWs, and the types of impacts on wetlands for Natural Gas Pipeline Alternative 2 would be as described for Alternative 1. Table 4.7-11 provides a summary of temporary wetland impacts and permanent type conversion impacts by wetland type that would result from construction of Alternative 2.

Table 4.7-11. Wetland Impacts (acres), Natural Gas Pipeline Alternative 2 (West Range Site)

Basin ID	Wetland Classification			Selected MnRAM Functions[1]		Temporary Emergent Impact[2]	Temporary Scrub-Shrub Impacts[3]	Permanent Scrub-Shrub and Forested Conversion[3,4]
	Cowardin	Circular 39	Eggers and Reed	Vegetative Diversity	Wetland Water Quality			
A1	PEMB/PSS 1B/PFO4	Type 3/6/8	Shallow Marsh, Shrub Carr, Coniferous Bog	High	Moderate	—	0.01	1.50
E1	PEMC	Type 3	Shallow Marsh	High	Moderate	0.43	—	—
E2	PEMB	Type 2	Wet Meadow	High	Moderate	0.23	—	—
E4	PEMC	Type 3	Shallow Marsh	Moderate	Moderate	0.08	—	—
E5	PEMH	Type 8	Coniferous Bog	High	Moderate	—	—	0.13
E6	PEMC	Type 3	Shallow Marsh	High	Moderate	0.17	—	—
E7	PEMC	Type 3	Shallow Marsh	High	High	0.33	—	—
NWI[5]	n/a	Type 2	Assumed Wet Meadow	Unknown	Unknown	0.17	—	—
NWI[5]	n/a	Type 3	Assumed Shallow Marsh	Unknown	Unknown	0.05	—	—
NWI[5]	n/a	Type 6	Assumed Aspen Thicket	Unknown	Unknown	—	0.01	6.09
NWI[5]	n/a	Type 7	Assumed Hardwood Swamp	Unknown	Unknown	—	—	1.82
NWI[5]	n/a	Type 8	Assumed Coniferous Bog	Unknown	Unknown	—	—	1.44
Total						**1.46**	**0.02**	**10.98**

1 Complete MnRAM 3.1 Functions and Values Assessment data can be found in Appendix F3.
2 Temporary Emergent Impacts are wetland impacts to wetland Types 1-5 within the 150-foot temporary construction ROW.
3 Temporary removal of scrub-shrub vegetation outside the 70-foot permanent ROW. Natural revegetation will be allowed following completion of construction.
4 Permanent conversion of scrub-shrub vegetation within 70-foot permanent ROW and scrub-shrub and forested vegetation within the 100-foot construction ROW.
5 NWI basins are those areas that have not been field investigated. Cowardin classifications are taken from the NWI. Circular 39 and Eggers and Reed classifications are assumed from the Cowardin classification, aerial photograph interpretations, and known characteristics of delineated wetlands.
n/a = not available

Water Crossings

Four water crossings would be associated with Natural Gas Pipeline Alternative 2 as listed in Table 4.7-12. Water crossings for Natural Gas Pipeline Alternative 2 would be directionally drilled as described for the Natural Gas Pipeline Alternative 1. Water bodies designated as "MNDNR PWI" are listed on the Public Waters Inventory and would require a license to be crossed.

Table 4.7-12. Water Crossings for Natural Gas Pipeline Alternative 2 (West Range Site)

Water Crossing Location	Milepost (mile + linear ft)	MNDNR PWI	Length of Crossing (linear ft)
Prairie River	0+1980	Yes	210
Swan River	5+4330	Yes	50
Swan River	10+4180	Yes	50
Perennial stream between Big & Little Diamond Lakes	13+1690	No	3
		Total	**313**

Natural Gas Pipeline – Alternative 3

Wetland Impacts

Construction methods, ROWs, and the types of impacts on wetlands for Natural Gas Pipeline Alternative 3 would be as described for Alternative 1. Table 4.7-13 provides a summary of temporary wetland impacts and permanent type conversion impacts by wetland type that would result from construction of Alternative 3.

Table 4.7-13. Wetland Impacts (acres), Natural Gas Pipeline Alternative 3 (West Range Site)

Basin ID	Wetland Classification			Selected MnRAM Functions[1]		Temporary Emergent Impact[2]	Temporary Scrub-Shrub Impacts[3]	Permanent Scrub-Shrub and Forested Conversion[34]
	Cowardin	Circular 39	Eggers and Reed	Vegetative Diversity	Wetland Water Quality			
A1	PEMB/PS S1B/PFO4	Type 3/6/8	Shallow Marsh, Shrub Carr, Coniferous Bog	High	Moderate	—	0.01	1.50
E1	PEMC	Type 3	Shallow Marsh	High	Moderate	0.43	—	—
E2	PEMB	Type 2	Wet Meadow	High	Moderate	0.23	—	—
E4	PEMC	Type 3	Shallow Marsh	Moderate	Moderate	0.08	—	—
E5	PEMH	Type 8	Coniferous Bog	High	Moderate	—	—	0.13
E6	PEMC	Type 3	Shallow Marsh	High	Moderate	0.21	—	—
E7	PEMC	Type 3	Shallow Marsh	High	High	0.33	—	—

Table 4.7-13. Wetland Impacts (acres), Natural Gas Pipeline Alternative 3 (West Range Site)

Basin ID	Wetland Classification			Selected MnRAM Functions[1]		Temporary Emergent Impact[2]	Temporary Scrub-Shrub Impacts[3]	Permanent Scrub-Shrub and Forested Conversion[3,4]
	Cowardin	Circular 39	Eggers and Reed	Vegetative Diversity	Wetland Water Quality			
NWI[5]	n/a	Type 2	Assumed Wet Meadow	Unknown	Unknown	6.36	—	—
NWI[5]	n/a	Type 3	Assumed Shallow Marsh	Unknown	Unknown	0.29	—	—
NWI[5]	n/a	Type 6	Assumed Aspen Thicket	Unknown	Unknown	—	0.32	0.97
NWI[5]	n/a	Type 7	Assumed Hardwood Swamp	Unknown	Unknown	—	—	0.46
NWI[5]	n/a	Type 8	Assumed Coniferous Bog	Unknown	Unknown	—	—	1.20
					Total	**7.93**	**0.33**	**4.26**

[1] Complete MnRAM 3.1 Functions and Values Assessment data can be found in Appendix F3.
[2] Temporary Emergent Impacts are wetland impacts to wetland Types 1-5 within the 150-foot temporary construction ROW.
[3] Temporary removal of scrub-shrub vegetation outside the 70-foot permanent ROW. Natural revegetation will be allowed following completion of construction.
[4] Permanent conversion of scrub-shrub vegetation within 70-foot permanent ROW and scrub-shrub and forested vegetation within the 100-foot construction ROW.
[5] NWI basins are those areas that have not been field investigated. Cowardin classifications are taken from the NWI. Circular 39 and Eggers and Reed classifications are assumed from the Cowardin classification, aerial photograph interpretations, and known characteristics of delineated wetlands.
n/a = not available

Water Crossings

Four water crossings would be associated with Natural Gas Pipeline Alternative 3 as listed in Table 4.7-14. Water crossings for Natural Gas Pipeline Alternative 3 would be directionally drilled as described for the Natural Gas Pipeline Alternative 1. Water bodies designated as "MNDNR PWI" are listed on the Public Waters Inventory and would require a license to be crossed.

Table 4.7-14. Water Crossings for Natural Gas Pipeline Alternative 3 (West Range Site)

Water Crossing Location	Milepost	MNDNR PWI	Length of Crossing (linear ft)
Prairie River	0+2300	Yes	210
Tributary of Prairie River	2+880	No	20
Perennial stream, drains to Holman Lake	9+3200	Yes	3
Perennial stream between Big & Little Diamond Lakes	11	No	3
		Total	**236**

Process Water Supply Pipelines (West Range Site)

Process Water Supply Pipeline Segments 1, 2, and 3 would all be included in the process water supply plan for the West Range Site (see Section 4.5) and would all be constructed during Phase I of the Mesaba Energy Project. Section 2.3.1.3 discusses the alignments, as shown in Figure 2.3-3 (Chapter 2). Process Water Pipelines would be located so they share permanently maintained ROW with other utilities as much as possible. For example, Segment 3 of the Proposed Process Water Pipeline would parallel the Proposed Rail Line, Site Access Road, CR-7, and a portion of Segment 2. Segment 2 of the Proposed Process Water Pipeline would parallel the Site Access Road, Sanitary Sewer Pipeline, Potable Water Pipeline, and a portion of Segment 3.

The pipelines would be constructed below grade within a 100-foot permanent ROW. Construction of the process water utilities would result in temporary impacts to wetlands existing within the 150-foot construction ROW. Wetland fill impacts would be avoided by restoring wetland habitat after construction. Wetland impacts along the pipeline alignments would include temporary impacts to emergent wetlands within the construction corridor, temporary disturbance of scrub-shrub habitat in temporary workspaces (areas within the construction ROW but outside the permanent ROW), and permanent conversion of scrub-shrub and forested habitat within the permanent ROW where prior disturbance has not removed woody vegetation. Although vegetation outside of the permanent ROW would be allowed to regenerate, impacts to forested wetlands even outside the permanent ROW are considered permanent because of the length of time required for restoration of forested habitat. Table 4.7-15 provides a summary of wetland impacts resulting from construction of Process Water Pipelines.

Table 4.7-15. Wetland Impacts (acres), Process Water Supply Pipelines (West Range Site)

Basin ID	Wetland Classification			Selected MnRAM Functions[1]		Temporary Emergent Wetland Impacts[2]	Temporary Scrub-Shrub Wetland Impacts[3]	Permanent Wetland Type Conversion[4]
	Cowardin	Circular 39	Eggers and Reed	Vegetative Diversity	Wetland Water Quality			
Lind Mine Pit to the Canisteo Mine Pit (Segment 1) Total Length: 2.18 miles Greenfield ROW: 0.17 miles								
—	—	—	—	—	—	—	—	—
Canisteo Mine Pit to the West Range Site (Segment 2) Total Length: 2.15 miles Greenfield ROW: 0.73 miles								
C10	PSS1A	Type 6	Alder Thicket	High	Moderate	—	0.12	0.04
C27	PFO1C	Type 7	Coniferous Swamp	High	Moderate	—	—	0.93
C28	PFO1C	Type 7	Coniferous Swamp	High	Moderate	—	—	1.05
F1	PSS1C	Type 6	Alder Thicket	High	High	—	0.06	0.08
					Segment 2 Subtotal	—	**0.18**	**2.10**

Table 4.7-15. Wetland Impacts (acres), Process Water Supply Pipelines (West Range Site)

Basin ID	Wetland Classification			Selected MnRAM Functions[1]		Temporary Emergent Wetland Impacts[2]	Temporary Scrub-Shrub Wetland Impacts[3]	Permanent Wetland Type Conversion[4]
	Cowardin	Circular 39	Eggers and Reed	Vegetative Diversity	Wetland Water Quality			
Gross-Marble Mine Pit to Canisteo Mine Pit (Segment 3) Total Length: 4.83 miles Greenfield ROW: 2.23 miles								
C10	C10	PSS1A	Type 6	Alder Thicket	High	—	0.84	0.76
C19	PEMH	Type 5	Shallow Open Water	High	Moderate	0.64	—	—
C21	PSS1C	Type 6	Alder Thicket	Moderate	Moderate	—	0.08	0.16
C22	PSS1C	Type 6	Alder Thicket	High	Moderate	—	0.02	—
C23	PSS1C	Type 6	Alder Thicket	Moderate	Moderate	—	0.08	0.18
C24	PFO2B	Type 8	Coniferous Bog	Moderate	Moderate	—	—	0.14
C28	PFO1C	Type 7	Coniferous Swamp	High	Moderate	—	—	0.05
NWI[5]	PUBF	Type 4	n/a	n/a	n/a	0.62	—	—
NWI[5]	PSS/EM5B	Type 6	n/a	n/a	n/a	—	0.13	0.13
NWI[5]	PFO/SSB	Type 7	n/a	n/a	n/a	—	—	0.46
NWI[5]	PFOB	Type 8	n/a	n/a	n/a	—	—	0.49
Segment 3 Subtotal						**1.26**	**1.15**	**2.37**
Grand Total						**1.26**	**1.33**	**4.47**

[1] Complete MnRAM 3.1 Functions and Values Assessment data can be found in Appendix F3.
[2] Temporary disturbance of emergent wetland habitat within the 150-foot construction ROW.
[3] Temporary removal of scrub-shrub vegetation outside the 100-foot permanent ROW. Natural revegetation will be allowed following completion of construction.
[4] Permanent conversion of scrub-shrub vegetation within 100-foot permanent ROW and scrub-shrub and forested vegetation within the 150-foot construction ROW.
[5] NWI basins are those areas that have not been field investigated. Cowardin classifications are taken from the NWI. Circular 39 and Eggers and Reed classifications are assumed from the Cowardin classification, aerial photograph interpretations, and known characteristics of delineated wetlands.
n/a = not available

Cooling Tower Blowdown Outfalls (West Range Site)

The Draft EIS included process water blowdown pipelines that would have resulted in the following type-conversion impacts during construction:

- **Permanent**
  - **0.09 acre of forested wetlands to emergent wetlands;**
  - **2.95 acres of shrub-scrub wetlands to emergent wetlands;**
- **Temporary**
  - **1.57 acres of shrub-scrub wetlands.**

Excelsior's decision to use an enhanced ZLD system at the West Range Site as discussed in Section 2.3.1.3 eliminated the need for construction of Cooling Tower Blowdown Outfalls. Therefore these impacts to wetlands have been avoided for the Final EIS.

Potable Water and Sewer Pipelines (West Range Site)

The Potable Water and Sewer Pipelines would be constructed below grade within a 40-foot permanent ROW. The permanent ROW and the 100-foot construction ROW are located within the same impact corridor as Process Water Pipeline Segment 2 and Access Road 3 as described in

Section 2.3.1.3 and shown in Figure 2.3-3. Therefore, construction of the potable water and sanitary sewer pipelines would not result in any additional wetland impacts.

Rail Line Alternatives (West Range Site)

Excelsior's original preferred rail line (Rail Alternative 1A), which pairs with the Central – Draft EIS plant location, would pass by the plant footprint and loop around a wetland complex as shown in Figure 4.7-1. This rail loop would result in about 18 acres of wetland fill. The impacts to wetlands, summarized in Table 4.7-16, include all wetlands within the construction limits of the proposed rail line based on a 3:1 slope along the railroad embankments. Rail Alternative 1A would also create potential indirect impacts by isolating wetlands within the loop (58 acres).

Table 4.7-16. Wetland Fill (acres), Rail Alternative 1A (West Range Site)

Basin ID	Wetland Classification			Selected MnRAM Functions[1]		Wetland Fill
	Cowardin	Circular 39	Eggers and Reed	Vegetative Diversity	Wetland Water Quality	
A1	PEMB/PSS1/PFO4	Type 3/6/8	Shallow Marsh/Shrub Carr/Coniferous Bog	High	Moderate	3.15
A3	PFO1C	Type 7	Hardwood Swamp	High	High	0.10
A4	PFO1C/F	Type 7	Hardwood Swamp	Moderate	High	12.65
C12	PSSC1	Type 6	Alder Thicket	High	Moderate	0.62
C13	PSS1C/PFOC1	Type 6/7	Alder Thicket/ Hardwood Swamp	High	Moderate	0.22
C15	PSS1C	Type 6	Alder Thicket	High	Moderate	0.07
D8	PEMC/PFO1C/PFO 4B	Type 3/7/8	Shallow Marsh/Hardwood Swamp/Coniferous Bog	High	Moderate	0.32
D10	PEMC/PSSA1C	Type 3/6	Sedge Meadow/ Shrub Carr	High	High	0.51
NWI[2]	n/a	Type 6	Assumed Alder Thicket	n/a	n/a	0.30
					Total	**17.94**
			Center Loop			**Isolated Wetlands**
A4	PFO1C/F	Type 7	Hardwood Swamp	Moderate	High	**58.30**

[1] Complete MnRAM 3.1 Functions and Values Assessment data are included in Appendix F3.
[2] NWI basins are those areas that have not been field investigated. Cowardin classifications are taken from the NWI. Circular 39 and Eggers and Reed classifications are assumed from the Cowardin classification, aerial photograph interpretations, and known characteristics of delineated wetlands.
n/a - not available

Excelsior's new preferred rail line (Rail Alternative 3B), which pairs with the Central – Final EIS plant location, would intersect the northeastern perimeter of the plant footprint and loop around the hill in the northeastern portion of the site as shown in Figure 4.7-1. This rail loop would result in less than 6 acres of wetland fill. The impacts to wetlands, summarized in Table 4.7-17, include all wetlands within the construction limits of the proposed rail line based on a 3:1 slope along the railroad embankments.

Although rail yard operations would be less than optimal, because the rail line would not adjoin the footprints of both phases (as would Alternative 1A), this rail alternative reduces the area of wetland fill from 18 acres to less than 6 acres and avoids potential indirect impacts to 58 acres of wetlands.

Table 4.7-17. Wetland Fill (acres), Rail Alternative 3B (West Range Site)

Basin ID	Wetland Classification			Selected MnRAM Functions[1]		Wetland Fill
	Cowardin	Circular 39	Eggers and Reed	Vegetative Diversity	Wetland Water Quality	
A1	PEMB/PSS1/PFO4	Type 3/6/8	Shallow Marsh/Shrub Carr/Coniferous Bog	High	Moderate	2.05
A3	PFO1C	Type 7	Hardwood Swamp	High	High	0.10
A4	PFO1C/F	Type 7	Hardwood Swamp	Moderate	High	0.27
A40	PEMC/PSS1C	Type 3/6	Shallow Marsh/ Alder Thicket	High	High	0.06
B15	PEMB/PSS1C/ PFO1A	Type 2/6/7	Wet Meadow/ Alder Thicket	High	High	0.14
C12	PSSC1	Type 6	Alder Thicket	High	Moderate	0.62
C13	PSS1C/PFOC1	Type 6/7	Alder Thicket/ Hardwood Swamp	High	Moderate	0.22
C15	PSS1C	Type 6	Alder Thicket	High	Moderate	0.08
D8	PEMC/PFO1C/ PFO4B	Type 3/7/8	Shallow Marsh/Hardwood Swamp/Coniferous Bog	High	Moderate	0.56
D10	PEMC/PSSA1C	Type 3/6	Sedge Meadow/ Shrub Carr	High	High	0.38
D12	PEMC/PFO1C	Type 3/7	Sedge Meadow/ Hardwood Swamp	High	High	0.01
D13	PEMC/PFO1C	Type 3/7	Sedge Meadow/ Hardwood Swamp	High	High	0.04
D14	PSS1C/PFO1C	Type 6/7	Shrub Carr/ Hardwood Swamp	High	High	0.61
NWI[2]	PSSB	Type 6	Assumed Alder Thicket	n/a	n/a	0.29
NWI[2]	PSSB	Type 6	Assumed Alder Thicket	n/a	n/a	0.16
NWI[2]	PSSB	Type 6	Assumed Alder Thicket	n/a	n/a	0.14
					Total	**5.73**

[1] Complete MnRAM 3.1 Functions and Values Assessment data are included in Appendix F3.
[2] NWI basins are those areas that have not been field investigated. Cowardin classifications are taken from the NWI. Circular 39 and Eggers and Reed classifications are assumed from the Cowardin classification, aerial photograph interpretations, and known characteristics of delineated wetlands.
n/a - not available

Access Road Alignments (West Range Site)

Excelsior planned Access Road 2 as proposed in the Draft EIS (Figure 4.7-1) with the intention of intersecting a new CR 7 realignment proposed by Itasca County. The realignment of CR 7 (Figure 4.7-1), identified as Access Road 1 in the Draft EIS, would extend eastward off the existing CR 7 just south of West Range Site, run east between Dunning Lake and Big Diamond Lake, and then turn south between Arcturus Mine and Big Diamond Lake to intersect with US 169.

Because of changes in highway funding priorities by the state, Itasca County does not expect to construct the CR 7 realignment in time to be available for use by the Mesaba Generating Station. Therefore, Excelsior investigated additional options for road access to the West Range Site after publication of the Draft EIS. During this investigation, DOE coordinated with Excelsior to ensure that the new access road alignment would reduce potential impacts on wetlands. These efforts resulted in the identification of Access Road 3, which would connect the Mesaba Generating Station

footprint with CR 7 near the southwest corner of the West Range Site as shown in Figure 4.7-1. This road alignment provides the shortest access to CR 7 and minimizes impacts to wetlands.

Wetland Fill

Wetland fill impacts for access road construction were calculated assuming fill across the width of the 120-foot wide permanent ROW. Table 4.7-18 provides a summary of wetland fill within the construction limits of the proposed roadway for the Draft EIS (Access Roads 1 and 2) and Table 4.7-19 provides the same summary for the proposed roadway in this Final EIS (Access Road 3).

Table 4.7-18. Wetland Fill (acres), Access Roads 1 and 2 (West Range Site)

Basin ID	Wetland Classification			Selected MnRAM Functions[1]		Wetland Fill
	Cowardin	Circular 39	Eggers and Reed	Vegetative Diversity	Wetland Water Quality	
A1	PEMB/PSS1/PFO4	Type 3/6/8	Shallow Marsh/Shrub Carr/Coniferous Bog	High	Moderate	3.44
A13	PFO1B	Type 7	Hardwood Swamp	High	High	0.24
A14	PFO1B	Type 7	Hardwood Swamp	High	High	0.14
A27	PFO1C	Type 7	Hardwood Swamp	High	High	—
C21	PSS1C	Type 6	Alder Thicket	High	Moderate	0.33
C22	PSS1C	Type 6	Alder Thicket	High	Moderate	0.09
C23	PSS1C/PFO1C	Type 6/7	Alder Thicket/Hardwood Swamp	High	Moderate	0.36
C24	PFO2B	Type 8	Coniferous Bog	High	Moderate	0.34
C26	PFO1C	Type 7	Coniferous Swamp	High	High	—
C27	PFO1C	Type 7	Coniferous Swamp	High	Moderate	0.01
NWI[2]	n/a	Type 4	Assumed Deep Marsh	n/a	n/a	0.43
NWI[2]	n/a	Type 6	Assumed Alder Thicket	n/a	n/a	—
NWI[2]	n/a	Type 7	Assumed Hardwood Swamp	n/a	n/a	0.19
NWI[2]	n/a	Type 8	Assumed Coniferous Bog	n/a	n/a	0.10
					Total	**5.67**

[1] Complete MnRAM 3.1 Functions and Values Assessment data are included in Appendix F3.
[2] NWI basins are those areas that have not been field investigated. Cowardin classifications are taken from the NWI. Circular 39 and Eggers and Reed classifications are assumed from the Cowardin classification, aerial photograph interpretations, and known characteristics of delineated wetlands.
n/a = not available

Table 4.7-19. Wetland Fill (acres), Access Road 3 (West Range Site)

Basin ID	Wetland Classification			Selected MnRAM Functions[1]		Wetland Fill
	Cowardin	Circular 39	Eggers and Reed	Vegetative Diversity	Wetland Water Quality	
A11	PEMC	Type 3	Shallow Marsh	Moderate	High	0.004
F1	PSS1C	Type 6	Alder Thicket	High	High	0.19
					Total	**0.194**

[1] Complete MnRAM 3.1 Functions and Values Assessment data are included in Appendix F3.

Temporary Wetland Impacts

Temporary impacts to wetlands associated with Access Road 3 construction assume a 200-foot wide construction ROW. This ROW would be shared with several process water pipelines and the potable water and sanitary sewer pipelines for a portion of its length. The total temporary wetland impacts are 0.2 acres, which includes 0.08 acres of Type 3 shallow marsh and 0.13 acres of Type 6 alder thicket.

4.7.3.2 Impacts of Operation

The impacts to wetlands at the West Range Site would be the same as those presented as common operational impacts in Section 4.7.2.2.

4.7.4 Impacts on East Range Site and Corridors

The following sections describe the wetland impacts specific to the East Range Site and associated utility and transportation corridors. Impacts that would be common at both the alternative sites are discussed in Section 4.7.2.

4.7.4.1 Impacts of Construction

Based upon comments received on the Draft EIS and additional analyses performed, Section 4.7.4.1 in the Draft EIS was deleted in its entirety and replaced with new text and tables. The major changes incorporated in the new section include:

- **The proposed Access Road looped alignment was replaced with a single, direct route;**
- **All fill calculations were done assuming 3:1 side slopes for the fill;**
- **Type conversion impacts were separated into temporary and permanent impacts;**
- **Impacts are described with respect to wetlands as classified by Eggers and Reed, 1997; and**
- **Selected results of the MnRAM analysis (full results in Appendix F3) are included.**

The proposed project includes actions throughout the East Range Site and Corridors, i.e., those within the Mesaba Generating Station Footprint and Buffer Land and the linear corridors along which the power transmission, gas pipeline, and other associated facilities traverse. Section 2.3.2 describes the project elements at the East Range Site. The following sections describe the impacts to wetlands that would result from the construction of each project element. Impacts to wetlands are described as wetland fill, temporary wetland disturbance, and wetland type-conversion resulting from vegetation removal. Section 4.7.6 contains a summary of potential impacts at the East Range Sites and Corridors as well as for the West Range Sites and Corridors. Appendix F2 contains additional graphics depicting the impacts described below.

<u>Mesaba Generating Station Footprint</u>

As positioned in Figure 4.7-2 the Mesaba Generating Station Footprint would affect 17.15 acres of wetland habitat. The impact area includes the plant footprint and the 3:1 grading at its boundaries required to achieve the natural grade of the surrounding area. Table 4.7-20 summarizes wetland impacts resulting from the placement, alignment, and grading of the plant footprint, including areas within the grading limits. Figure 4.7-2 shows the locations of the wetlands affected.

Table 4.7-20. Wetland Fill (acres), Mesaba Generating Station (East Range Site)

Basin ID	Wetland Classification			Selected MnRAM Functions[1]		Wetland Fill[2]		
	Cowardin	Circular 39	Eggers and Reed	Vegetative Diversity	Wetland Water Quality	Phase I	Phase II	Total
A	PEMC	Type 2	Sedge Meadow	High	Moderate	0.05	0.003	0.05
B	PFOC	Type 7	Coniferous Swamp	High	Moderate	5.53	—	5.53
C3	PFO2B	Type 7	Coniferous Swamp	High	Moderate	0.66	1.42	2.08
C4	PEMH	Type 4	Deep Marsh	High	Moderate	1.89	1.38	3.27
C5	PEMB	Type 2	Fresh Wet Meadow	High	Moderate	1.74	0.004	1.74
C6	PFO1B	Type 7	Hardwood Swamp	High	Moderate	3.38	—	3.38
C9	PSS1B	Type 6	Shrub Swamp	High	Moderate	0.19	0.90	1.09
					Total	**13.44**	**3.71**	**17.15**

[1] Complete MnRAM 3.1 Functions and Values Assessment data are included in Appendix F3.
[2] Impacts due to grading limits for the entire plant site are included in the Phase 1 impacts.

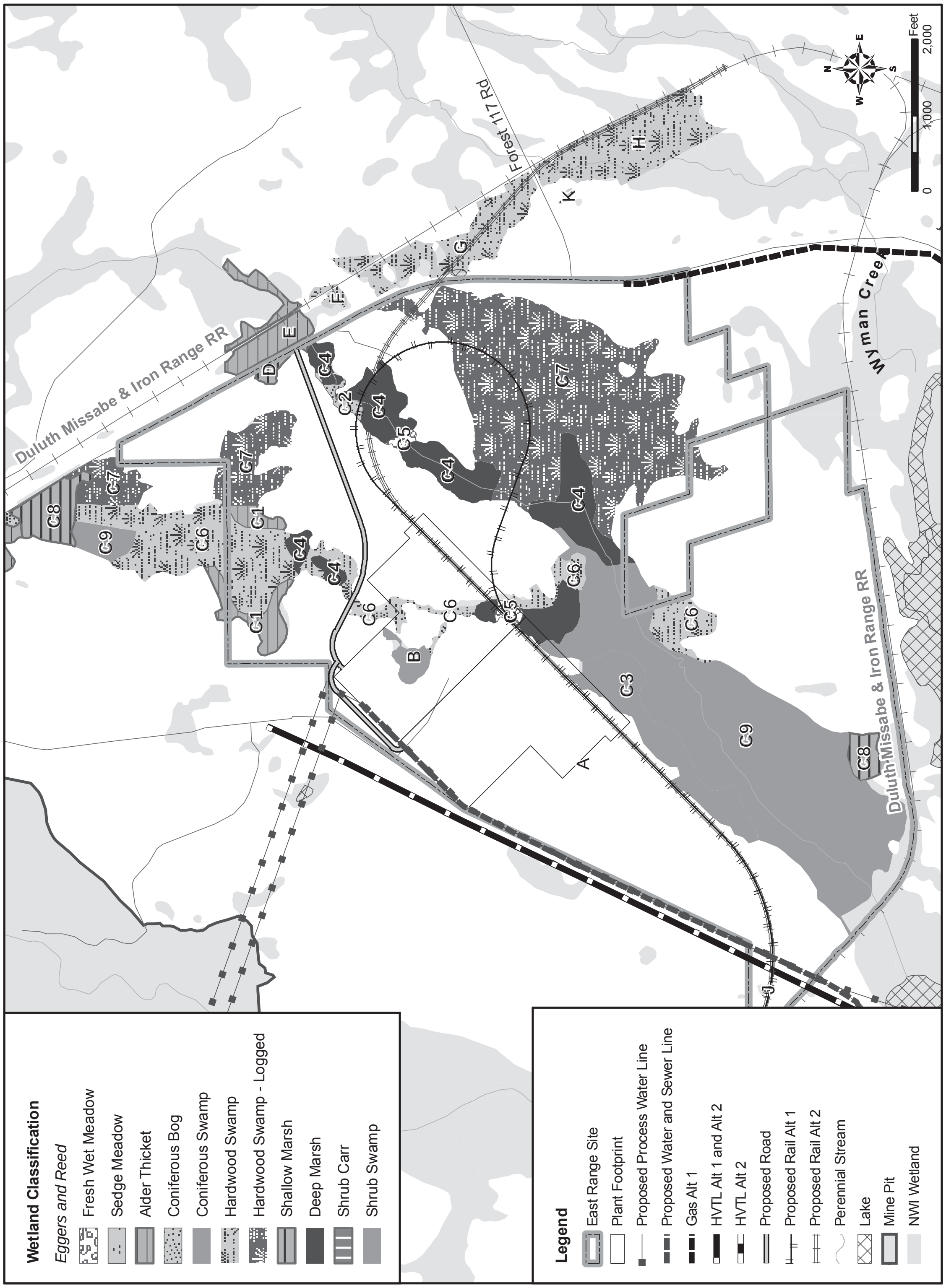

Figure 4.7-2. East Range Eggers and Reed Wetland Classifications

HVTL Alternatives (East Range Site)

Excelsior's transmission plan for the Mesaba Generating Station at the East Range Site consists of constructing two new 345kV HVTLs within three existing ROWs (MP 37L, 38L, and 39L) to link the generating station with the Forbes Substation. Both of Excelsior's HTVL Alternatives would follow the same two routes; however, construction-staging requirements would necessitate the widening of one of the corridors by 30 feet. Hence, Alternative 1 would require clearing of a 30-foot additional ROW along the MP 38L corridor, and Alternative 2 would require clearing of a 30-foot additional ROW along the MP 37L/39L corridor. Section 2.3.2.5 (Chapter 2) describes these alternatives, and Figure 2.3-8 illustrates the corridors. Both HVTL corridors would be required for Phase I operation of the Mesaba Energy Project.

Wetland impacts along the HVTL alignments would include wetland fill for power pole placement, temporary impacts to scrub-shrub habitat in temporary workspaces (areas within the construction ROW but outside the permanent ROW), and conversion of scrub-shrub and forested habitat within the additional 30-foot permanent ROW.

Wetland Fill

Wetland fill would be limited to those areas where power poles would be placed within wetlands. Each pole would require an estimated 28 ft^3 of fill. Wetland impacts were calculated for the HVTL alignment assuming that power poles would be placed every 800 feet. Using this assumption, a total of 139 power poles (73 for MP 38L and 66 for MP 37L/39L) would be placed in wetland areas, resulting in 0.09 acres of permanent wetland impacts along the 68.42-mile alignment (33.58 miles for MP 38L and 34.84 for MP 37L/39L). Table 4.7-21 summarizes the wetland fill impacts, which would be the same for both HVTL Alternatives 1 and 2.

Table 4.7-21. Wetland Fill (acres), HVTL Alternatives (East Range Site)

Basin ID[1]	Wetland Classification			Selected MnRAM Functions[2]		Wetland Fill	
	Cowardin	Circular 39	Eggers and Reed	Vegetative Diversity	Wetland Water Quality	# Poles	Area
MP 38 Line							
NWI	Various	Type 2	Assumed Wet Meadow	—	—	3	0.0019
NWI	Various	Type 5	Assumed Shallow Open Water	—	—	1	0.0006
NWI	Various	Type 6	Assumed Alder Thicket	—	—	33	0.0211
NWI	Various	Type 7	Assumed Hardwood Swamp	—	—	5	0.0030
NWI	Various	Type 8	Assumed Coniferous Bog	—	—	30	0.0189
NWI	Riverine	n/a	n/a	—	—	1	0.0006
					Total	**73**	**0.0461**

Table 4.7-21. Wetland Fill (acres), HVTL Alternatives (East Range Site)

Basin ID[1]	Wetland Classification			Selected MnRAM Functions[2]		Wetland Fill	
	Cowardin	Circular 39	Eggers and Reed	Vegetative Diversity	Wetland Water Quality	# Poles	Area
MP 37/39 Lines							
NWI	Various	Type 2	Assumed Wet Meadow	—	—	1	0.0006
NWI	Various	Type 5	Assumed Shallow Open Water	—	—	3	0.0019
NWI	Various	Type 6	Assumed Alder Thicket	—	—	19	0.0123
NWI	Various	Type 7	Assumed Hardwood Swamp	—	—	13	0.0084
NWI	Various	Type 8	Assumed Coniferous Bog	—	—	30	0.0194
					Total	**66**	**0.0426**
					Combined Total	**139**	**0.0887**

[1] NWI basins are those areas that have not been field investigated. Cowardin classifications are taken from the NWI. Circular 39 and Eggers and Reed classifications are assumed from the Cowardin classification, aerial photograph interpretations, and known characteristics of delineated wetlands.
[2] MnRAM assessments were only completed for wetlands field delineated, and are not available for wetland impacts based off the NWI.
n/a = not applicable

Wetland Type Conversion (Tree and Shrub Clearing)

The majority of HVTL construction for the Mesaba Energy Project would occur within existing 100-foot HVTL ROWs, which would avoid the need for clearing of trees and shrubs. Tree clearing would be required on the additional 30 feet of new ROW and on the new ROW to the Syl Laskin Substation. The proposed new 30-foot ROW would parallel the existing 100-foot HVTL ROW and would alter wooded or shrub wetland habitat. Construction of the new 100-foot ROW between the East Range Mesaba Generating Station and the Syl Laskin Substation would require clearing of shrub swamp. Impacts to wetland vegetation would be of two types—temporary affects to scrub-shrub habitat in temporary workspaces outside the permanent ROW and permanent conversion of scrub-shrub habitat and forested habitat within the permanent ROW. These respective impacts would be as described for HVTL Alternative 1 at the West Range Site.

Table 4.7-22 summarizes wetland type conversion that would result from construction for the respective HVTL alternatives. Type conversion impacts from HVTL Alternative 1 would be based on the addition of a 30-foot ROW along the existing ROW of the MP 38L corridor. Type conversion impacts from Excelsior's preferred HVTL Alternative 2 would be based on the addition of a 30-foot ROW along the existing ROWs of the MP 37L/39L corridor. Both alternatives would include the same new ROW between the Syl Laskin Substation and the Mesaba Generating Station, as well as the new ROW linking the 37L corridor with the 39L corridor near Eveleth.

Table 4.7-22. Wetland Conversion (acres), HVTL Alternatives (East Range Site)

Basin ID[1]	Wetland Classification			Temporary Scrub-Shrub Impacts[2]	Permanent Scrub-Shrub and Forested Conversion[3]
	Cowardin	Circular 39	Eggers and Reed		
Alternative 1 - MP 38 Line (Existing ROWs, Plant Access, plus 30-foot additional ROW on MP 38L)					
NWI	Various	Type 1	Assumed Floodplain Forest	0 (no shrubs)	0 (no trees/shrubs)
NWI	Various	Type 2	Assumed Wet Meadow	0 (no shrubs)	0 (no trees/shrubs)
NWI	Various	Type 5	Assumed Shallow Open Water	0 (no shrubs)	0 (no trees/shrubs)
NWI	Various	Type 6	Assumed Alder Thicket	0 (no wetlands)	24.27
NWI	Various	Type 7	Assumed Hardwood Swamp	0 (no shrubs)	9.15
NWI	Various	Type 8	Assumed Coniferous Bog	0 (no shrubs)	29.03
NWI	Riverine	n/a	n/a	0 (no shrubs)	0 (already cleared)
			Total	**0**	**62.45**
Alternative 2 - MP 37/39 Line (Existing ROWs, Plant Access plus 30-foot additional ROW on MP 37L/39L)					
NWI	Various	Type 1	Assumed Floodplain Forest	0 (no shrubs)	0 (no trees/shrubs)
NWI	Various	Type 2	Assumed Wet Meadow	0 (no shrubs)	0 (no trees/shrubs)
NWI	Various	Type 5	Assumed Shallow Open Water	0 (no shrubs)	0 (no trees/shrubs)
NWI	Various	Type 6	Assumed Alder Thicket	0.20	19.21
NWI	Various	Type 7	Assumed Hardwood Swamp	0 (no shrubs)	10.99
NWI	Various	Type 8	Assumed Coniferous Bog	0 (no shrubs)	29.42
NWI	Riverine	n/a	n/a	0 (no shrubs)	0 (no wetlands)
			Total	**0.20**	**59.62**

[1] NWI basins are those areas that have not been field investigated. Cowardin classifications are taken from the NWI. Circular 39 and Eggers and Reed classifications are assumed from the Cowardin classification, aerial photograph interpretations, and known characteristics of delineated wetlands.
[2] Temporary removal of scrub-shrub vegetation outside the 100-foot permanent ROW. Natural revegetation would be allowed following completion of construction.
[3] Permanent conversion of scrub-shrub vegetation within 100-foot permanent ROW and scrub-shrub and forested vegetation within the 150-foot construction ROW.
n/a = not applicable

Water Crossings

There would be 21 crossings of streams or water bodies associated with **MP 38L corridor** (HVTL Alternative 1) **for a total length of water crossings estimated at 1,194 linear feet. There would be 20 water crossings in the MP 37L/39L corridors (HVTL Alternative 2) for a total length estimated at 1,760 linear feet. Table 4.7-23 summarizes the length of each water crossing. Water bodies designated as "MNDNR PWI" are listed on the Public Waters Inventory and would require a license to be crossed.**

Table 4.7-23. Water Crossings for HVTL Alternatives (East Range Site)

Water Crossing Location	Milepost	MNDNR PWI	Length of Crossing (linear ft)
HVTL Alternative 1 - MP 38 Line Corridor			
Colby Lake	1+4670	Yes—249P	540
Partridge River	5+1190	Yes	110
Perennial Tributary to St. Louis River	6+3680	No	3
Perennial Tributary to St. Louis River	6+4590	Yes	3
Perennial Tributary to St. Louis River	8+1215	No	3
Perennial Tributary to St. Louis River	8+2420	No	3
Unnamed Pond	9+0480	Yes—430W	180
Perennial Stream between North and South Cedar Island Lake	11+1780	Yes	60
Perennial Stream South of Forge Lake	13+1850	No	95
Perennial Tributary to Esquagama Lake	15+0670	Yes	3
Perennial Ditch to Esquagama Lake	15+3590	No	3
Perennial Tributary to Embarrass River	16+3900	No	60
Intermittent Stream to Embarrass River	16+4900	No	3
Ely Creek	22+0090	Yes	3
Perennial Stream south of Half Moon Lake	23+4750	No	3
Intermittent Stream north of Long Lake Creek	26+4020	No	3
Long Lake Creek	27+0360	Yes	3
Perennial Stream north of St. Louis River	29+3250	Yes	3
Elbow Creek	30+1230	Yes	15
Perennial Stream north of Elbow Creek	30+4100	No	3
Two River (in 3 places due to meander)	31+2840	Yes	95
		Total MP 38 Line	**1194**
HVTL Alternative 2- MP 37/39 Line Corridor			
Colby Lake	1+4670	Yes—249P	540
Partridge River	5+3020	Yes	250
Perennial Tributary to St. Louis River	7+1110	Yes	80
Perennial Tributary to St. Louis River	8+2300	Yes	3
Perennial Tributary to St. Louis River	8+2980	No	3
Perennial Drainage Ditch to wetland	12+1410	No	6
Embarrass River	15+1140	No	3
Embarrass River	15+1490	Yes	70
Deep Lake	19+2260	Yes—666P	690
Perennial Stream west of Deep Lake (2 crossings in meander)	19+4840	No	6
Perennial Stream west of Deep Lake	20+1540	No	3
Unnamed Intermittent Stream	22+4080	Yes	3
Perennial Ditch to Mine Dump	25+0960	No	3
Perennial Stream to Mine Dump	25+1960	No	3

Table 4.7-23. Water Crossings for HVTL Alternatives (East Range Site)

Water Crossing Location	Milepost	MNDNR PWI	Length of Crossing (linear ft)
Elbow Creek	28+5130	Yes	15
Perennial Ditch to East Two River	30+2190	No	3
Perennial Stream to East Two River	31+1910	No	3
East Two River	32+0810	Yes	70
Unnamed Perennial Stream	33+0340	No	3
Perennial Ditch to Two River	34+4960	No	3
		Total MP 37/39 Line	**1760**

Natural Gas Pipeline (East Range Site)

Section 2.3.2.4 describes proposed Natural Gas Pipeline and Figure 2.3-8 (Chapter 2) shows the alignment.

Wetland Impacts

The Natural Gas Pipeline would be constructed below grade within an existing NNG ROW. Construction methods, ROWs, and the types of impacts on wetlands for Natural Gas Pipeline would be as described for Natural Gas Pipeline Alternative 1 for the West Range Site. Construction and installation of the proposed natural gas pipeline would disturb an estimated total of 24.79 acres of wetland along the entire 28.8 miles of existing ROW as summarized in Table 4.7-24. This area assumes that open cut trenching would be employed for construction, which would require use of the entire width of the ROW.

Table 4.7-24. Wetland Impacts (acres), Natural Gas Pipeline (East Range Site)

Basin ID	Wetland Classification			Selected MnRAM Functions[1]		Temporary Emergent Wetland Impacts[2]	Temporary Scrub-Shrub Wetland Impacts[3]	Permanent Wetland Type Conversion[4]
	Cowardin	Circular 39	Eggers and Reed	Vegetative Diversity	Wetland Water Quality			
C2	PFO2B	Type 8	Coniferous Bog	High	Moderate	—	—	0.06
C4	PEMH	Type 4	Deep Marsh	High	Moderate	0.68	—	—
C6	PFO1B	Type 7	Hardwood Swamp	High	Moderate	—	—	0.41
C7	PSS1B	Type 6	Hardwood Swamp - Logged	High	Moderate	—	0.33	—
C8	PEMC	Type 3	Shallow Marsh	High	Moderate	0.003	—	—
NWI[5]	Various	Type 2	Assumed Wet Meadow	—	—	1.81	—	—
NWI[5]	Various	Type 5	Assumed Shallow Open Water	—	—	(0.34)[6]	—	—
NWI[5]	Various	Type 6	Assumed Alder Thicket	—	—	8.71	Already clear	—
NWI[5]	Various	Type 7	Assumed Hardwood Swamp	—	—	3.60	—	Already clear
NWI[5]	Various	Type 8	Assumed Coniferous Bog	—	—	9.10	—	Already clear
NWI[5]	Riverine	n/a	n/a	—	—	0.09	—	—
					Total	**23.99**	**0.33**	**0.47**

[1] MnRAM 3.1 Functional Assessments were completed only for wetlands field delineated.
[2] Temporary disturbance of emergent wetland habitat within the 100-foot construction ROW. This includes impacts to previously cleared Type 6, 7, and 8 NWI wetlands.
[3] Temporary removal of scrub-shrub vegetation outside the 70-foot permanent ROW. Natural revegetation would be allowed following completion of construction.
[4] Permanent conversion of scrub-shrub vegetation within 70-foot permanent ROW and scrub-shrub and forested vegetation within the 100-foot construction ROW.
[5] NWI basins are those areas that have not been field investigated. Cowardin classifications are taken from the NWI. Circular 39 and Eggers and Reed classifications are assumed from the Cowardin classification, aerial photograph interpretations, and known characteristics of delineated wetlands.
[6] Impacts to open water would be avoided by directionally drilling pipeline under the water body.
n/a = not applicable

Water Crossings

The East Range Natural Gas Pipeline would require crossing about 792 linear feet of streams and bodies of water (Table 4.7-25), not including adjacent wetland habitat. Colby Lake (249P) and 12 streams and rivers impacted by the Natural Gas Pipeline construction are protected by the MNDNR.

Table 4.7-25. Water Crossings for Natural Gas Pipeline (East Range Site)

Water Crossing Location	Milepost	MNDNR PWI	Length of Crossing (linear ft)
Elbow Creek	1+3580	Yes	20
Unnamed Perennial Stream	4+1010	No	3
Perennial Stream from Mud to Horseshoe Lake	5+2840	Yes	3
Perennial Ditch from Airport to Ely Creek	8+0550	No	3
Perennial Ditch from Airport to Ely Creek	8+1030	No	3
Ely Creek	9+3530	Yes	3
Perennial Ditch from Leaf Lake	12+2370	No	3
Perennial Stream to Esquagama Lake	13+4720	Yes	15
Perennial Stream to Esquagama Lake	14+1790	Yes	15
Perennial Ditch to Esquagama Lake	15+0710	No	3
Perennial Stream from Fourth Lake to Esquagama Lake	15+3620	Yes	90
Perennial Stream to St. Louis River	19+3500	No	3
Perennial Stream to St. Louis River	19+4350	Yes	3
Perennial Stream to St. Louis River	21+1880	Yes	15
Perennial Stream to St. Louis River	21+3380	No	15
Partridge River	24+0960	Yes	100
Colby Lake	25+1490	Yes	430
Partridge River	27+3230	Yes	50
Wyman Creek	28+0950	Yes	15
		Total	**792**

Process Water Supply Pipelines (East Range Site)

All Process Water Supply Pipeline segments would be included in the process water supply plan for the East Range Site (see Section 4.5) and all would be constructed during Phase I of the Mesaba Energy Project. Section 2.3.2.3 discusses the alignments, as shown in Figure 2.3-7 (Chapter 2). Construction methods, ROWs, and the types of impacts on wetlands for Process Water Supply Pipelines would be as described for Process Water Supply Pipelines for the West Range Site. The impacted acreages in Table 4.7-26 were calculated using the same assumptions as described for the West Range Site. Only the Process Water Pipeline segments constructed from Area 2WX to the power plant footprint and Area 6 and Stephens Mine to Area 2WX contain shrub scrub or forested wetland habitat. Since publication of the Draft EIS, Excelsior has consulted with MNDNR and representatives of potential water users that may conflict with potential water sources at the East Range Site as originally identified in the Draft EIS. See Section 4.5.4.1, which has been updated and discusses potential conflicts and new water sources identified since publication of the Draft EIS.

Table 4.7-26. Wetland Impacts (acres), Process Water Supply Pipelines (East Range Site)

Basin ID	Wetland Classification			Selected MnRAM Functions[1]		Temporary Emergent Wetland Impacts[2]	Temporary Scrub-Shrub Wetland Impacts[3]	Permanent Wetland Type Conversion[4]
	Cowardin	Circular 39	Eggers and Reed	Vegetative Diversity	Wetland Water Quality			
Area 2WX to Station Footprint - Total Length: 2.18 miles								
NWI[5]	Various	Type 3	Assumed Shallow Marsh	—	—	0.38	—	—
NWI[5]	Various	Type 7	Assumed Hardwood Swamp	—	—	—	—	0.75
NWI[5]	Various	Type 8	Assumed Coniferous Bog	—	—	—	—	0.32
Segment Subtotal						0.38	0	1.07
Area 2WX to Area 2W - Total Length: 0.51 miles								
—	—	—	—	—	—	—	—	—
Segment Subtotal						—	—	—
Area 2W to Area 2E - Total Length: 0.14 miles								
—	—	—	—	—	—	—	—	—
Segment Subtotal						—	—	—
Area 3 to Area 2E - Total Length: 0.55 miles								
NWI[5]	Various	Type 4	Assumed Deep Marsh	—	—	0.41	—	—
Segment Subtotal						0.41	—	—
Knox Mine to Area 2WX - Total Length: 0.16 miles								
—	—	—	—	—	—	—	—	—
Segment Subtotal						—	—	—
Area 6 and Stephens Mine to Area 2WX - Total Length: 2.15 miles								
NWI[5]	Various	Type 6	Assumed Alder Thicket	—	—	—	0.19	0.26
Segment Subtotal						—	0.19	0.26
Area 9 South to Area 6 - Total Length: 0.50 miles								
NWI[5]	Various	Type 5	Assumed Shallow Open Water	—	—	(0.54)[6]	—	—
Segment Subtotal						—	—	—
Area 9 North (Donora Mine) to Area 6 - Total Length: 0.95 miles								
—	—	—	—	—	—	—	—	—
Segment Subtotal						—	—	—
Grand Total						**0.79**	**0.19**	**1.33**

[1] MnRAM 3.1 Functional Assessments were completed only for wetlands field delineated.
[2] Temporary disturbance of emergent wetland habitat within the 150-foot construction ROW.
[3] Temporary removal of scrub-shrub vegetation outside the 100-foot permanent ROW. Natural revegetation would be allowed following completion of construction.
[4] Permanent conversion of scrub-shrub vegetation within 100-foot permanent ROW and scrub-shrub and forested vegetation within the 150-foot construction ROW.
[5] NWI basins are those areas that have not been field investigated. Cowardin classifications are taken from the NWI. Circular 39 and Eggers and Reed classifications are assumed from the Cowardin classification, aerial photograph interpretations, and known characteristics of delineated wetlands.
[6] Impacts to open water would be avoided by directionally drilling pipeline under the water body.

Several segments of the East Range Process Water Supply Pipeline system would cross streams (**Table 4.7-27**).

Table 4.7-27. Water Crossings for Process Water Supply Pipeline (East Range Site)

Water Crossing Location	MNDNR PWI	Length of Crossing (linear ft)
Area 6 and Stephens Mine to Area 2WX		
Stephens Creek	Yes	3
Second Creek	Yes	30
Area 9 South to Area 6		
First Creek	Yes	3
Area 9 North to Area 6		
First Creek	Yes	3
	Total	**39**

Potable Water and Sanitary Sewer

The Potable Water and Sewer Pipelines are described in Section 2.3.2.3 and shown in Figure 2.3-7. Based on the NWI, up to 1.12 acres of Colby Lake lie within the construction limit and would be affected during construction. No other NWI wetlands are identified within the 100-foot wide construction ROW; however, field verification would be required for confirmation. Construction of the Potable Water and Sewer Pipelines would require crossing about 460 linear feet of Colby Lake. This segment of the pipelines would be directionally drilled to avoid impacts to the lake and lakeshore. Table 4.7-28 shows impacts due to crossing.

Table 4.7-28. Water Crossings for Potable Water and Sewer Pipelines (East Range Site)

Water Crossing Location	Milepost	MNDNR PWI	Length of Crossing (linear ft)
Colby Lake	1+3720	Yes—249 P	460
	Total	**460**	

Rail Line Alternatives (East Range Site)

Excelsior's alternatives for rail service to the East Range Site are described in Section 2.3.2.2 and shown in Figure 4.7-2. Excelsior's preferred alignment is Rail Line Alternative 1. Table 4.7-29 summarizes the wetland impacts of this rail line alternative and includes all wetlands within the construction limits of the proposed rail line based on a 3:1 slope along the railroad embankments. The rail line would affect 13.38 acres of wetland, and an additional 51.26 acres of two remnant wetlands would be enclosed within the rail loop. The wetland complex is supported by surface flow via a tributary to Colby Lake from off site to the north. Rail Line Alternative 1 would cross this tributary in two locations where culverts would be installed to maintain current flow volumes. Culverts would be installed in other locations throughout the rail loop to maintain hydrologic connectivity throughout the wetland.

Table 4.7-29. Wetland Fill (acres), Rail Alternative 1 (East Range Site)

Basin ID	Wetland Classification			Selected MnRAM Functions[1]		Permanent Impact Area
	Cowardin	Circular 39	Eggers and Reed	Vegetative Diversity	Wetland Water Quality	
C2	PFO2B	Type 8	Coniferous Bog	High	Moderate	0.91
C3	PFO2B	Type 7	Coniferous Swamp	High	Moderate	0.45
C4	PEMH	Type 4	Deep Marsh	High	Moderate	2.67
C6	PFO1B	Type 7	Hardwood Swamp	High	Moderate	0.44
C7	PSS1B	Type 6	Hardwood Swamp - Logged	High	Moderate	8.19
I	PSS1C	Type 6	Alder Thicket	Moderate	Moderate	0.67
J	PEMC	Type 2	Fresh Wet Meadow	Moderate	Moderate	0.05
					Total	**13.38**
Center Loop						**Isolated Wetlands**
C4/C7	PEMH/ PSS1B	Type 4/ Type 6	Deep Marsh/Hardwood Swamp Logged	High	Moderate	**51.26**

[1] Complete MnRAM 3.1 Functions and Values Assessment data can be found in Appendix F3.

The Rail Alternative 1 corridor would require crossing about 6 linear feet of streams and bodies of water. See Table 4.7-30. The tributary to Colby Lake that flows through Wetland C is crossed twice by the center loop.

Table 4.7-30. Water Crossings for Rail Alternative 1 (East Range Site)

Water Crossing Location	MNDNR PWI	Length of Crossing (linear feet)
Tributary to Colby Lake (North Crossing)	Yes	3
Tributary to Colby Lake (South Crossing)	Yes	3
	Total	**6**

Railroad Alternative 2 (Figure 4.7-2) would extend from existing CN track southwest of the East Range Site, unload coal at the Mesaba Generating Station, and exit the site to join existing CN track east of the site. This alternative would not include a rail loop. Construction of Rail Alternative 2 would require filling 18.34 acres of wetland as indicated in Figure 4.7-2.

Railroad Alternative 2 would cross two streams as listed in Table 4.7-31 encompassing about 6 linear feet of crossings.

Table 4.7-31. Water Crossings for Rail Alternative 2 (East Range Site)

Water Crossing Location	MNDNR PWI	Length of Crossing (linear feet)
Tributary to Colby Lake	Yes	3
Wyman Creek	Yes	3
	Total	**6**

Access Road Alignments (East Range Site)

The plan for the East Range Access Road in the Draft EIS consisted of a looped roadway with two access points onto CR 666. Construction of the north segment of the roadway would require filling of 1.93 acres of wetland. Because of concerns raised by the USACE and other agencies regarding the need to avoid and minimize impacts to wetland habitats, the northern segment of the

looped Access Road was eliminated. Excelsior's revised Access Road for the East Range Site would connect the plant footprint with CR 666 directly to the east of the East Range Site as described in Section 2.3.2.2. The revised Access Road would minimize wetland impacts by crossing at the most narrow location and by accessing CR 666 at a point where adjacent wetland habitat is minimal. Table 4.7-32 identifies wetland impacts from the revised Access Road alignment.

Table 4.7-32. Wetland Fill for Revised Access Road (East Range Site)

Basin ID	Wetland Classification			Selected MnRAM Functions[1]		Permanent Impact Area
	Cowardin	Circular 39	Eggers and Reed	Vegetative Diversity	Wetland Water Quality	
C6	PFO1B	Type 7	Hardwood Swamp	High	Moderate	0.39
D	PSS1B	Type 6	Alder Thicket	High	Moderate	0.05
					Total	**0.44**

[1] Complete MnRAM 3.1 Functions and Values Assessment data can be found in Appendix F3.

4.7.4.2 Impacts of Operation

The impacts to wetlands at the East Range Site would be the same as those presented as common operational impacts in Section 4.7.2.2.

4.7.5 Impacts of the No Action Alternative

For the purposes of this EIS, as explained in Section 2.1.1.2, the DOE No Action Alternative is assumed equivalent to a "No Build" Alternative. Under the No Action Alternative, there would be no changes to water resources in the project area and the wetlands would continue to function in their current form.

4.7.6 Summary of Impacts

Table 4.7-33 (new in the Final EIS) summarizes both temporary and permanent wetland impacts for the Mesaba Generating Station Footprint and Buffer Land, HVTL and pipeline corridors, rail and access road alignments at the West Range Site. The table compares the impacts of these features based on the preferred sites and alignments in the Draft EIS with the preferred sites and alignments in the Final EIS for the West Range Site. The avoidance and minimization efforts described in Appendix F2 eliminated the potential for indirect wetland impacts, reduced the temporary and permanent type-conversion impacts, and reduced the wetlands to be filled by nearly 20 acres.

Table 4.7-33. Summary Comparison of Wetland Impacts (acres), West Range Site and Corridors

Project Component[1]	Permanent Impacts						Temporary Impacts		
	Indirect	Type Conversion			Fill	Total Direct (Fill + Type Conversion)	Emer-gent	Shrub -scrub	Total
		Shrub Scrub to Emergent	Forested to Emergent	Total					
Plant Footprint	—	—	—	—	—	—	—	—	—
Draft EIS	7.3	—	—	—	34.58	34.58	—	—	—
Final EIS	—	—	—	—	31.36	31.36	—	—	—
Rail Line	—	—	—	—	—	—	—	—	—
Draft EIS	58.3	—	—	—	17.93	17.93	—	—	—
Final EIS	—	—	—	—	5.73	5.73	—	—	—
Access Road	—	—	—	—	—	—	—	—	—
Draft EIS	—	—	1.07	1.07	5.67	6.74	—	—	—
Final EIS	—	—	—	—	0.19	0.19	0.08	0.13	0.21
HVTLs	—	—	36.16	36.16	0.01	36.17	—	2.33	2.33
Natural Gas	—	4.50	11.88	16.38	—	16.38	3.90	0.84	4.74
Process Water	—	1.35	3.12	4.47	—	4.47	1.26	1.33	2.59
Blowdown	—	—	—	—	—	—	—	—	—
Draft EIS	—	2.95	0.09	3.04	—	3.04	—	1.57	1.57
Final EIS	—	—	—	—	—	—	—	—	—
Water/Sewer	—	—	—	—	—	—	—	—	—
TOTAL									
Draft EIS	**65.6**	**8.80**	**52.32**	**61.12**	**58.19**	**119.31**	**5.16**	**6.07**	**11.23**
Final EIS	**0.0**	**5.85**	**51.16**	**57.01**	**37.29**	**94.30**	**5.24**	**4.63**	**9.87**

[1] Same configuration in Draft EIS and Final EIS unless listed separately.

Table 4.7-34 (new in the Final EIS) summarizes both temporary and permanent wetland impacts for the Mesaba Generating Station Footprint and Buffer Land, HVTL and pipeline corridors, rail and access road alignments at the East Range Site. The table compares the impacts of these features based on the preferred alternative sites and alignments in the Draft EIS with the preferred alternative sites and alignments in the Final EIS for the East Range Site. The avoidance and minimization process described in Appendix F2 slightly reduced the temporary type-conversion impacts and the wetlands to be filled. The reductions achieved at the East Range were less than those at the West Range because the mining and wetlands constraints dramatically reduced the design options.

Table 4.7-34. Summary Comparison of Wetland Impacts (acres), East Range Site and Corridors

Project Component[1]	Permanent Impacts						Temporary Impacts		
	Indirect	Type Conversion			Fill	Total Direct (Fill + Type Conversion)	Emer-gent	Shrub -scrub	Total
		Shrub Scrub to Emergent	Forested to Emergent	Total					
Plant Footprint	—	—	—	—	17.15	17.15	—	—	—
Rail Line	51.26	—	—	—	13.38	13.38	—	—	—
Road Access	—	—	—	—	—	—	—	—	—
Draft EIS	—	—	1.81	1.81	3.23	5.04	—	0.49	0.49
Final EIS	—	—	—	—	0.44	0.44	—	—	—
HVTL	—	19.21	40.41	59.62	0.09	59.71	—	0.20	0.20
Natural Gas	—	—	0.47	0.47	—	0.47	23.99	0.33	24.32
Process Water	—	0.26	1.07	1.33	—	1.33	0.79	0.19	0.98
Water/ Sewer	—	—	—	—	—	0.0	—	—	0.0
TOTAL									
Draft EIS	**51.26**	**19.47**	**43.76**	**63.23**	**33.85**	**97.08**	**24.78**	**1.21**	**25.99**
Final EIS	**51.26**	**19.47**	**41.95**	**61.42**	**31.06**	**92.48**	**24.78**	**1.01**	**25.50**

[1] Same configuration in Draft EIS and Final EIS unless listed separately.

4.7.7 Wetland Permitting and Mitigation Issues

4.7.7.1 Regulatory and Policy Considerations

Under Minnesota law and through a memorandum of understanding between the Minnesota Board of Water and Soil Resources and the USACE – St. Paul District, wetland impacts are generally evaluated based on acreage impacted and wetland function. For isolated versus non-isolated wetlands, the **state's WCA** makes no distinction in how these two types of wetlands are regulated. Therefore, isolated and non-isolated wetlands would be mitigated at the same thresholds.

Special or protected wetlands as discussed above are not known to occur within the West Range Site or the East Range Site IGCC Station Footprint and Buffer Land or utility and transportation corridors. However, areas of tamarack and spruce bogs are located within the facility site and the utility and transportation corridors (Excelsior, 2006b). USACE regulatory staff evaluates wetland loss by function, and therefore give much attention to wetland impacts by type. Wetland mitigation ratios often vary by wetland type affected, particularly for losses of forested wetland that require decades to establish. A more detailed analysis of wetland loss by function and actual mitigation ratios would be determined later in the permitting processes**, as discussed further in Appendix F2**.

The Proposed Action would be designed to minimize impacts to wetlands wherever feasible, including the placement of the facility footprint at the West Range Site or the East Range Site and routing infrastructure to avoid wetland areas. Placement of the HVTL towers would be selected to minimize placement within wetlands. Pipelines would be buried and would be directionally drilled under wetlands, whenever feasible, to avoid impacts (Excelsior, 2006b).

Many potential wetland impacts would be temporary (impacted during construction only) and these areas would be restored as quickly as possible following construction activities. USACE may require mitigation for temporary impacts.

Mitigation of wetland impacts would **follow** the **"watershed approach" that may include on-site compensatory mitigation, off-site compensatory mitigation (including mitigation banks), or a combination** of **on-site and off-site** replacement (see Appendix F2 for additional discussion). Wetland mitigation would follow **the** USACE **St. Paul District Compensatory Mitigation Policy for Minnesota**

and Replacement Plan requirements set forth in the WCA. No specific plans for wetland mitigation have been proposed by the project proponent at this point in time. Detailed mitigation plans would be created during the wetland permitting process following site selection under the guidance of respective regulatory entities. The application would be submitted with the Combined Wetland Permit Application and would include any design details on wetland replacement sites, wetland banks, and/or sources of wetland credit for the project. Mitigation requirements would be determined during the wetland-permitting phase of the project (Excelsior, 2006b).

In accordance with USACE wetland mitigation policy **and WCA wetland replacement standards**, wetland replacement options would be explored in the following sequence**, following the watershed approach**:

- Step 1: Project-specific wetland replacement options (on-site **and in-kind**) would be investigated first. If no project-specific wetland replacement opportunities exist or additional mitigation credit is required, Step 2 would be followed.
- Step 2: Potential wetland replacement opportunities within the watershed where the project is located would be investigated. If no opportunities are available or additional wetland mitigation credit is required, Step 3 would be followed.
- Step 3: Potential wetland replacement opportunities **would be identified within regions of the state where 80 percent or more of the pre-settlement wetlands exist. If no wetland replacement opportunities exist or additional mitigation credit is required, Step 4 would be followed**.
- **Step 4: Potential wetland replacement opportunities statewide would be identified.**

When replacement is by wetland banking, special rules apply with regard to location of replacement within the bank service area or adjacent bank service area.

The Basic Wetland Replacement Ratios under the USACE Mitigation Policy for Minnesota and WCA Rules are 1.5:1 for the greater than 80 percent area of Minnesota. The replacement ratio would never be greater than 1.5:1, but could be modified at most by 0.5:1 through implementation of at least two of the following three criteria: 1) in-advance, 2) in-place, or 3) in-kind. If only one measure were to be implemented the replacement ratio would be 1.25:1.

Under current WCA Exempt Rules, two forms of wetland replacement credit **may be used** in Minnesota: New Wetland Credit and Public Value Credit. New Wetland Credit can be used for any portion of wetland replacement. Public Value Credit means wetland replacement credit that can only be used for the portion of wetland replacement required above a 1:1 ratio. The USACE also recognizes these wetland credit types for Minnesota projects through a Memorandum of Understanding with the **Minnesota Board of Water and Soil Resources, but may accept Public Value Credit in the form of upland buffer at a lesser replacement ratio value**. Wetland replacement would likely include a combination of both New Wetland Credit and Public Value Credit to meet all replacement requirements of WCA and the USACE. As described above, it is anticipated that the **base ratio for replacement for both the** USACE **and WCA** would require wetland replacement at a ratio of 1.5:1 (Excelsior, 2006b).

Establishing **wetland credit** for mitigation is determined based on the type of wetland replacement used to mitigate impacts. Wetland replacement is generally in the form of restoration or creation. Restoration involves the functional improvement of a previously drained or impacted wetland. In comparison, wetland creation involves modification of a non-wetland area to establish newly formed wetlands. Wetland restoration is preferred and encouraged **over wetland creation** in **both** the WCA rules and USACE guidance and policies. Generally, 1 acre of **wetland credit** is valued equally to every 1 acre of impacted wetland, and **upland buffer** is valued at **0.25-**0.5 acre for every 1 acre of impacted wetland**, depending on the buffer's quality, quantity, and relative value to the surrounding wetland**. For these reasons, the value of **replacement credits, whether in the form of newly created or restored**

wetland, adjacent upland buffer, or utilization of New Wetland Credit and/or Public Value Credit from an approved wetland bank would need to be negotiated between the USACE**, Minnesota Board of Water and Soil Resources, and local government unit (LGU) administering the WCA** to determine what is appropriate for mitigation on the selected site and its utility and transportation corridors (Excelsior, 2006b).

No wetland replacement site-specific design details have been **finalized to date. However, potential wetland replacement projects have been identified and are under evaluation. The expectation is that final selection of such projects will be confirmed in Excelsior's applications for permits to be issued individually by the USACE and the LGU administering WCA. Initiation of replacement projects is expected to begin sometime after the Minnesota Public Utilities Commission issues Site and Route Permits for the Project. Proposed wetland replacement projects** would be designed to replace the wetland types, functions, and values to the greatest extent feasible. If additional wetland replacement credit is needed off site, the above-described regulatory-based processes and requirements would be followed (Excelsior, 2006b).

4.7.7.2 Contacts with Agencies

The project proponent has initiated consultation with USACE with respect to the consideration of wetlands in the screening of alternative sites for the Mesaba Energy Project, including the submission of **pre-application materials required to address USACE's questions, comments, and concerns arising as part of their participation as a Cooperating Agency in preparation of this EIS (e.g.,** Appendix F1) **under the State's Power Plant Siting Act process. Formal** agency consultation associated **with submission of a** Combined Wetland Permit Application and Replacement Plan **would begin after the USACE confirms that the Project represents the least environmentally damaging practicable alternative. This determination is expected to be made based on information to be presented in the Final EIS. A** Combined Wetland Permit Application and Replacement Plan would be prepared and submitted to the following agencies:

- USACE – Section 404 Clean Water Act wetland dredge-and-fill activities permit.
- MPCA – Section 401 Clean Water Act water quality certification.
- MNDNR – Public Waters work permit **(Division of Waters)**.
- Itasca County Soil and Water Conservation District –WCA approval (West Range Site and Associated Corridors).
- St. Louis County, Minnesota – WCA approval (East Range Site and associated corridors not within the city limits of Hoyt Lakes, Minnesota).
- City of Hoyt Lakes, Minnesota – WCA approval (Associated corridors for East Range Site within the city limits of Hoyt Lakes, Minnesota) (Excelsior, 2006b).

Designation of the LGU administering the WCA would be determined once the Minnesota Public Utilities Commission issues Site and Route Permits for the Project.

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4.8 BIOLOGICAL RESOURCES

4.8.1 Approach to Impacts Analysis

The following sections describe the approach that was employed to analyze the potential for impacts to biological resources resulting from the construction and operation of the Mesaba Energy Project.

4.8.1.1 Region of Influence

The region of influence for biological resources includes the alternative sites (West and East Range Sites) for the footprint of the Mesaba Generating Station and buffer land surrounding the plant. The region of influence also includes associated corridors and ROWs of the roads, rail lines, HVTLs, natural gas pipelines, process water lines, and cooling tower blowdown lines that would be necessary supporting structures for Mesaba Energy Project operations.

4.8.1.2 Method of Analysis

The evaluation of potential impacts on biological resources considered whether the Proposed Action or an alternative would cause, either directly or indirectly, the loss, displacement, isolation or alteration (irreparable or irreversible) of:

- Vegetation and/or wildlife;
- Aquatic communities;
- Aquatic and/or terrestrial habitat; or,
- Federally or state-listed protected species and habitat.

In response to Draft EIS comments by USACE and other agencies, the Final EIS was revised to address impacts to wildlife habitat based on the MNDNR ECS. Section 3.8 (Table 3.8-1) lists and describes the ECS categories included in the regions of influence for the West Range and East Range Sites and corridors along with the Species in Greatest Conservation Need (SGCN), as defined by the MNDNR, that typically utilize those habitat types.

4.8.2 Common Impacts of the Proposed Action

This section describes impacts to biological resources that would be common to the implementation of the Proposed Action at either site, based on the descriptions of biological resources provided in Section 3.8. Section 4.8.3 describes site-specific impacts. Impacts to wildlife and Federally listed, protected species resulting from the implementation of the Proposed Action would be considered common to both potential sites and their associated transportation and utility corridors. Therefore, impacts to wildlife and Federally protected species (not including State of Minnesota-listed, protected wildlife) are included in this section and are not addressed for site- and corridor-specific impacts (Section 4.8.3).

No MNDNR WMAs, SNAs, designated Game Lakes, or Designated Trout Streams are within or immediately adjacent to the West or East Range Sites.

4.8.2.1 Impacts of Construction

<u>Flora</u>

At either the West Range Site or the East Range Site, construction of the Mesaba Generating Station would cause loss of vegetation **for the power plant footprint and associated structures**. **Surrounding wooded vegetation would be preserved to the extent practicable to serve as buffer areas reducing visual and noise impacts of the power plant facilities.** Section 3.8.1 describes vegetation types that may be affected by construction at the West Range and East Range Sites and corridors.

Construction of the HVTLs and pipelines would result in permanent loss of forest resources and a temporary loss of grasslands. Forest areas within the disturbed utility ROWs would be converted to grasslands and any areas of existing grassland disturbed during construction would be restored and stabilized with native grasses. These grassy areas would experience periodic maintenance to control the growth of woody vegetation to ensure access and maintain the integrity of the utilities; therefore, the conversion of forest into grasslands would be permanent. Placement of underground pipelines would temporarily affect vegetation; however, these areas would be restored after construction.

Construction of railways and access roads at either the West Range Site or East Range Site would also result in the permanent loss of vegetation in areas falling within the footprint of the roads and rails. Forest areas would be converted into grasslands alongside the slopes and shoulders of these corridors.

Invasive species are species that have been introduced or moved by human activities to a location where they do not naturally occur and are termed “exotic,” “non-native,” “alien,” and “nonindigenous.” Oftentimes, these species become dominant in disturbed areas and outcompete native species, lower biological diversity, and alter ecosystem function. Earth disturbance associated with the removal of woody and herbaceous vegetation provides an opportunity for non-native or invasive plants to colonize disturbed areas. Invasive or non-native plants alter plant diversity and affect ecosystem function by displacing native flora. Native floral communities generally provide food, cover, or shelter for a wide variety of wildlife at different times of year. In contrast, non-native or invasive plant species typically alter wildlife habitat structure, forming monotypic vegetation communities by out-competing native plant species for resources such as water and light. Some invasive species also secrete toxic chemicals into the soil (allelopathy), which can prevent native plants from re-colonizing disturbed areas. The result could be creation of a structurally impaired, low quality habitat that benefits one or two faunal species instead of a highly diverse plant community benefiting a greater diversity of wildlife.

The potential for invasive species, primarily invasive plant species, would increase within the project area through construction and clearing activities. Natural areas around the power plant site as well as along utility corridors would be susceptible to invasive species introduction. Both the presence of vehicles and human traffic, which can inadvertently carry invasive plant seeds from other locations, would increase. Construction equipment could inadvertently carry invasive plant seeds into the area, and continued maintenance (i.e., vegetation clearing) along the utility ROWs would potentially allow for the spread and dominance of these species. Impacts to the overall ecosystems would be reduced, as these species would be located within lower quality habitat areas that would experience periodic human disturbance. Invasive species control measures, such as spraying and manual removal, could be implemented in areas dominated by invasive species to minimize impacts and prevent spreading.

Though no invasive or non-native species were noted in disturbed areas at the sites, the likelihood exists for invasive plant species to colonize and express dominance in areas disturbed by construction and maintenance activities. BMPs to stabilize the areas of ground disturbance, which would be required for erosion and sedimentation control described in Sections 4.4 and 4.5, along with the planting of native vegetation, would help avoid the establishment and dominance of invasive plant species in disturbed areas resulting from the Proposed Action.

Locations where temporary impacts to vegetation would occur would be restored following construction activities. In wetlands, excavated soils would be stockpiled and segregated from upland soils; then replaced in the opposite order from which they were excavated. This would insure replacement of subsurface soils at the appropriate lower depths and replacement of surface organic soils at the top, which would be more effective for wetland vegetation restoration. In upland areas, soil amelioration would be performed to alleviate compaction, which could include scarification, harrowing, disking, or other measures. Where possible, upland topsoil would be stockpiled and replaced in disturbed uplands. In some instances, additional clean, certified weed-

free topsoil may be required. Revegetation of wetland and upland habitats would be accomplished through reseeding with native grasses and forbs appropriate to the region and would follow standard practices acceptable to the local, state, and Federal agencies that authorize work within wetland and upland habitats. Following reseeding, these areas would be covered with weed-free certified mulch and, in upland habitats, would be covered with erosion control blankets/fabrics per site conditions.

Fauna and Habitat

In general, construction and operation of the Mesaba Generating Station and supporting infrastructures (i.e., HVTLs, gas and water pipelines, and transportation corridors) at either potential site could cause animal mortality and disrupt wildlife (mammals, birds, reptiles, and amphibians) movement through the West Range or East Range Sites. Section 3.8.1 describes wildlife species that may be affected by construction at the West Range and East Range Sites and corridors. Direct impacts on terrestrial habitats would not differ greatly between the West Range and East Range Sites.

Impacts to wildlife from the construction of the Mesaba Energy Project at either of the potential sites would occur due to vegetative clearing and habitat conversion resulting in permanent loss of potential habitat for mammals, birds, amphibians, and reptiles that either inhabit one of the sites or use a site transiently for food and shelter. Habitat loss and habitat degradation are influencing factors that contribute to the decline of wildlife species (MNDNR, 2007). Consequently, wildlife using the natural resources within the region of influence for the Mesaba Generating Station may be adversely affected. **Individual animals would be forced either to find suitable available habitat from relatively large amounts of comparable habitat in the area or to perish. As birds are more mobile than terrestrial species, they would be better equipped for relocating.**

The construction of the Mesaba Generating Station would cause the elimination of a small fraction of the total habitat near either the West Range Site or the East Range Site. **Therefore, these losses would not be expected to cause population-level adverse effects.** The potential impacts on wildlife travel corridors have been evaluated in a cumulative impacts analysis in Section 5.2.6 that takes into consideration the effects of the Mesaba Energy Project in conjunction with other potential projects in the Iron Range area. **Based on the cumulative impacts analysis, the loss of total existing habitat in the West Range and East Range from the Mesaba Energy Project would be 0.2 percent and 0.5 percent, respectively, within the study areas for the analysis.**

Noise from construction may disturb animals or displace them to less favorable habitat; however, wildlife responses to noise may be species-specific, and could result in either avoidance or habituation. Avoidance could cause species to underuse high-quality habitat near disturbance areas, resulting in decreased fecundity and survival. Noise impacts due to construction would be temporary and localized in nature.

Certain species with limited range or mobility such as small rodents, reptiles, and amphibians would be more susceptible to construction impacts than mobile, larger-ranging wildlife. Mortality of these species would most likely occur during grading and clearing activities. Other species, including birds and mammals, would be more susceptible if impacts occurred during the nesting/rearing season when nests and nurseries of various species may be destroyed during clearing and grading activities. Coordination with the MNDNR would determine the best time period to conduct grading or clearing activities.

Clearing of forest areas related to the power plant and transmission corridors may benefit some wildlife species such as deer, which use the transition zones between differing vegetative cover types for foraging or migration corridors. However, wildlife habitat fragmentation and the creation of the edge effect would increase predatory and parasitic prospects for a variety of opportunistic wildlife species. For example, small mammals (i.e., raccoon [*Procyon lotor*]) would exploit the newly created environment to satisfy their dietary needs by preying on avifauna **and herpetofauna** nest eggs. Similarly, parasitic avifauna, such as the cowbird (*Molothrus ater*) or swallows (*Tachycineta* spp.), can affect a brood of fledgling birds. Parasitic birds lay their eggs in the nests of other bird species and leave the chick-rearing responsibility to other parents. The parasitic chick out-competes the host chicks for food, and in some cases, the parasitic chick may eliminate its competition by pushing the host chick out of the nest.

Predation of ground-nesting birds would increase along the newly cleared utility corridors primarily due to the increased presence of edge species such as raccoons. However, the overall amount of forest edge created and the vast amount of interior forest habitat would not create a noticeable decline in these bird populations. Studies have shown that nesting success rates of ground-nesting birds increase within 328 feet of the forest edge. In addition, studies have shown that predation due to edge effect is lower in forested dominated landscapes compared to agricultural dominated landscapes, as factors such as brood parasitism by brown-headed cowbirds is lessened (Manolis et al., 2002).

More generally, habitat fragmentation may inhibit gene flow between groups of individuals within a population due to geographic isolation. Although road and utility corridors do not necessarily create impassable barriers to wildlife movement, from a behavioral perspective, some species may not cross a location because the area was disturbed, habitat was altered, etc. This can ultimately result in a diminishing of genetic diversity and amplification of inbreeding within populations that become geographically isolated, which may result in the accumulation of deleterious genetic traits that can reduce individuals' ability to survive and reproduce. In addition, habitat fragmentation reduces the overall size of accessible habitat to a population, which may result in the area no longer being viable to support that population at its existing size (e.g., food resources could become too limited). In some instances, fragmented habitats may not be able to support any individuals of a particular species at all, considering some species require certain amounts of contiguous habitat to perform necessary survival functions (e.g., foraging and breeding) (EPA, 1994b).

Seeding the transmission or utility corridors with an appropriate seed mixture could benefit an assortment of wildlife species that thrive within a forest edge. Additionally, the grassy areas created by the transmission corridors would provide nesting habitat for a variety of grassland dependant avifauna.

Wetland habitat conversions on the respective site and corridors would occur as described in Section 4.7. Forested wetland areas would be maintained as herbaceous or shrub dominated communities, which in turn would affect migratory birds as well as amphibians that utilize the area for reproduction.

Impacts to game species, such as moose, deer, and grouse would be expected to be similar between the two site alternatives. These species may encounter some mortality during site preparation activities; however, these species are highly mobile making them some of the least susceptible in terms of collisions with vehicles and equipment. The primary impact to game species would be in the form of lost habitat; however, as previously stated, these are highly mobile species that would be expected to move to habitats adjacent to locations that would be affected by the Proposed Action. Also, as previously stated, forest clearing for utility ROWs would create open areas that could be utilized by larger game species as movement corridors, which could be a benefit during foraging activities. Therefore, impacts to game species would be expected to be small considering that there is ample habitat for these species surrounding the potential site locations.

The MNDNR NHIS database shows no bald eagle nesting areas within the West Range Site or the East Range Site or within a 2-mile radius of each site's boundary. The MNDNR NHIS database does show five bald eagle nesting areas within a 1-mile radius of the various transportation and utility corridors associated with the East Range Site. Though the bald eagle has been delisted under the Federal Endangered Species Act, the eagles are still regulated by the USFWS and are still listed as species of special concern by the MNDNR. The USFWS and the MNDNR are cooperating to monitor and protect this species in Minnesota. The USFWS bald eagle protection measures include buffer zones and construction/activity limitations within these zones that are applicable during the nesting season to protect the nest trees from destruction. In addition, bald eagle nests are dynamic and can change geographically through time, resulting in the continuous updating of nest location data by the USFWS and MNDNR. In a letter dated March 6, 2007 (Appendix E), the USFWS agreed to consult with DOE on the West Range Site and concurred with DOE's determination that the Proposed Action would not likely adversely affect the bald eagle. In addition to complying with the protection measures, ongoing coordination with these agencies would be performed to receive updated information on new bald eagle nesting locations prior to construction.

Aquatic Communities

The water crossings that would occur under the various alternative utility and rail alignments, as described in Section 4.7, can generally be broken down into two categories: small perennial streams and lakes. None of the water bodies proposed to be crossed is designated as a trout stream or would be considered a cold-water stream, although it is possible that trout are occasionally present in some of the area waterways not designated. Section 3.8.2 describes aquatic communities in the West Range and East Range.

The crossing of streams for construction of rail lines could directly affect fisheries and aquatic life. Fish mortality may occur by temporary alteration of fish passage, causing incidental mortality. Fisheries and aquatic life may also be affected through habitat fragmentation and conversion. Uncontrolled sedimentation could enter the streams causing increased turbidity and biochemical oxygen demand and armoring the substrate of the stream channels. Armoring of the stream channels could affect the benthic community and the aquatic fauna that are dependent on macroinvertebrates as a food source. The removal of the riparian vegetation could also result in a temporary loss of habitat and shading, thereby resulting in increased water temperatures.

Water crossing impacts would be temporary for utility installations. Directional drilling is the preferred means, because it would avoid or minimize impacts to aquatic resources, and it could be used for short crossings lacking bedrock. In the event that directional drilling is not feasible, an open cut trench would be used, which would result in temporary impacts to aquatic communities. Potential impacts from open cut trenching could include a temporary increase in sedimentation of the water column, a short-term increase in the biochemical oxygen demand, armoring of the stream substrate that would affect the macroinvertebrate community, and an increase in water temperatures due to the loss of shading provided by riparian vegetation. This means of construction could be timed to coincide with low water levels, and accomplished using cofferdams, bypass flumes, diversionary channels, or other short-term methods of allowing work to be done in a dry channel. These measures would allow minimally invasive construction to be used depending on the type of crossing needed. It is assumed that fish species would temporarily relocate in open-trenched areas during construction. State in-stream construction restrictions would help reduce impacts to these species.

Construction would comply with all applicable state regulations pertaining to construction in surface waters. Guidance published by the USFWS, USACE, FERC, and MNDNR would be consulted and evaluated once final alignments have been determined. The cross sections and contours of the waters would be restored to their original grade and vegetated after construction to ensure continued water flow, habitat re-establishment, and adequate faunal movement, as required by applicable regulations and standards. **Therefore, construction would cause some temporary impacts to fisheries and other aquatic biota primarily from disruptions in water levels and increased sedimentation; however, these impacts would be construction-related and would not be permanent.**

Protected Species

There are no Federally listed plant species identified by the USFWS within either of the sites or any of the proposed utility or transportation corridors. Therefore, no adverse effects would be expected for any Federally protected plant species due to the implementation of the Proposed Action at either of the alternative sites.

As discussed in Section 3.8.3.1, both the West and East Range Sites and their associated utility and transportation corridors have potential habitat for and are within the distributional range of the Canada lynx (*Lynx canadensis*) **and the gray wolf (*Canis lupus*) both Federally listed as threatened**.

Preliminary discussions between DOE and USFWS on listed species began in September 2005, and subsequent discussions have been held. DOE initiated formal consultation with USFWS in accordance with Section 7 of the Federal Endangered Species Act in a letter dated December 18, 2006 (Appendix E), which requested a biological opinion regarding potential impacts and mitigation for listed species on both sites. In a letter dated March 6, 2007 (Appendix E), the USFWS agreed to consult with DOE on the West Range Site. USFWS concurred with DOE's determination that the Proposed Action may affect the Canada lynx and expressed concerns that the vulnerability of lynx to vehicle collisions when crossing roads would be the most pressing challenge. USFWS stated that activities resulting in new roads, new road alignments, widened ROWs, or increased vehicle speeds in habitat occupied by the Canada lynx might affect this species.

Since Canada lynx **and gray wolf are** highly mobile, the direct take (loss of a species, or significant habitat modification or degradation that results in the loss of a species by significantly impairing essential behavioral patterns) due to construction activities would not be likely if clearing and grading activities are restricted during breeding times. Harassment of this species would likely occur within the project area through permanent loss of habitat and temporary noise disruption from construction. The potential for impacts to occur to Canada lynx would be greater at the East Range Site as compared to the West Range Site because, based on the distribution of verified lynx records since 2000 (Sullins, 2007), the East Range Site is well within the range of the lynx while the West Range Site is located toward the southwest periphery of the lynx's range.

On August 15, 2008, DOE submitted a BA for the Canada lynx and a determination that the proposed action may affect, but is unlikely to adversely affect, Canada lynx or their critical habitat. In subsequent discussions, the USFWS requested that, due to uncertainty over the listing of the gray wolf, the BA be revised to include potential effects on the gray wolf. On February 25, 2009, DOE submitted the revised BA addressing impacts to both the Canada lynx and the gray wolf. As stated in this version of the BA (ENSR, 2009) (see Appendix E), "impacts associated with project habitat loss and disturbance, and collisions with vehicles and trains, could impact lynx and gray wolf. Using worst case assumptions, 618 acres of wildlife habitat would be lost within the West Range Site and associated utility and transportation corridors; 929 acres of habitat would be lost within the East Range Site and its associated corridors. Noise, light, and glare from the generating facility could cause lynx and wolves to avoid either area. Lynx and gray wolf could be hit by vehicles or trains. Other potential impacts include human encroachment in the backcountry, and increased interspecific competition facilitated by snow compaction." However, the BA concluded that given the large amount of similar habitat in the region and the low predicted density of Canada lynx and gray wolf in the area, these species and their critical habitat may be affected, but are unlikely to be adversely affected by the Mesaba Energy Project. In a letter sent on May 1, 2009, the USFWS concurred with DOE's conclusion that the proposed action may affect, but is unlikely to adversely affect, Canada lynx, gray wolf or their critical habitat at the West Range Site (Appendix E). In the event that the East Range Site were selected for the Proposed Action, DOE would reopen consultation under Section 7 of the Endangered Species Act and resubmit the BA for USFWS review and concurrence at the East Range Site.

There are no MNDNR NHIS rare, threatened, or endangered animal species known to exist at either the West Range or East Range Sites. Sections 4.8.3 and 4.8.4 discuss Minnesota protected plant species and potential habitats, which potentially occur at respective sites.

4.8.2.2 Impacts of Operation

The impacts of Mesaba Generating Station operations on biological resources would be comparable for either site. Therefore, the descriptions of impacts for the West Range and East Range below focus primarily on construction-related impacts to the sites and corridors.

Once operational, the Mesaba Generating Station at either alternative site would require maintenance of landscaping; however, no additional direct impacts to vegetation would be expected following construction. An indirect impact from both the introduction of access roads and railways and increased traffic would include the potential for increased stress to vegetation from particulate matter and dust**, which could injure leaves, stems, and roots and increase vulnerability to diseases or insects (Delphi, 2004)**. Salt or deicers used on roads may cause additional stress to vegetation during the winter season.

The siting of the Mesaba Generating Station would cause the elimination of a small fraction of the total habitat in the areas of the West Range Site or the East Range Site; though similar habitat types are common in the region **(see Section 5.2.6)**. Impacts to wildlife from the operation of the Mesaba Generating Station at either of the potential sites would occur due to the placement of security fences and other barriers that would particularly affect the movement of larger animals in wildlife travel corridors. The potential impacts on wildlife travel corridors were evaluated in a cumulative impacts analysis in Section 5.2.6 that takes into consideration the effects of the Mesaba Energy Project in conjunction with other potential projects in the Iron Range area. Road and rail traffic near either site would increase during operation of the Mesaba Generating Station as described in Section 4.15, which would potentially result in increased collisions involving wildlife. This effect would be of particular concern with respect to Federally listed species as described further below.

Bird and bat mortality from collisions with exhaust stacks, transmission lines, and towers would be expected to occur, though this would not likely have a significant impact on bird populations within or migrating through the area. Collisions would typically peak seasonally during the spring and fall migrations and during night time hours. See Appendix D5 for further information.

The operation of the proposed Mesaba Generating Station at either location would have minimal impact on aquatic species and their prey caused by the bioaccumulation of heavy metals. The concentration of mercury in air emissions would be lower than background concentrations and would not be expected to directly increase the potential for bioaccumulation of mercury in fish or other aquatic species present in receiving waters (see also Sections 4.3, Air Quality, and 4.17, Safety and Health). **In general, mercury exposure can cause negative impacts to terrestrial and avian wildlife species including adverse effects to neurological, endocrine, and reproductive processes. There are two major guilds of wildlife that have the potential to act as a baseline for bioaccumulation: fish and insects. Therefore, species that prey on fish or insects have the potential to be affected as well (Colman, 2007).**

With the proposed use of an enhanced ZLD system at either plant site, as well as the collection and reuse of stormwater runoff, the Mesaba Generating Station would not discharge any process effluents or cooling tower blowdown to surface water bodies. However, large quantity water withdrawals for plant process and cooling water requirements could alter lake or stream temperatures and reduce the quality and quantity of aquatic habitat. Refer to Section 4.5, Water Resources, for surface water withdrawal predictions. Consequently, withdrawals could affect the lake or stream's ability to support certain types of fish, potentially leading to a decline in biodiversity in source waters for the project. Significant water level reductions could interfere with lake trout natural reproduction in the CMP (for the West Range Site), as this species deposits eggs

in the fall on boulder or cobble habitats in depths usually less than 40 feet and incubation lasts 4 to 6 months after spawning (Snyder and Oswald, 2005). Potentially affected fisheries would be the CMP and Prairie River on the West Range and Colby Lake and White Water Reservoir on the East Range. Withdrawals from the Prairie River may not be necessary and would be less than the state limit of 25 percent of 7Q10 flows, which is set to protect the river from excessive withdrawals. For the CMP, water level fluctuations are the only potential impact on fisheries.

For the East Range, fluctuations in the mining pits could be extreme, but such pits are privately owned, inaccessible to the public except through illegal trespass, and are neither protected waters nor established fisheries. Water levels in Colby Lake and White Water Reservoir would be controlled by the MNDNR to protect Hoyt Lake's potable water supply and local landowners' property interests, respectively. As part of the water appropriation permit process, the project proponent would be required to provide further hydrologic modeling to ensure that the Mesaba Generating Station would not result in any significant adverse impacts to regional water resources at the East Range Site.

As described in Section 4.5, Water Resources, the intake structures for process water pumping stations at the various mine pits would be designed to prevent the entrainment of fish species, which would preclude the transfer of live fish between surface waters. This situation is of particular concern for the West Range Site, because the CMP has a non-native population of rainbow smelt (see Section 3.8.2) that the USFWS and MNDNR do not want introduced into other local surface waters. **Water intake flow velocities would be less than 0.5 feet per second, as required by applicable regulations to minimize the potential for the entrainment of aquatic species within the structures (Barr, 2008).**

The greater challenge to listed species, as stated by USFWS in its letter of March 6, 2007, is the vulnerability of the Canada lynx to vehicle collisions when crossing roads. Therefore, the realignment of CR 7 for the West Range Site, which is a separate but connected action under consideration by Itasca County, could potentially affect this species by creating a new road with a new alignment, widened ROW, and potentially increased vehicle speeds in habitat occupied by the lynx. **However, as stated in Section 2.3.1.2, Itasca County has deferred its proposed project to realign CR 7 due to changes in state funding priorities.** These potential impacts will be addressed in the biological opinion to be prepared by USFWS. Other potential impacts from project operations on the lynx would be comparable to the impacts on fauna as described above. Also, this species may be affected by permanent noise disruption from facility and rail operations.

4.8.3 Impacts on West Range Site and Corridors

The construction-related impacts of the Mesaba Generating Station on the West Range Site and corridors are described in this section. The impacts of operations on biological resources would be comparable for either site and have been described in Section 4.8.2.2 unless otherwise appropriate. **This section as published in the Draft EIS was revised to address impacts to wildlife habitat based on the ECS habitat types in response to comments and requests by USACE and MNDNR. Therefore, tables that were included in the Draft EIS listing affected acreages by respective land cover were eliminated and replaced with tables based on the ECS System categories.**

During construction for the Phase I power plant, the Phase II footprint would be prepared and used as a staging and laydown area for stockpiling of materials and storage of equipment as well as for a concrete batch plant. Therefore, much of the footprint would be cleared during Phase I construction with the exception of wetlands and sensitive areas that would be avoided. For Phase II construction, Excelsior would establish off-site construction staging and laydown areas on 85 acres of land selected from among four potential sites as described in Chapter 2 (see Sections 2.2.4.1 and 2.3.1.1). All of the sites are located on lands that have been disturbed or cleared during prior uses by mineral extraction companies, and all have access to local roadways. Excelsior would select appropriate sites for the necessary acreage prior to construction of Phase II taking into

consideration potential effects on biological resources. Following completion of Phase II construction, sites used for staging and laydown would be restored to pre-existing conditions.

4.8.3.1 West Range Site and Power Plant Footprint

See Figure 2.3-1 in Section 2.3.1, which shows the West Range Site and plant footprint.

Vegetation and Habitat

A description of vegetation types found at the West Range Site is included in Section 3.8.1.1. **Because of concerns raised by the USACE and other agencies, regarding the need to avoid and minimize impacts to wetland habitats the footprint for the proposed IGCC power plant was shifted to the northwest as described in Section 2.3.1. This move would result in deciduous** forest **incurring** the highest acreage of impact from the construction of the Mesaba Generating Station at the West Range Site.

The impacts of construction on vegetation at the West Range Site generally would be as described in Section 4.8.2.1. Though the construction of the Mesaba Generating Station at the West Range Site would require a relatively large amount of vegetation clearing, resulting in habitat loss and fragmentation, these resources are common in the region, and the construction of the Mesaba Generating Station at the West Range Site would degrade only a small fraction of the total amount of these plant communities in the area **(see Section 5.2.6)**. The potential introduction of non-native or invasive flora would be minimized as described for common impacts in Section 4.8.2.

Section 3.8.1.1 describes wildlife species likely to inhabit the West Range Site. Habitat loss and habitat degradation are influencing factors that contribute to the decline of wildlife species (MNDNR, 2007). Consequently, wildlife using the natural resources within the region of influence for the Mesaba Generating Station may be adversely affected. However, comparable habitat types are common in the region, and the placement of the Mesaba Generating Station would cause the elimination of a small fraction of the total habitat near the West Range Site. Refer also to the discussion of cumulative impacts on wildlife habitat in Section 5.2.6.

Table 4.8-1 (added for the Final EIS) provides a summary of impacts to vegetation and wildlife habitats by ECS category. Section 4.8.2.1 generally describes impacts to wildlife. Table 3.8-1 (Chapter 3) lists the SGCN species, as defined by the MNDNR, that typically utilize the habitat types identified in Table 4.8-1. The plant site would convert existing wildlife habitat into industrial land use. The main habitat type that would be affected is northern mesic hardwood forest, which would experience over 150 acres of direct habitat loss as well as fragmentation for construction of Phases I and II. The impacts that would result from the original plant footprint are shown for comparison. The shifted plant footprint would affect slightly more forest, but less wetland cover. The difference in total footprint cover is attributed to grading outside the limits of the IGCC Power plant facility and equipment.

Table 4.8-1. Vegetation and Habitat Impacts (acres), Mesaba IGCC Power Plant Footprint (West Range Site)

ECS Codes[1]	West Range Site (acres)	Shifted Plant Footprint[2] Impacts (acres)			Original Plant Footprint[2] Impacts (acres)		
		Phase I	Phase II	Total	Phase I	Phase II	Total
AFXXXX - Aspen Forest[1]	185.4	-0.5	-7.1	-7.6	-1.8	—	-1.8
MHn35 - Northern Mesic Hardwood Forest	682.4	-84.2	-66.6	-150.8	-83.1	-64.4	-147.5
MHn44 - Northern Wet-Mesic Boreal Hardwood-Conifer Forest	468.9	-12.3	—	-12.3	—	-18.4	-18.4
MRn83 - Northern Mixed Cattail Marsh	12.6	—	-0.5	-0.5	-0.2	—	-0.2
WFn55 - Northern Wet Ash Swamp	209.7	-6.1	-17.2	-23.3	-19.5	-2.1	-21.6
WMn82 - Northern Wet Meadow/Carr	79.2	-7.5	—	-7.6	-1.2	-11.6	-12.7
APn80 – Northern Spruce Bog	4.0	—	—	—	—	—	—
APn90 – Northern Open Bog	0.4	—	—	—	—	—	—
FPn73 – Northern Rich Alder Swamp	34.0	—	—	—	—	—	—
Fpn82 – Northern Rich Tamarack Swamp	0.2	—	—	—	—	—	—
LKi54 – Inland Lake Clay/Mud Shore	0.6	—	—	—	—	—	—
OW – Other Water Body	0.1	—	—	—	—	—	—
XDXXPF – Old Field[1]	31.2	—	—	—	—	—	—
Total	**1708.4**	**-110.6**	**-91.5**	**-202.1**	**-105.8**	**-96.5**	**-202.3**

[1] Codes were created for habitats not included in ECS classification system.
[2] Phase I and Phase II are reversed between Original and Shifted Plant Footprints.
Note: Negative values indicate a loss of habitat.

Aquatic Communities

No direct impacts to aquatic species would occur from construction of the Mesaba Generating Station at the West Range Site. Section 4.8.2.2 describes the impacts of plant operations on aquatic communities. Section 4.8.3.2 discusses potential impacts that may result from the construction and operation of supporting infrastructure (e.g., natural gas pipelines, process water pipelines).

Protected Species

As described in Section 4.8.2.1, potential adverse impacts on Canada lynx and gray wolf would not be expected (see BA in Appendix E).

As discussed in Section 3.8.3.2, no MNDNR NHIS threatened, endangered or other species of concern inhabit or occur within the West Range Site. There are eight plant species (17 occurrences) of state-listed rare or protected plant species identified by the MNDNR NHIS within the Nashwauk, Taconite, and Bovey areas near the site (see Section 3.8). One plant species, moonwort (*Botrychium* sp.), is listed as occurring within a 1-mile radius of the West Range Site boundary. This species is located off site southeast of the West Range Site.

Records for the state-listed endangered orchid species, *Platanthera flava* var. *herbiola* (tubercled-rein orchid), indicate that the orchid can colonize in disturbed mine spoil areas **(it is not fully understood how this species was recruited into these highly disturbed areas)**. Typical habitat for this species occurs in wet meadow habitats dominated by native graminoids and sedges, which are present within the West Range Site boundary. Due to the rarity of tubercled-rein orchid in the state, the probability is low for encountering this species in wet meadow habitat within the West Range Site; however, it is not without possibility.

Two plant species records from the NHIS database in areas other than disturbed mine refuse areas, include the leafless water milfoil (*Myriophyllum tenellu* – non-status) and Torrey's manna grass

(*Torreyochloa pallida* – special concern). The leafless water milfoil is associated with the littoral zones of surface waters. Dunning Lake, adjacent to the site, is likely the only area within the West Range Site boundary that may provide potential habitat for this species. However, Dunning Lake and its associated aquatic habitats would be avoided for construction of the West Range Site facility and associated utility and transportation corridors.

T. pallida occurs in shallow marsh habitats in mixed hardwood forests. This type of habitat is common throughout the West Range Site, although this species was not observed during the habitat field reconnaissance or the wetland surveys. Shallow marsh habitat that could contain this plant would be affected by construction at the West Range Site and associated transportation and utility corridors. During the field reconnaissance in June 2005, a plant species that closely resembled moonwort (*B. minganense)*, a state-listed species of special concern, was observed in the mixed-hardwood conifer forest. Only one individual was observed, and no voucher specimens were collected. This area of forest may require a more thorough review for potential occurrences of state-listed *Botrychium* spp., and to determine if these resources could be affected. If the West Range Site were selected, a survey for *T. pallida* and *B. minganense* may be requested by the MNDNR. State-listed species of special concern and non-status species and their habitats are not regulated under the Minnesota Endangered Species Statute (Minnesota Statutes § 84.0895). However, coordination with MNDNR would be completed to determine if any impacts would occur and to avoid or minimize the potential for impacts should these species occur at the West Range Site.

4.8.3.2 HVTL, Pipeline, and Transportation Corridors

See Section 2.3.1 for descriptions of alternative alignments and Figures 2.3-2, 2.3-3, and 2.3-4 showing corridor alignments for the West Range Site.

HVTL Alternatives (West Range Site)

Section 2.3.1.5 describes HVTL alternatives and Figure 2.3-3 (Chapter 2) shows the alignments. Table 4.8-2 (added for the Final EIS) summarizes the impacts from construction of the alignments on vegetation and habitat acreage by ECS category based on a 100-foot permanent ROW and an additional 50-foot temporary ROW. Each alternative is described individually and does not consider habitat that would be impacted by other HVTL alignment alternatives. The table also does not reflect impacts attributed to the Power Plant Footprint or shared alignments with Rail Lines, Access Roads, Process Water Pipelines, or Natural Gas Pipelines. The following subsections describe the impacts from construction of respective alignments.

Table 4.8-2. Vegetation and Habitat Impacts (acres), HVTLs (West Range Site)

ECS Codes[1]	Permanent ROW Area			Temporary ROW Impact[2]			Permanent ROW Change[3]		
	HVTL 1	HVTL 1A	PH 2 B	HVTL 1	HVTL 1A	PH 2 B	HVTL 1	HVTL 1A	PH 2 B
AFXXXX - Aspen Forest[1]	18.8	11.8	4.4	3.1	0.3	—	-18.8	-11.8	-4.4
APn80 - Northern Spruce Bog	0.4	2.8	0.4	—	1.2	—	-0.4	-2.8	-0.4
APn90 - Northern Open Bog	10.3	5.8	—	4.2	2.2	—	+4.2	+2.8	+6.1
FPn73 - Northern Rich Alder Swamp	7.7	9.4	17.2	1.8	2.8	—	-7.7	-9.4	-17.2
FPn82 - Northern Rich Tamarack Swamp (Western Basin)	3.8	—	5.7	1.9	—	—	-3.8	—	-5.7
LKi54 - Inland Lake Clay/Mud Shore	—	0.2	0.3	—	0.2	—	—	—	—
MHn35 - Northern Mesic Hardwood Forest	19.5	11.2	1.2	5.3	4.1	0.7	-19.5	-11.2	-1.2
MHn44 - Northern Wet-Mesic Boreal Hardwood-Conifer Forest	14.7	30.7	6.9	3.2	12.3	3.7	-14.7	-30.7	-6.9
MRn83 - Northern Mixed Cattail Marsh	2.0	2.0	27.8	—	—	—	—	—	—
MRn93 - Northern Bulrush-Spikerush Marsh	—	—	0.2	—	—	—	—	—	—
WFn55 - Northern Wet Ash Swamp	5.5	4.1	0.7	1.3	0.9	—	-5.5	-4.1	-0.7
WMn82 - Northern Wet Meadow/Carr	3.5	4.9	16.2	1.5	2.3	1.1	+13.3	+13.5	+17.9
XDXXOF - Old Field[1]	24.9	21.0	100.8	0.1	1.8	—	+53.0	+53.7	+12.5
XDXXXX - Disturbed Land[1]	0.6	2.9	3.2	0.1	1.0	—	—	—	—
Total	**111.9**	**106.8**	**184.9**	**22.4**	**29.1**	**5.4**	**—**	**—**	**—**

[1] Codes were created for habitats not included in ECS classification system.
[2] Temporary ROW acreages do not include the area within the permanent ROW. There would be no permanent impacts to the temporary ROW as these habitats will be allowed to regenerate following construction.
[3] Negative values indicate a loss of habitat and positive values indicate a gain of habitat.

HVTL Alternative 1

Vegetation and Habitat

The area of an existing HVTL ROW **(MP 45L)** that extends from the West Range Site boundary southward to US 169, is classified by the LandSat-Based Land Use-Land Cover (Raster) data as “other rural developments,” which means the existing ROW has been identified as land use other than a terrestrial vegetative community. In this area, no additional land clearing (beyond what is already cleared for the existing ROW) would be expected for installation of HVTL Alternative 1. **The remainder of the alignment would consist of new ROW (see Section 2.3.1.5) to** be cleared of trees and shrubs. Deciduous and regeneration/young forest are the most common vegetation/habitats within the corridor proposed for HVTL Alternative 1. **Table 4.8-2 summarizes the impacts to vegetation and wildlife habitats by ECS category that would result from construction of the proposed HVTL Alternative 1 route. Installation of HVTL Alternative 1 would convert existing wooded vegetation to grassland habitat within the permanent 100-foot ROW. Habitat cleared during construction activities within the additional temporary ROW would be allowed to regenerate following construction and would eventually recover over several years of natural succession. The habitat cleared within the permanent ROW would be maintained as grassland in perpetuity by vegetation management activities to keep the HVTL ROW cleared of trees and woody vegetation. The losses and gains in**

acreage by habitat type are listed in Table 4.8-2 in the column for the permanent ROW change. The main habitat types that would be affected are northern mesic hardwood forest and regrowth aspen forest, which would experience about 20 acres each of direct habitat loss as well as fragmentation. Impacts to wildlife would be as described in Section 4.8.2.1.

Aquatic Communities

There would be multiple surface water crossings associated with HVTL Alternative 1 as described in Section 4.7; however, the HVTL corridor would be suspended over the waterways, and the alignments would be designed to preclude the placement of towers within surface waters. Therefore, no direct impacts to aquatic communities would be expected.

Protected Species

As described in Section 4.8.2.1, adverse impacts on Canada lynx and gray wolf would not be expected based on the results of the BA.

There are seven known occurrences of state-listed **plant** species within 1 mile of HVTL Alternative 1 (see Section 3.8). Records for the endangered tubercled-rein orchid indicate it occurs within 1 mile of HVTL Alternative 1 in mine spoil areas, but there are no mine spoil areas that are within the alignment for HVTL Alternative 1. Although there is wet meadow habitat within HVTL Alternative 1, the probability is low, but not impossible, for encountering this species in wet meadow habitat along HVTL Alternative 1.

The remaining records of state-listed species observed within 1 mile of HVTL Alternative 1 are listed as species of special concern or non-status species. These species were all recorded within mine spoil areas, which are not found within the proposed alignment for HVTL Alternative 1.

If the West Range Site were selected for permitting, prior to construction Excelsior would coordinate with MNDNR to determine if a plant survey would be warranted for the tubercled-rein orchid along HVTL Alternative 1, as well as to determine potential effects on the state-listed species or their habitats within or near HVTL Alternative 1.

HVTL Alternative 1A

Vegetation and Habitat

The segment of HVTL Alternative 1A **shared** in common with HVTL Alternative 1 from the West Range Site boundary south to US 169 **was described for Alternative 1**. **The remainder of the alignment would consist of new ROW (see Section 2.3.1.5) to** be cleared of trees and shrubs. Deciduous and regeneration/young forest are the most common vegetation within the corridor proposed for HVTL Alternative 1A. **Table 4.8-2 summarizes the impacts to wildlife habitats by ECS category that would result from construction of the proposed HVTL Alternative 1A route. The impacts on temporary and permanent ROWs would be as described for HVTL Alternative 1. The main habitat type that would be affected is northern wet mesic boreal hardwood conifer forest, which would experience about 31 acres of direct habitat loss as well as fragmentation. Impacts on wildlife would be as described in Section 4.8.2.1.**

Aquatic Communities

There would be multiple surface water crossings associated with HVTL Alternative 1A as described in Section 4.7; however, no direct impacts to aquatic communities would be expected **for the same reasons as described for Alternative 1**.

Protected Species

Because the alignment for HVTL Alternative 1A is within 1 mile of the alignment for HVTL Alternative 1, and contains comparable vegetation, the potential for encountering state-listed plant species would be as described for HVTL Alternative 1. The same coordination with MNDNR would

apply. As described in Section 4.8.2.1, adverse impacts on Canada lynx and gray wolf are not expected.

HVTL Phase II Plan B

Vegetation and Habitat

The existing ROWs **for MP HVTLs, including the 45L/28L and 62L/63L (see Section 2.3.1.5)** that extend eastward from the West Range Site and then southward toward US 169, have been cleared of tree and shrub vegetation for establishment and maintenance of the ROWs. Although the LandSat-Based Land Use-Land Cover (Raster) data classify the areas within the Phase II Plan B ROW as a mix of terrestrial and wetland habitats, and other developed uses, aerial photographs show that it is clear of trees and shrubs. No additional land clearing (beyond what is already cleared for the existing ROW) would be expected for the installation of HVTLs during Phase II Plan B.

Table 4.8-2 summarizes impacts to wildlife habitats by ECS categories calculated utilizing GIS mapping. The mapping did not take into account the current condition of the land and therefore shows impacts to vegetation and habitat that do not currently exist. Because the route would follow existing ROWs there would be no change in vegetation and no effect on wildlife.

Aquatic Communities

There would be multiple surface water crossings associated with HVTLs for Phase II Plan B as described in Section 4.7; however, no impacts to aquatic communities would be expected **for the same reasons as described for HVTL Alternative 1**. **Pickerel Creek, a** designated trout stream located 2,500 feet east of HVTL Phase II Plan B Alternative, would not be crossed by the HVTL; therefore, no impact would be expected on this stream.

Protected Species

There are 12 known occurrences of state-listed **plant** species within 1 mile of HVTLs proposed for Phase II Plan B, which are detailed in Section 3.8. The known record for the tubercled-rein orchid near HVTL Phase II Plan B is within a mine spoil area, but there are no mine spoil areas or wet meadow habitat within the alignment for HVTL Phase II.

There are two known occurrences of pale moonwort (*B. pallidum* – state listed as endangered) within 1 mile of HVTL Phase II. However, this species would not be affected by HVTL Phase II because the records are within mine spoil areas, which would not be crossed by the HVTL. The remaining records of state-listed species within 1 mile of HVTL Phase II are listed as species of special concern or non-status.

Coordination with MNDNR would be completed to determine if a plant survey would be warranted for the tubercled-rein orchid along HVTL Phase II. Coordination would also be held with the MNDNR to determine potential effects on the state-listed species or their habitats within or near HVTL Phase II, particularly for state-listed endangered tubercled-rein orchid and pale moonw**o**~~a~~rt.

As described in Section 4.8.2.1, adverse impacts on Canada lynx and gray wolf are not expected.

<u>Natural Gas Pipeline Alternatives (West Range Site)</u>

Section 2.3.1.4 describes Natural Gas Pipeline alternatives and Figure 2.3-4 (Chapter 2) shows the alignments. Table 4.8-3 (added for the Final EIS) summarizes the impacts from construction of the alignments on vegetation and habitat acreage by ECS category based on a 70-foot permanent ROW and an additional 30-foot temporary ROW during construction. Each line is described individually and does not consider habitat that would be impacted by other gas pipeline alignment alternatives. The table also does not reflect impacts attributed to the Power Plant Footprint or shared alignments with Rail Lines or Access Roads. The impacts from construction of respective alignments are described in the following subsections.

Table 4.8-3. Vegetation and Habitat Impacts (acres), Natural Gas Pipeline (West Range Site)

ECS Codes[1]	Permanent ROW Area			Temporary ROW Impact[2]			Permanent ROW Change[3]		
	Alt 1	Alt 2	Alt 3	Alt 1	Alt 2	Alt 3	Alt 1	Alt 2	Alt 3
AFXXXX - Aspen Forest[1]	10.4	9.8	12.8	1.7	1.4	5.5	-10.4	-9.8	-12.8
APn80 - Northern Spruce Bog	1.0	0.5	—	0.3	—	—	-1.0	-0.5	—
APn90 - Northern Open Bog	1.2	0.9	1.2	0.4	—	0.1	+1.0	+0.5	—
FPn73 - Northern Rich Alder Swamp	4.0	6.3	1.0	1.9	0.4	0.3	-4.0	-6.3	-1.0
MHn35 - Northern Mesic Hardwood Forest	38.6	13.2	1.4	14.3	3.5	0.5	-38.6	-13.2	-1.4
MHn44 - Northern Wet-Mesic Boreal Hardwood-Conifer Forest	12.5	4.5	14.2	3.6	0.1	6.2	-12.5	-4.5	-14.2
MRn83 - Northern Mixed Cattail Marsh	1.2	1.1	1.0	0.1	—	—	—	—	—
MRn93 - Northern Bulrush-Spikerush Marsh	—	0.2	2.9	—	—	0.9	—	—	—
WFn55 - Northern Wet Ash Swamp	9.0	1.4	0.3	3.2	—	0.1	-9.0	-1.4	-0.3
WMn82 - Northern Wet Meadow/Carr	3.9	2.7	5.1	0.9	0.4	1.6	+13.0	+7.7	+1.3
XDXXOF - Old Field[1]	19.9	35.7	31.1	5.1	0.3	2.5	+61.5	+27.5	+28.4
XDXXXX - Disturbed Land[1]	1.2	1.1	7.3	0.3	—	2.6	—	—	—
Total	**102.8**	**77.5**	**78.2**	**31.8**	**6.2**	**20.4**	—	—	—

[1] Codes were created for habitats not included in ECS classification system.
[2] Temporary ROW acreages do not include the area within the permanent ROW. There would be no permanent impacts to the temporary ROW as these habitats will be allowed to regenerate following construction.
[3] Negative values indicate a loss of habitat and positive values indicate a gain of habitat.

As explained in Section 2.3.1.4, construction of the Nashwauk Natural Gas Pipeline was approved by the Minnesota PUC after publication of the Mesaba Draft EIS. Excelsior has stated its intent to negotiate with the Nashwauk PUC for purchase of natural gas from the Nashwauk pipeline, which will be constructed along the same corridor as the alignment for Natural Gas Pipeline Alternative 1 proposed for the Mesaba Energy Project. In the event that Excelsior would reach favorable terms for the purchase of natural gas from Nashwauk PUC, the construction of a separate natural gas pipeline for the Mesaba Generating Station would not be necessary, and the impacts described for Alternative 1 would not be directly attributable to the Mesaba Energy Project.

Natural Gas Pipeline Alternative 1

Vegetation and Habitat

Table 4.8-3 provides a summary of impacts to vegetation and wildlife habitats by ECS category that would result from the construction of the Natural Gas Pipeline along the Alternative 1 route. Installation of the pipeline would convert existing vegetation to grassland habitat within a permanent 70-foot ROW. Habitat cleared during construction activities within the additional temporary ROW would eventually regenerate over several years of natural succession. The habitat cleared within the permanent ROW would be maintained as grassland in perpetuity by ROW vegetation management activities to keep the HVTL ROW cleared of trees and woody vegetation. The losses and gains in acreage by ECS category are listed in the table column for the permanent ROW change. The main habitat type that would be affected is northern mesic hardwood forest, which would experience almost 39 acres of direct habitat loss as well as fragmentation. Impacts on wildlife would be as described in Section 4.8.2.1.

Aquatic Communities

Section 4.7 describes surface water crossings associated with Natural Gas Pipeline Alternative 1. Wherever practicable, the gas pipeline would be directionally drilled beneath surface waters to a distance of about 100 feet beyond the aquatic community, which would minimize the potential for impacts on aquatic resources.

Protected Species

There are nine known occurrences of state-listed **plant** species within 1 mile of Natural Gas Pipeline Alternative 1 (see Section 3.8). One species, is a state-listed endangered species, the others are listed as species of special concern or non-status. Records for the endangered tubercled-rein orchid, indicate it has colonized in disturbed mine spoil areas near Natural Gas Pipeline Alternative 1, but there are no mine spoil areas within the alignment. Due to the rarity of *P. flava* var. *herbiola* in the state, the probability is low, but not impossible, for encountering this species in wet meadow habitat within the alignment.

If the West Range Site were selected for permitting, before construction Excelsior would coordinate with MNDNR to determine if a plant survey would be warranted for the tubercled-rein orchid along Natural Gas Pipeline Alternative 1, as well as to determine potential effects on state-listed species or their habitats within or near the alignment.

As described in Section 4.8.2.1, adverse impacts on Canada lynx and gray wolf are not expected.

Natural Gas Pipeline Alternative 2

Vegetation and Habitat

Deciduous, mixed wood and regeneration/young forests would be the most common **vegetation** cleared for the **Natural Gas Pipeline along the Alternative 2** alignment. **Existing** grassland habitats would be used for access and staging of construction equipment as the pipeline is installed.

Table 4.8-3 summarizes impacts to vegetation and wildlife habitats by ECS category for construction of Natural Gas Pipeline along the Alternative 2 alignment. The impacts on temporary and permanent ROWs would be as described for the Alternative 1 route. The main habitat type affected is northern mesic hardwood forest, which would experience about 13 acres of direct habitat loss as well as fragmentation. Impacts on wildlife would be as described in Section 4.8.2.1.

Aquatic Communities

Section 4.7 describes surface water crossings associated with Natural Gas Pipeline Alternative 2. Construction methods to reduce impacts would be the same as described for Alternative 1.

Protected Species

There are three known occurrences of one state-listed **plant** species within 1 mile of Natural Gas Pipeline Alternative 2, which are detailed in Section 3.8. These three records are for the endangered tubercled-rein orchid. However, the known records for this species near Natural Gas Pipeline Alternative 2 are within mine spoil areas, and there are no mine spoil areas within the alignment.

Because of the rarity of *P. flava* var. *herbiola* in the state, the probability is low, but not impossible, for encountering this species in wet meadow habitat within Natural Gas Pipeline Alternative 2**. If the West Range Site were selected for permitting, prior to construction Excelsior would coordinate with MNDNR** to determine potential effects on the state-listed species or their habitats.

Based on the results of the BA, adverse impacts on Canada lynx and gray wolf are not expected.

Natural Gas Pipeline Alternative 3

Vegetation and Habitat

Deciduous forest is the most common vegetation that would be cleared for the Natural Gas Pipeline Alternative 3 alignment. Existing grassland habitats would be used for access and staging of construction equipment as the pipeline is installed.

Table 4.8-3 summarizes impacts to vegetation and wildlife habitats by ECS category that would result from construction of the proposed Natural Gas Pipeline along the Alternative 3 route. The impacts on temporary and permanent ROWs would be as described for the Alternative 1 route. The main habitat type that would be affected is northern wet mesic boreal hardwood conifer forest, which would experience about 14 acres of direct habitat loss as well as fragmentation. Impacts on wildlife would be as described in Section 4.8.2.1.

Aquatic Communities

Section 4.7 describes surface water crossings associated with Natural Gas Pipeline Alternative 3. Construction methods to reduce impacts would be the same as described for Alternative 1.

Protected Species

There are no known occurrences of state-listed protected or otherwise rare species within 1 mile of Natural Gas Pipeline Alternative 3. **Adverse impacts on Canada lynx and gray wolf are not expected based on the results of the BA.**

Process Water Supply Pipelines (West Range Site)

Process Water Supply Pipeline Segments 1, 2, and 3 described in this subsection would all be included in the process water supply plan for the West Range Site (see Section 4.5) and would all be constructed during Phase I of the Mesaba Energy Project. Section 2.3.1.3 discusses the alignments, as shown in Figure 2.3-3 (Chapter 2). Table 4.8-4 (added for the Final EIS) summarizes the impacts from construction of the pipelines on acreage by ECS category. Collectively, the pipeline segments would convert about 42 acres of wooded vegetation types to grassland types in the permanent ROWs. The table also does not reflect impacts attributed to Power Plant Footprint or shared alignments with Rail Lines or Access Roads.

Segment 1 (Lind Pit to Canisteo Pit)

Vegetation and Habitat

Table 4.8-4 provides a summary of impacts to vegetation and wildlife habitats by ECS category that would result from construction of the proposed Process Water Supply Pipeline Segment 1. Installation of the pipeline would convert existing vegetation to grassland habitat within a permanent 100-foot ROW. Habitat cleared during construction activities within an additional 50-foot temporary ROW would eventually regenerate over several years of natural succession. Maintenance of the permanent ROW would be as described for natural gas pipelines. The losses and gains in acreage by habitat type are listed in the table column for the permanent ROW change. The main habitat type that would be affected is aspen forest, which would experience about 6 acres of direct habitat loss as well as fragmentation. Aspen forests within the West Range Site are characterized as early successive, emerging after logging activities. Impacts on wildlife would be as described in Section 4.8.2.1.

Table 4.8-4. Vegetation and Habitat Impacts (acres), Process Water Supply Pipelines (West Range Site)

ECS Codes[1]	Permanent ROW Area				Temporary ROW Impact[2]				Permanent ROW Change[3]			
	Segment 1	Segment 2	Segment 3	Total	Segment 1	Segment 2	Segment 3	Total	Segment 1	Segment 2	Segment 3	Total
AFXXXX - Aspen Forest[1]	6.3	1.5	—	7.8	4.3	1.1	—	5.4	-6.3	-1.5	—	-7.8
APn90 - Northern Open Bog	—	—	0.4	0.4	—	—	0.1	0.1	—	—	—	—
FPn73 - Northern Rich Alder Swamp	—	0.1	1.4	1.5	—	0.1	1.2	1.3	—	-0.1	-1.4	-1.5
FPn82 - Northern Rich Tamarack Swamp (Western Basin)	—	—	—	—	—	—	0.1	0.1	—	—	+4.1	+4.1
APn81 - Northern Poor Conifer Swamp	—	0.8	1.0	1.8	—	0.3	0.1	0.4	—	-0.8	-1.0	-1.8
LKi54 - Inland Lake Clay/Mud Shore	—	—	0.1	0.1	—	0.1	0.2	0.3	—	—	—	—
MHn35 - Northern Mesic Hardwood Forest	—	5.8	17.2	23	—	3.4	9.9	13.3	—	-5.8	-17.2	-23.0
MHn44 - Northern Wet-Mesic Boreal Hardwood-Conifer Forest	—	1.6	9.9	11.5	—	1.2	5.7	6.9	—	-1.6	-9.9	-11.5
MRn83 - Northern Mixed Cattail Marsh	—	—	0.2	0.2	—	—	0.4	0.4	—	—	—	—
WMn82 - Northern Wet Meadow/Carr	—	—	—	—	—	—	—	—	—	+0.8	—	+0.8
MRn93 - Northern Bulrush-Spikerush Marsh	—	—	0.4	0.4	—	—	0.2	0.2	—	—	—	—
OW- Other Water Body	0.7	—	0.4	1.1	0.6	—	0.4	1.0	—	—	—	—
WFn55 - Northern Wet Ash Swamp	—	—	1.7	1.7	—	—	0.9	0.9	—	—	-1.7	-1.7
XDXXOF - Old Field[1]	8.8	4.5	3.4	16.7	7.5	0.9	1.0	9.4	+6.3	+8.9	+27.1	+42.3
XDXXXX - Disturbed Land[1]	10.9	0.2	11.4	22.5	1.0	1.3	4.0	6.3	—	—	—	—
Total	**26.6**	**14.3**	**47.6**	**88.7**	**13.4**	**8.3**	**24.1**	**46.0**	—	—	—	—

[1] Codes were created for habitats not included in ECS classification system.
[2] Temporary ROW acreages do not include the area within the permanent ROW. There would be no permanent impacts to the temporary ROW as these habitats will be allowed to regenerate following construction.
[3] Negative values indicate a loss of habitat and positive values indicate a gain of habitat.

Aquatic Communities

There are no surface water crossings that would be associated with Process Water Supply Pipeline Segment 1; therefore, no impacts to aquatic communities would be expected during construction.

Protected Species

There are four known occurrences of one state-listed **plant** species within 1 mile of Process Water Supply Pipeline Segment 1 (Lind Pit to Canisteo Pit), which are detailed in Section 3.8. These four records are for the state-listed *Botrychium* spp., which were documented through a field survey completed by Critical Connections Ecological Services, Inc. in 2005 (CCESR, 2005). It is assumed these records have been reported to the MNDNR and are now part of the NHIS database.

All four *Botrychium* spp. were recorded to occur in mine spoil areas, although it is not fully understood how these species were recruited into these highly disturbed areas. One species, *B. pallidum* (pale moonwort), is state-listed endangered. The remaining *Botrychium* spp. are listed as species of special concern or non-status species. All four species may be within the temporary or permanent ROWs for Process Water Supply Pipeline Segment 1 and could be directly affected due to construction activities.

Although impacts to species of special concern or non-status species and their habitats are not regulated by state law, the Proposed Action does not preclude the need for coordination or consultation with the MNDNR to determine significance of potential impacts. For these reasons, **Excelsior would coordinate** with MNDNR to determine the potential effects on these species or their habitats within or near Process Water Supply Pipeline Segment 1, particularly for state-listed endangered *B. pallidum*.

As described in Section 4.8.2.1, adverse impacts on Canada lynx and gray wolf are not expected.

Segment 2 (Canisteo Pit to West Range Site)

Vegetation and Habitat

The alignment for the Process Water Supply Pipeline Segment 2 (see Section 2.3.1.3) was relocated after publication of the Draft EIS to follow the alignment of Access Road 3 to the plant footprint. Table 4.8-4 summarizes the impacts on the permanent ROW for the Segment 2 realignment. The shifted alignment would affect slightly more aspen forest, but less northern wet-mesic boreal hardwood-conifer forest as compared to the original alignment. The impacts on temporary and permanent ROWs would be as described for Segment 1. Impacts on wildlife would be as described in Section 4.8.2.1.

Aquatic Communities

There are no surface water crossings that would be associated with Process Water Supply Pipeline Segment 2; **therefore,** no impacts to aquatic communities would be expected during construction.

Because the water level in the Canisteo Pit would be maintained in accordance with the water resources management plan for the Mesaba Generating Station at the West Range Site, and the process water intake structure would be designed to prevent entrainment of aquatic life as described in Section 4.5, impacts on lake trout would be minor. The design of the intake structure would preclude the transfer of live rainbow smelt to other surface waters during plant operation.

Protected Species

There are no known occurrences of state-listed protected or otherwise rare **plant** species within 1 mile of Process Water Supply Pipeline Segment 2 (Canisteo Pit to West Range Site). **As described in Section 4.8.2.1, adverse impacts on Canada lynx and gray wolf are not expected.**

Segment 3 (Gross-Marble Pit to Canisteo Pit)

Vegetation and Habitat

Table 4.8-4 summarizes the impacts on vegetation and wildlife habitats by ECS category that would result from Process Water Supply Pipeline Segment 3. The impacts on temporary and permanent ROWs would be as described for segment 1. The main habitat type that would be affected is northern mesic hardwood forest, which would experience about 17 acres of direct habitat loss as well as fragmentation. Impacts on wildlife would be as described in Section 4.8.2.1.

Aquatic Communities

There are no surface water crossings that would be associated with Process Water Supply Pipeline Segment 3; therefore, no impacts to aquatic communities would be expected during construction.

Protected Species

There is one known occurrence of a state-listed species within 1 mile of Process Water Supply Pipeline Segment 3 (Gross-Marble Pit to Canisteo Pit), which is detailed in Section 3.8. This record is for the state-listed threatened *B. rugulosum* (St. Lawrence grapefern), which was observed within a mine tailings basin among aspen trees. Although this record is not within the proposed alignment for Process Water Supply Pipeline Segment 3, there are mine spoil areas within the proposed alignment that may contain undocumented occurrences of this species. Consequently, coordination with MNDNR would determine whether a plant survey would be warranted. **As described in Section 4.8.2.1, adverse impacts on Canada lynx and gray wolf are not expected.**

Cooling Tower Blowdown Outfalls (West Range Site)

[Text in the Draft EIS describing impacts from construction of Cooling Tower Blowdown Outfalls was eliminated at this point based on Excelsior's decision to use an enhanced ZLD system at the West Range Site as discussed in Section 2.3.1.3.]

Potable Water and Sewer Pipelines (West Range Site)

Vegetation and Habitat

The alignment for the Potable Water and Sewer Pipelines was relocated after publication of the Draft EIS to follow the alignment of Access Road 3 to the plant footprint (see discussion in Section 2.3.1.3). Table 4.8-5 (added for the Final EIS) provides a summary of impacts to vegetation and wildlife habitats by ECS category that would result from construction of these pipelines. The shifted alignment would parallel the new access road to CR 7 and then continue south along CR 7 as originally proposed.

Installation of the pipeline would convert existing vegetation to grassland habitat within a permanent 40-foot ROW. An additional 60-foot temporary ROW would be cleared during construction but would eventually regenerate over several years of natural succession. Maintenance of the permanent ROW would be as described for Natural Gas Pipeline Alternative 1. Table 4.8-5 compares the impacts that would result from the revised alignment with those of the original alignment. The losses and gains in acreage by habitat type are listed in the table column for permanent ROW change. The impacts on wooded habitats would be slightly less for the revised alignment than the original alignment. The table does not reflect impacts attributed to the Power Plant Footprint or shared alignments with Rail Lines, Access Roads, or the Process Water Supply Pipelines. Impacts on wildlife would be as described in Section 4.8.2.1.

Table 4.8-5. Vegetation and Habitat Impacts (acres), Potable Water and Sewer Pipelines (West Range Site)

ECS Codes[1]	Permanent ROW Area		Temporary ROW Impact[2]		Permanent ROW Change[3]	
	Revised Alignment	Original Alignment	Revised Alignment	Original Alignment	Revised Alignment	Original Alignment
AFXXXX - Aspen Forest[1]	—	—	—	—	—	—
FPn73 - Northern Rich Alder Swamp	—	—	—	—	—	—
FPn82 – Northern Rich Tamarack Swamp (Western Basin)	—	—	—	1.5	—	—
APn81 - Northern Poor Conifer Swamp	0.6	—	—	—	-0.6	—
MHn35 - Northern Mesic Hardwood Forest	—	0.9	1.8	2.8	—	-0.9
MHn44 - Northern Wet-Mesic Boreal Hardwood-Conifer Forest	0.4	1.8	1.4	3.5	-0.4	-1.8
WMn82 – Northern Wet Meadow/Carr	—	1.0	—	—	+0.6	—
XDXXOF - Old Field[1]	—	—	0.8	0.3	+0.4	+2.7
XDXXXX - Disturbed Land[1]	2.3	2.3	1.9	1.7	—	—
Total	**3.3**	**6.1**	**5.9**	**9.9**	—	—

[1] Codes were created for habitats not included in ECS classification system.
[2] Temporary ROW acreages do not include the area within the permanent ROW. There would be no permanent impacts to the temporary ROW as these habitats will be allowed to regenerate following construction.
[3] Negative values indicate a loss of habitat and positive values indicate a gain of habitat.

Aquatic Communities

There are no surface water crossings that would be associated with the Potable Water and Sewer Pipelines.

Protected Species

As described in Section 4.8.2.1, adverse impacts on Canada lynx and gray wolf would not be expected. There are no known occurrences of state-listed protected or otherwise rare species within 1 mile of the Potable Water and Sewer Pipelines.

Rail Line Alternatives (West Range Site)

Section 2.3.1.2 describes the Rail Line Alternative alignments, as shown in Figure 2.3-2 (Chapter 2). Based on comments and recommendations from USACE and other agencies after publication of the Draft EIS, DOE conferred with Excelsior to identify additional alignments that would minimize and avoid impacts on wetlands (see also Section 4.7 and Appendix F2). This effort resulted in a new alignment preferred by Excelsior, Alternative 3B, which is compared to Excelsior's original preferred Alternative 1A in this Final EIS. Table 4.8-6 (added for the Final EIS) summarizes the impacts from construction of the alignments on vegetation and habitat acreage by ECS category. The table does not reflect impacts already attributed to the Power Plant Footprint. The impacts of the alternative alignments are described in the following subsections.

Table 4.8-6. Vegetation and Habitat (acres), Rail Line (West Range Site)

ECS Codes[1]	Alternative 3B		Alternative 1A	
	Rail Line	Center Loop[2]	Rail Line	Center Loop[2]
AFXXXX - Aspen Forest[1]	3.5	23.1	0.7	—
FPn73 - Northern Rich Alder Swamp	2.0	0.2	1.7	—
MHn35 - Northern Mesic Hardwood Forest	29.4	145.1	31.1	29.8
MHn44 - Northern Wet-Mesic Boreal Hardwood-Conifer Forest	42.0	25.4	32.3	—
MRn83 - Northern Mixed Cattail Marsh	0.1	2.0	—	—
OW- Other Water Body	0.6	—	0.2	—
WFn55 - Northern Wet Ash Swamp	10.2	3.5	18.5	49.8
WMn82 - Northern Wet Meadow/Carr	2.1	0.6	3.2	—
XDXXOF - Old Field[1]	1.9	12.6	2.2	—
XDXXXX - Disturbed Land[1]	2.3	—	2.2	—
Total	**93.8**	**212.4**	**92.0**	**79.6**

¹ Codes were created for habitats not included in ECS classification system.
² Depending on final design specifications for the center loop, habitat may not be impacted and would continue to exist in current form.

Rail Line Alternative 1A and Center Loop

Vegetation and Habitat

Table 4.8-6 summarizes impacts to vegetation and wildlife habitats by ECS category that would result from Rail Line Alternative 1A. The main habitat types that would be affected are northern wet-mesic boreal hardwood-conifer forest and northern mesic hardwood forest, which would experience, respectively, about 32 acres and 31 acres of direct habitat loss as well as fragmentation through construction of the rail line. Wetland habitat conversions would also occur as described in Section 4.7; however, unlike utility corridors, these wetland areas would be lost through construction of the rail line as opposed to being converted into herbaceous-dominated communities. Wetland habitats within the center loop, principally northern wet ash swamp, would be avoided during construction to the extent practicable and may not be permanently altered depending on the final design specifications.

Impacts on wildlife would be as described in Section 4.8.2.1. Impacts resulting from habitat fragmentation during construction and mortality due to collisions with trains during operations would be principal concerns.

Aquatic Communities

There are no surface water crossings that would be associated with Rail Line Alternative 1A; therefore, no impacts to aquatic communities would be expected as a result of the construction or operation of this structure.

Protected Species

As described in Section 4.8.2.1, adverse impacts on Canada lynx and gray wolf would not be expected based on the results of the BA. During plant operation, the potential for collisions with trains would be the impact of most concern.

There are no known occurrences of state-listed protected or otherwise rare species within 1 mile of Rail Line Alternative 1A.

Rail Line Alternative 1B and Center Loop

[Text in the Draft EIS describing impacts from construction of Rail Line Alternative 1B was deleted at this point. Excelsior eliminated Rail Line Alternative 1B from further consideration

based on the evaluation in the Draft EIS and subsequent consideration of Rail Line Alternative 3B as discussed in Section 2.3.1.2.]

Rail Line Alternative 3B and Center Loop

Vegetation and Habitat

As a result of concerns about potential wetland impacts raised by the USACE and other agencies following publication of the Draft EIS, Rail Line Alternative 3B was identified as Excelsior's new preferred alignment as described in Section 2.3.1.2. Alternative 3B would reduce impacts to wetlands, but would increase impacts to coniferous, deciduous, and mixed forest. Areas for the rail line are expected to be cleared and permanently altered for construction of the rail line. Wooded vegetation in the center loop would be avoided during construction to the extent practicable and may not be permanently altered depending on the final design specifications.

Table 4.8-6 summarizes impacts to vegetation and wildlife habitats by ECS category that would result from the proposed Rail Line Alternative 3B. The revised alignment would loop around the hill in the northeastern portion of the West Range Site and avoid encircling a substantial amount of wetland habitat as proposed under Alternative 1A. Alternative 3B would reduce impacts to northern wet ash swamp by about 8 acres for the rail alignment, and avoid about 46 acres of potential impacts to northern wet ash swamp encircled by the center loop of Alternative 1A. The main habitat type that would be affected is northern wet-mesic boreal hardwood-conifer forest, which would experience about 42 acres of direct habitat loss as well as fragmentation through construction of the rail line. The rail loop for Alternative 3B would encircle an upland area dominated by northern mesic hardwood forest.

Impacts on wildlife would be as described in Section 4.8.2.1. Impacts resulting from habitat fragmentation during construction and mortality due to collisions with trains during operations would be principal concerns.

Aquatic Communities

There are no surface water crossings that would be associated with Rail Line Alternative 3B.

Protected Species

As described in Section 4.8.2.1, adverse impacts on Canada lynx and gray wolf are not expected based on the results of the BA. During plant operation, the potential for collisions with trains would be the impact of most concern.

There are no known occurrences of state-listed protected or otherwise rare species within 1 mile of Rail Line Alternative 3B.

Access Road Alignments (West Range Site)

Potential Access Road alternatives are described in Section 2.3.1.2, and the alignments are shown in Figure 2.3-2 (Chapter 2).

Vegetation and Habitat

As discussed in Section 2.3.1.2, after publication of the Draft EIS, Itasca County deferred its proposed project to realign CR 7, which would have been the basis of Excelsior's proposed Access Road 1. Excelsior's proposed Access Road 2 would have connected Access Road 1 with the plant footprint and depended upon the realignment of CR 7 to be feasible. Also, as a result of concerns raised by the USACE and other agencies after the Draft EIS was published regarding the need to avoid and minimize impacts to wetland habitats, Excelsior identified a new preferred alignment, Access Road 3, which would connect the existing CR 7 with the plant footprint near the southwestern corner of the West Range Site boundary.

Table 4.8-7 (added for the Final EIS) provides a summary of impacts to vegetation and wildlife habitats by ECS category that would result from construction of Access Road 3. The table also summarizes impacts that would result from the Access Roads 1 and 2 alignments for comparison. The revised alignment would shorten the length of the road and would reduce impacts in the permanent ROW by a total of about 8 acres. Habitat cleared during construction activities within the temporary ROW would eventually recover over several years of natural succession. The habitat cleared within the permanent ROW would be converted to roadway and grassland in roadside ditches. The ditches would be kept cleared of trees and woody vegetation through maintenance. Process Water Supply Pipeline Segment 2 and the Potable Water and Sanitary Sewer Pipelines would occupy the permanent ROW adjacent to the new roadway. The main habitat types that would be affected include aspen forest and northern mesic hardwood forest, which would experience, respectively, about 7 acres and 5 acres of direct habitat loss as well as fragmentation. Aspen forests within the West Range Site are characterized as early successive, emerging after logging activities. Impacts on wildlife would be as described in Section 4.8.2.1.

Table 4.8-7. Vegetation and Habitat Impacts (acres), Access Roads (West Range Site)

ECS Codes[1]	Temporary ROW Impact[2]		Permanent ROW Change[3]	
	Access Road 3 Alignment	Access Roads 1 & 2 Alignment	Access Road 3 Alignment	Access Roads 1 & 2 Alignment
AFXXXX - Aspen Forest	4.3	0.6	-6.5	-0.7
FPn73 - Northern Rich Alder Swamp	0.1	—	-0.2	—
FPn82 - Northern Rich Tamarack Swamp (Western Basin)	—	—	—	—
MHn35 - Northern Mesic Hardwood Forest	3.3	5.2	-5.2	-7.8
MHn44 - Northern Wet-Mesic Boreal Hardwood-Conifer Forest	—	3.1	—	-4.3
MRn83 - Northern Mixed Cattail Marsh	0.1	0.1	—	—
WMn82 - Northern Wet Meadow/Carr	—	2.7	—	-4.2
XDXXOF - Old Field[1]	0.3	1.9	-0.2	-2.5
XDXXXX - Disturbed Land[1]	0.1	0.2	-0.1	-0.9
Total	**8.2**	**13.7**	**-12.3**	**-20.4**

¹ Codes were created for habitats not included in ECS classification system.
² Temporary ROW acreages do not include the area within the permanent ROW. There would be no permanent impacts to the temporary ROWs as these habitats will be restored following construction.
³ Negative values indicate a loss of habitat.

Aquatic Communities

There are no surface water crossings that would be associated with the road alignments.

Protected Species

As described in Section 4.8.2.1, adverse impacts on Canada lynx and gray wolf are not expected based on the results of the BA. During plant operation, the potential for collisions with vehicles would be the impact of most concern.

There are no known occurrences of state-listed protected or otherwise rare species within 1 mile of the road alignment.

4.8.4 Impacts on East Range Site and Corridors

This section describes the construction-related impacts of the Mesaba Generating Station on the East Range Site and corridors. The impacts of operations on biological resources would be comparable for either site and are described in Section 4.8.2.2 unless otherwise appropriate. This

section as published in the Draft EIS was revised to address impacts to wildlife habitat based on the ECS habitat types in response to comments and requests by USACE and MNDNR. Therefore, tables that were included in the Draft EIS listing affected acreages by respective land cover have been eliminated and replaced with tables based on the ECS System categories.

During construction for the Phase I power plant, the Phase II footprint would be prepared and used as a staging and laydown area for stockpiling of materials and storage of equipment as well as for a concrete batch plant. Therefore, much of the footprint would be cleared during Phase I construction with the exception of wetlands and sensitive areas that would be avoided. For Phase II construction, Excelsior would establish off-site construction staging and laydown areas on 85 acres of land selected from two potential sites as described in Chapter 2 (see Sections 2.2.4.1 and 2.3.2.1). Both potential sites are located on lands that have been disturbed or cleared during prior uses by mineral extraction companies, and they have access to local roadways. Excelsior would select appropriate sites for the necessary acreage prior to construction of Phase II taking into consideration potential effects on biological resources. Following completion of Phase II construction, sites used for staging and laydown would be restored to pre-existing conditions.

4.8.4.1 East Range Site and Power Plant Footprint

See Figure 2.3-5 in Section 2.3.2, which shows the East Range Site and plant footprint.

Vegetation and Habitat

The impacts of construction on vegetation at the East Range Site generally would be as described in Section 4.8.2.1 Though the construction of the Mesaba Generating Station at the East Range Site would require a relatively large amount of vegetation clearing, resulting in habitat loss and fragmentation, these resources are common in the region, and the construction of the Mesaba Generating Station at the East Range Site would degrade a small fraction of the total amount of these plant communities in the area **(see Section 5.2.6)**. The potential introduction of non-native or invasive flora would be minimized as described for common impacts in Section 4.8.2.

Section 3.8.1.2 describes wildlife species likely to inhabit the East Range Site. Habitat loss and habitat degradation are influencing factors that contribute to the decline of wildlife species (MNDNR, 2007). Consequently, wildlife using the natural resources within the region of influence for the Mesaba Generating Station may be adversely affected. However, comparable habitat types are common in the region, and the placement of the Mesaba Generating Station would cause the elimination of a small fraction of the total habitat near the East Range Site. Refer also to the discussion of cumulative impacts on wildlife habitat in Section 5.2.6.

Table 4.8-8 (added for the Final EIS) provides a summary of impacts to vegetation and wildlife habitats by ECS category. Impacts on wildlife would be as described in Section 4.8.2.1. Table 3.8-1 (Chapter 3) lists the SGCN species, as defined by the MNDNR, that typically utilize the habitat types identified in Table 4.8-8. The plant site would convert existing wildlife habitat into industrial land use. The main habitat type that would be affected is northern wet-mesic boreal hardwood-conifer forest, which would experience over 133 acres of direct habitat loss as well as fragmentation for construction of Phases I and II.

Table 4.8-8. Vegetation and Habitat Impacts (acres), Mesaba IGCC Power Plant Footprint (East Range Site)

ECS Codes	Total Area within East Range Site (acres)	Phase I Impacts (acres)	Phase II Impacts (acres)	Total Impacts (acres)
APn80 - Northern Spruce Bog	12.9	-4.8	—	-4.8
APn81 - Northern Poor Conifer Swamp	37.1	-0.7	-1.4	-2.1
FPn73 - Northern Rich Alder Swamp	181.2	-0.2	-0.9	-1.1
MHn35 - Northern Mesic Hardwood Forest	304.3	-2.8	-11.1	-13.9
MHn44 - Northern Wet-Mesic Boreal Hardwood-Conifer Forest	416.4	-63.7	-69.4	-133.2
MRn83 - Northern Mixed Cattail Marsh	62.7	-1.9	-1.4	-3.3
WFn55 - Northern Wet Ash Swamp	249.4	-21.8	-0.3	-22.1
WMn82 - Northern Wet Meadow/Carr	12.1	-1.8	—	-1.8
XDXXOF - Old Field[1]	23.2	-0.3	-0.7	-1.0
AFXXXX - Aspen Forest1[1]	21.4	—	—	—
XDXXXX – Disturbed Land1[1]	0.9	—	—	—
Total	**1321.7**	**-97.9**	**-85.2**	**-183.1**

[1] Codes were created for habitats not included in ECS classification system.
Note: Negative values indicate a loss of habitat.

Aquatic Communities

No direct impacts to aquatic species would occur from construction of the Mesaba Generating Station at the East Range Site. Section 4.8.2.2 describes the impacts of plant operations on aquatic communities. Section 4.8.4.2 discusses potential impacts that may result from the construction and operation of supporting infrastructure (e.g., natural gas pipelines, process water pipelines).

Protected Species

As described in Section 4.8.2.1, adverse impacts on Canada lynx and gray wolf would not be expected (see BA in Appendix E).

No MNDNR NHIS threatened, endangered, or otherwise rare species inhabit or occur within the East Range Site. According to the MNDNR NHIS database, the closest occurrence is the wood turtle (*Clemmys insculpta*), which exists on the Partridge River, more than 2 miles from the East Range Site boundary **and would not be affected by the project**.

4.8.4.2 HVTL, Pipeline, and Transportation Corridors

See Section 2.3.2 for descriptions of alternative alignments and Figures 2.3-6, 2.3-7, and 2.3-8 showing corridor alignments for the East Range Site.

HVTL Alternatives (East Range Site)

Section 2.3.2.5 describes HVTL alternatives and Figure 2.3-8 (Chapter 2) shows the alignments. Table 4.8-9 (added for the Final EIS) summarizes the impacts from construction of the alignments on vegetation and habitat acreage by ECS category based on the clearing of additional permanent ROW in existing corridors and an additional 100-foot permanent ROW for corridors bridging between existing ROWs. Each alternative is described individually and does not consider habitat that would be impacted by other HVTL alignment alternatives. The table also does not reflect impacts attributed to the Power Plant Footprint or shared alignments with Rail Lines, Access Roads, Process Water Pipelines, or Natural Gas Pipelines. The impacts from construction of respective alignments are described in the following subsections.

Table 4.8-9. Vegetation and Habitat Impacts (acres), HVTLs (East Range Site)

ECS Codes[1]	Permanent ROW Area		Permanent ROW Change[2]	
	Alternative 1	Alternative 2	Alternative 1	Alternative 2
AFXXXX - Aspen Forest[1]	2.9	9.0	-2.9	-9.0
APn80 - Northern Spruce Bog	44.4	46.4	-44.4	-46.4
APn81 - Northern Poor Conifer Swamp	8.8	7.3	-8.8	-7.3
APn90 - Northern Open Bog	11.3	15.7	+53.2	+53.7
FPn73 - Northern Rich Alder Swamp	60.8	69.3	-60.8	-69.3
FPn81 - Northern Rich Tamarack Swamp (Water Track)	0.7	0.7	-0.7	-0.7
LKi54 - Inland Lake Clay/Mud Shore	3.7	3.3	—	—
MHn35 - Northern Mesic Hardwood Forest	31.4	38.3	-31.4	-38.3
MHn44 - Northern Wet-Mesic Boreal Hardwood-Conifer Forest	49.7	25.8	-49.7	-25.8
MRn83 - Northern Mixed Cattail Marsh	0.3	—	—	—
MRn93 - Northern Bulrush-Spikerush Marsh	0.7	0.8	—	—
OW- Other Water Body	1.1	1.0	—	—
WFn55 - Northern Wet Ash Swamp	20.2	19.2	-20.2	-19.2
WFn64 - Northern Very Wet Ash Swamp	0.2	2.8	-0.2	-2.8
WMn82 - Northern Wet Meadow/Carr	6.1	6.3	+81.8	+92.1
XDXXOF - Old Field[1]	475.8	478.4	+84.0	+73.1
XDXXXX - Disturbed Land[1]	35.0	39.2	—	—
Total	**752.8**	**763.5**	—	—

[1] Codes were created for habitats not included in ECS classification system.
[2] Negative values indicate a loss of habitat and positive values indicate a gain of habitat.

HVTL Alternative 1

Vegetation and Habitat

As described in Section 2.3.2.5, HVTL Alternative 1 would require the clearing of an additional 30-foot wide ROW alongside the existing ROW of the MP 38L that has been cleared of tree and shrub vegetation for maintenance. In addition, the HVTLs in the existing cleared ROWs for the MP 39L and MP 37L corridors would be upgraded with new poles and additional power lines, but no widening of the ROWs. Furthermore, two new ROW segments, each about 2 miles in length, would be required. One would extend alongside the existing MP 43L HVTL corridor to connect the Mesaba Generating Station with the initiation point of the 39L and 38L corridors. The second new ROW segment would be required to link the 39L and 37L corridors near the City of Eveleth. Table 4.8-9 summarizes the impacts to vegetation and wildlife habitats by ECS category that would result from construction for the proposed HVTL Alternative 1 routes. The main habitat types that would be affected are northern rich alder swamp and northern wet-mesic boreal hardwood-conifer forest, which would respectively experience about 61 acres and 50 acres of direct habitat loss as well as fragmentation. However, except in the new ROW segments, these losses would generally occur within a 30-foot corridor adjacent to an existing cleared ROW for the MP 38L. Impacts on wildlife would be as described in Section 4.8.2.1.

Aquatic Communities

There would be multiple surface water crossings associated with HVTL Alternative 1 as described in Section 4.7; however, the HVTLs would be suspended and the alignments would be designed to avoid the placement of towers within surface waters. Therefore, no impacts to aquatic resources would be expected..

Protected Species

As described in Section 4.8.2.1, adverse impacts on Canada lynx and gray wolf would not be expected. The HVTLs for Alternative 1 would be constructed in parallel to existing HVTLs in the same cleared ROWs, one alignment of which would be widened by an additional 30 feet.

There are 16 known occurrences of state-listed species within 1 mile of HVTL Alternative 1, which are detailed in Section 3.8. Of greatest potential concern are records for the state-listed endangered floating marsh-marigold (*Caltha natans*) that inhabits a pond outlet and state-listed threatened wood turtle, which exists in habitats near the St. Louis and Partridge Rivers. Wood turtles prefer wetland habitats and water bodies. The HVTL would be suspended and poles could be placed up to 1,000 feet apart, which would allow the project to avoid particularly sensitive habitats that may contain state-listed species. If this alternative is chosen as the preferred alternative, a survey for these species may be requested by the MNDNR. Coordination with the MNDNR would be completed to determine significance of effect on these species.

The remaining records of state-listed species within 1 mile of HVTL Alternative 1 are listed as species of special concern or non-status species. Coordination with MNDNR would be completed to determine the potential effects on these species or their habitats within or near HVTL Alternative 1.

HVTL Alternative 2

Vegetation and Habitat

As described in Section 2.3.2.5, HVTL Alternative2 (preferred by Excelsior) would require construction of an additional 30-foot wide ROW alongside the existing ROWs of the MP 39L and MP 37L that have been cleared of tree and shrub vegetation for maintenance. In addition, the HVTL in the existing cleared ROW for the MP 38L corridor would be upgraded with new poles and additional power lines, but no widening of the ROW. Furthermore, the same two new ROW segments, each about 2 miles in length, would be required as described for HVTL Alternative 1. Table 4.8-9 summarizes the impacts to vegetation and wildlife habitats by ECS category that would result from construction for the proposed HVTL Alternative 2 routes. The main habitat types that would be affected are northern rich alder swamp and northern spruce bog, which would respectively experience about 69 acres and 46 acres of direct habitat loss as well as fragmentation. However, except in the new ROW segments, these losses would generally occur within a 30-foot corridor adjacent to an existing cleared ROWs for the MP 39L and MP 37L. Impacts on wildlife would be as described in Section 4.8.2.1.

Aquatic Communities

There would be several surface water crossings associated with HVTL Alternative 2**,** as described in Section 4.7; however, the HVTLs would be suspended and the alignments would be designed to avoid the placement of towers within surface waters. Therefore, no impacts to aquatic resources would be expected.

Protected Species

As described in Section 4.8.2.1, adverse impacts on Canada lynx and gray wolf would not be expected. The HVTLs for Alternative 2 would be constructed in parallel to existing HVTLs in the same cleared ROWs, one alignment of which would be widened by an additional 30 feet.

There are 18 known occurrences of state-listed species within 1 mile of HVTL Alternative 2, which are detailed in Section 3.8. Of greatest potential concern are records for the state-listed threatened wood turtle, found in habitats near the St. Louis and Partridge Rivers. Wood turtles prefer wetland habitats and water bodies. The HVTL would be suspended and poles could be placed up to 1,000 feet apart, which would allow the project to avoid particularly sensitive habitats that may contain state-listed species. If this alternative is selected, a survey for this species may be requested by the MNDNR. Coordination with the MNDNR would be completed to determine significance of effect on this species.

The remaining records of state-listed species within 1 mile of HVTL Alternative 2 are listed as species of special concern or non-status species. Coordination with MNDNR would be completed to determine the potential effects on these species or their habitats within or near HVTL Alternative 2.

Natural Gas Pipeline (East Range Site)

Vegetation and Habitat

Section 2.3.2.4 describes the proposed alignment for the East Range Natural Gas Pipeline, as shown in Figure 2.3-8 (Chapter 2). Construction of the natural gas pipeline would take place entirely within the ROW of the existing NNG pipeline except for the segment of the pipeline extending from the existing ROW to the plant footprint. The land cover within the existing gas pipeline ROW has been cleared and contains no forested cover. Table 4.8-10 (added for the Final EIS) provides a summary of impacts to wildlife habitats by ECS category that would result from construction of the proposed natural gas pipeline. The table does not reflect impacts attributed to the Power Plant Footprint or shared alignments with other project elements. The impacts on the 30-foot temporary and 70-foot permanent ROWs would be as described for the West Range Natural Gas Pipeline Alternative 1 route. The main habitat types that would be affected are northern rich alder swamp and northern spruce bog, which would respectively experience about 9 acres and 8 acres of direct habitat loss as well as fragmentation. Impacts on wildlife would be as described in Section 4.8.2.1.

Table 4.8-10. Vegetation and Habitat Impacts (acres), Natural Gas Pipeline (East Range Site)

ECS Codes[1]	Permanent ROW Area	Temporary ROW Impacts[2]	Permanent ROW Change[3]
APn80 - Northern Spruce Bog	7.9	—	-7.9
APn90 - Northern Open Bog	1.0	—	+8.1
FPn73 - Northern Rich Alder Swamp	9.0	—	-9.0
FPn81 - Northern Rich Tamarack Swamp (Water Track)	0.2	—	-0.2
LKi54 - Inland Lake Clay/Mud Shore	0.4	—	—
MHn35 - Northern Mesic Hardwood Forest	0.8	0.3	-0.8
MHn44 - Northern Wet-Mesic Boreal Hardwood-Conifer Forest	1.4	0.6	-1.4
MRn83 - Northern Mixed Cattail Marsh	0.6	0.2	—
MRn93 - Northern Bulrush-Spikerush Marsh	0.1	—	—
OW- Other Water Body	0.1	—	—
WFn55 - Northern Wet Ash Swamp	4.4	0.2	-4.4
WMn82 - Northern Wet Meadow/Carr	1.8	—	+13.4
XDXXOF - Old Field[1]	95.6	0.1	+2.2
XDXXXX - Disturbed Land[1]	4.3	—	—
Total	**127.6**	**1.3**	—

¹ Codes were created for habitats not included in ECS classification system.
² Temporary ROW acreages do not include the area within the permanent ROW. There would be no permanent impacts to the temporary ROW as these habitats will be allowed to regenerate following construction.
³ Negative values indicate a loss of habitat and positive values indicate a gain of habitat.

Aquatic Communities

Section 4.7 describes surface water crossings associated with **the proposed** Natural Gas Pipeline. Wherever practicable, the gas pipeline would be directionally drilled beneath surface waters to a distance of about 100 feet beyond the aquatic community, which would minimize the potential for impacts on aquatic resources.

Protected Species

As described in Section 4.8.2.1, adverse impacts on Canada lynx and gray wolf would not be expected.

There are 12 known occurrences of state-listed species within 1 mile of the proposed Natural Gas Pipeline, detailed in Section 3.8. Of greatest potential concern are those records for the state-listed threatened wood turtle, which exists in habitats near the St. Louis and Partridge Rivers. The preferred means of construction for the natural gas pipeline would be to directionally drill beneath rivers, streams, and other bodies of water, which could have temporary impacts on the wood turtle and its habitat in areas of disturbance. Impacted habitat would be restored to preconstruction conditions. If the East Range Site **were selected for permitting**, **prior to construction** a survey for wood turtles within this corridor may be requested by the MNDNR. Coordination with the MNDNR should be completed to determine potential impacts to this species.

The remaining records of state-listed species within 1 mile of the proposed Natural Gas Pipeline are listed as species of special concern or non-status species. Coordination with MNDNR would be completed to determine the potential effects on these species or their habitats within or near the Natural Gas Pipeline.

Process Water Supply Pipelines (East Range Site)

Vegetation and Habitat

All Process Water Supply Pipeline segments would be included in the process water supply plan for the East Range Site (see Section 4.5.4.1 for a discussion of uncertainties associated with process water sources relating to other projects proposed in the vicinity), and all would be constructed during Phase I of the Mesaba Energy Project. Section 2.3.2.3 discusses the alignments, as shown in Figure 2.3-7 (Chapter 2). Table 4.8-11 (added for the Final EIS) summarizes the impacts from construction of the pipelines on acreage by ECS category. Installation of the pipeline would require the clearing of a permanent 100-foot ROW. Habitat cleared during construction activities within an additional 50-foot temporary ROW would eventually regenerate over several years of natural succession. Most of the pipeline segments traverse lands between mine pits that have been disturbed during prior mineral extraction activities and contain negligible to minimal vegetation. Only two segments, Area 2WX to the Plant Footprint and Area 6 and Stephens Mine to Area 2WX, contain more than a few acres of wooded vegetation. Collectively, the pipeline segments would convert about 20 acres of wooded vegetation types to grassland types in the permanent ROWs. Impacts on wildlife would be as generally described in Section 4.8.2.1. The impacts from Process Water Supply Pipeline segments do not include acreages already included in the Power Plant Footprint.

Table 4.8-11. Vegetation and Habitat Impacts (acres), Process Water Supply Pipelines (East Range Site)

ECS Code[1]	Permanent ROW Area									Total Temporary Row Impact[2]	Total Permanent ROW Change[3]
	Area 2WX to Footprint	Area 2WX to 2W	Area 2W to 2E	Area 3 to 2E	Area Knox Mine to 2WX	Area 6 and Stephens Mine to 2WX	Area 9 south to Area 6	Area 9 North to Area 6	Total		
AFXXXX - Aspen Forest[1]	—	—	—	—	—	0.6	—	—	**0.6**	**0.8**	**-0.6**
APn80 - Northern Spruce Bog	0.2	—	—	—	—	—	—	—	**0.2**	**0.2**	**-0.2**
FPn63 - Northern Cedar Swamp	0.5	—	—	—	—	0.3	—	—	**0.8**	**0.5**	**-0.8**
FPn73 - Northern Rich Alder Swamp	—	—	—	—	—	0.7	—	—	**0.7**	**0.5**	**-0.7**
LKi54 - Inland Lake Clay/Mud Shore	—	—	—	—	—	—	—	—	**—**	—	**—**
MHn35 - Northern Mesic Hardwood Forest	3.3	—	—	1.0	—	2.9	—	0.5	**7.7**	**4.3**	**-7.7**
MHn44 - Northern Wet-Mesic Boreal Hardwood-Conifer Forest	1.4	0.3	—	—	0.6	8.5	—	—	**10.8**	**6.6**	**-10.8**
MRn93 - Northern Bulrush-Spikerush Marsh	—	—	—	0.2	—	—	0.3	—	**0.5**	**0.4**	**—**
OW- Other Water Body	—	0.1	0.7	—	0.1	0.3	0.5	0.2	**1.8**	**1.5**	**—**
WFn55 - Northern Wet Ash Swamp	0.1	—	—	—	—	—	—	—	**0.1**	**0.1**	**-0.1**
WMn82 - Northern Wet Meadow/Carr	0.2	—	—	—	—	—	—	—	**0.2**	**0.2**	**+1.8**
XDXXOF - Old Field[1]	1.5	0.4	0.3	—	—	2.9	1.0	—	**6.1**	**4.0**	**+19.1**
XDXXXX - Disturbed Land[1]	3.1	5.5	0.9	5.7	1.5	10.1	4.5	10.9	**42.2**	**18.9**	**—**
Total	**10.3**	**6.3**	**1.8**	**6.9**	**2.2**	**26.2**	**6.3**	**11.7**	**71.7**	**38.0**	**—**

[1] Codes were created for habitat not included in ECS classification system.
[2] Temporary ROW acreages do not include the area within the permanent ROW. There would be no permanent impacts to the temporary ROW as these habitats will be allowed to regenerate following construction.
[3] Negative values indicate a loss of habitat and positive values indicate a gain of habitat.

Aquatic Communities

The pipeline from Area 6 and Stephens Mine to Area 2WX would cross two streams; the pipeline from Area 9 South to Area 6 would cross one stream; and the pipeline from Area 9 North (Donora Mine) to Area 6 would cross one stream. Section 4.7 describes these stream crossings. In each case, construction of the pipeline is proposed to be conducted using open cut trenching. Construction methods and potential impacts would be as described in Section 4.8.2.1.

Protected Species

There are no known occurrences of state-listed protected or otherwise rare species within 1 mile of **any of the Process Water Supply Pipeline segments**. **As described in Section 4.8.2.1, adverse impacts on Canada lynx and gray wolf are not expected. Having been disturbed extensively during mining activities, the area is devoid of habitat for these species.**

Potable Water and Sewer Pipelines (East Range Site)

Vegetation and Habitat

Table 4.8-12 (added for the Final EIS) provides a summary of impacts to wildlife habitats by ECS habitat type that would result from the proposed Potable Water and Sanitary Sewer Pipelines. The temporary and permanent ROWs would be as described for the West Range Potable Water and Sewer Pipelines. The main habitat type that would be affected is northern wet mesic boreal hardwood conifer forest, which would experience about 1 acre of direct habitat loss as well as fragmentation. Impacts on wildlife would be as generally described in Section 4.8.2.1.

Table 4.8-12. Vegetation and Habitat Impacts (acres), Potable Water and Sewer Pipelines (East Range Site)

ECS Codes[1]	Permanent ROW Area	Temporary ROW Impact[2]	Permanent ROW Change[3]
LKi54 - Inland Lake Clay/Mud Shore	0.5	0.7	—
MHn35 - Northern Mesic Hardwood Forest	0.4	1.2	-0.4
MHn44 - Northern Wet-Mesic Boreal Hardwood-Conifer Forest	1.3	2.8	-1.3
WFn55 - Northern Wet Ash Swamp	0.1	0.2	-0.1
WMn82 - Northern Wet Meadow/Carr	—	—	+0.1
XDXXOF - Old Field[1]	5.3	6.6	+1.7
XDXXXX - Disturbed Land[1]	0.7	0.7	—
Total	**8.1**	**12.2**	—

¹ Codes were created for habitats not included in ECS classification system.
² Temporary ROW acreages do not include the area within the permanent ROW. There would be no permanent impacts to the temporary ROW as these habitats will be allowed to regenerate following construction.
³ Negative values indicate a loss of habitat and positive values indicate a gain of habitat.

Aquatic Communities

The Potable Water and Sewer Pipelines are proposed to cross a relatively narrow portion of Colby Lake. The pipelines would be directionally drilled beneath the lake unless bedrock is encountered, which would require the pipelines to be installed by microtunneling. The pipelines would emerge about 100 feet beyond the edges of both sides of the lake. Since the pipelines would be drilled beneath Colby Lake no impacts to aquatic communities would be expected. **Construction methods and potential impacts would be as described in Section 4.8.2.1.**

Protected Species

There are no known occurrences of state-listed protected or otherwise rare species within 1 mile of the Potable Water and Sewer Pipelines; therefore, impacts to these resources or their habitats are not expected for this alternative**. As described in Section 4.8.2.1, adverse impacts on Canada lynx and gray wolf are not expected.**

Rail Line Alternatives (East Range Site)

Section 2.3.2.2 describes the Rail Line Alternative alignments, as shown in Figure 2.3-6 (Chapter 2). Table 4.8-13 (added for the Final EIS) summarizes the impacts from construction of the alignments on vegetation and habitat acreage by ECS category. The table does not reflect impacts already attributed to the Power Plant Footprint. The impacts of the alternative alignments are described in the following subsections.

Table 4.8-13. Vegetation and Habitat (acres), Rail Line (East Range Site)

ECS Codes[1]	Alternative 1		Alternative 2
	Rail Line	Center Loop[2]	Rail Line
APn80 - Northern Spruce Bog	0.9	0.1	0.4
APn81 - Northern Poor Conifer Swamp	0.5	—	0.3
FPn63 - Northern Cedar Swamp	—	—	11.7
FPn73 - Northern Rich Alder Swamp	0.7	—	0.7
MHn35 - Northern Mesic Hardwood Forest	24.2	35.2	23.8
MHn44 - Northern Wet-Mesic Boreal Hardwood-Conifer Forest	13.6	20.0	10.9
MRn83 - Northern Mixed Cattail Marsh	2.7	22.9	5.3
WFn55 - Northern Wet Ash Swamp	8.6	25.3	1.1
WMn82 - Northern Wet Meadow/Carr	0.1	1.3	0.1
XDXXOF - Old Field[1]	0.8	—	1.8
XDXXXX - Disturbed Land[1]	1.2	—	2.0
Total	**53.2**	**104.8**	**58.0**

¹ Codes were created for habitats not included in ECS classification system.
² Depending on final design specifications for the center loop, habitat may not be impacted and would continue to exist in current form.

Rail Line Alternative 1 and Center Loop

Vegetation and Habitat

Table 4.8-13 summarizes impacts to vegetation and wildlife habitats by ECS category that would result from the proposed Rail Line Alternative 1. The main habitat types that would be affected are northern mesic hardwood forest and northern wet-mesic boreal hardwood-conifer forest, which would respectively experience about 24 acres and 14 acres of direct habitat loss, as well as fragmentation through construction of the rail line. Wetland habitat conversions would also occur as described in Section 4.7; however, unlike utility corridors, these wetlands areas will be lost through construction of the rail line as opposed to being converted into herbaceous dominated communities. Vegetation and habitat, including wetlands, which exist within the center loop would be avoided during construction to the extent practicable and may not be permanently altered depending on the final design specifications.

Impacts on wildlife would be as described in Section 4.8.2.1. Impacts resulting from habitat fragmentation during construction and mortality due to collisions with trains during operations would be principal concerns.

Aquatic Communities

The construction of Rail Line Alternative 1 would require crossing two streams, which could directly affect fisheries and aquatic life. **The potential impacts on aquatic life would be as described in Section 4.8.2.1**.

Upon the completion of construction, continued fish passage would be assured through the installation of culverts and the bridging of watercourses. The restoration of fish passage would adhere to the grades, habitat restoration, and other specifications established by the FERC, Mn/DOT, and the FHWA regulations.

Protected Species

As described in Section 4.8.2.1, adverse impacts on Canada lynx and gray wolf are not expected based on the results of the BA. During plant operation, the potential for collisions with trains would be the impact of most concern.

There are no known occurrences of state-listed protected or otherwise rare species within 1 mile of Rail Line Alternative 1.

Rail Line Alternative 2

Vegetation and Habitat

Table 4.8-13 summarizes impacts to wildlife habitats by ECS category that would result from the proposed Rail Line Alternative 2. This alternative does not have a center loop as it would cross the site rather than looping within it. The main habitat type that would be affected is northern mesic hardwood forest, which would experience about 24 acres of direct habitat loss as well as fragmentation through construction of the rail line. Wetland habitat conversions would also occur as described in Section 4.7; however, unlike utility corridors, these wetlands areas will be lost through construction of the rail line as opposed to being converted into herbaceous dominated communities.

Impacts on wildlife would be as described in Section 4.8.2.1. Impacts resulting from habitat fragmentation during construction and mortality due to collisions with trains during operations would be principal concerns.

Aquatic Communities

The construction of Rail Line Alternative 2 would require one stream crossing and would directly affect fisheries and aquatic life**. The potential impacts on aquatic life would be as described in Section 4.8.2.1.**

Upon the completion of construction, continued fish passage would be assured through the installation of culverts and the bridging of watercourses. The restoration of fish passage would adhere to the grades, habitat restoration, and other specifications established by the FERC, Mn/DOT, and FHWA regulations.

Protected Species

As described in Section 4.8.2.1, adverse impacts on Canada lynx and gray wolf would not be expected. During plant operation, the potential for collisions with trains would be the impact of most concern.

There are no known occurrences of state-listed protected or otherwise rare species within 1 mile of Rail Line Alternative 2.

Access Road Alignments (East Range Site)

Vegetation and Habitat

As a result of concerns raised by the USACE and other agencies regarding the need to avoid and minimize impacts to wetland habitats, the looped Access Road described in the Draft EIS was revised. Excelsior's current preferred Access Road for the East Range Site would connect the plant footprint with CR 666 directly to the east of the East Range Site as described in Section 2.3.2.2. The

single Access Road would affect 10 acres less vegetation than the original looped Access Road. This change would result in mixed wood forests incurring the highest acreage of impact. Table 4.8-14 provides a summary of impacts to vegetation and wildlife habitats by ECS category that would result from the revised Access Road alignment in comparison to the original alignment. The revised alignment would cross the wetlands at the most narrow point to reduce impacts. The main habitat type that would be affected is northern wet-mesic boreal hardwood-conifer forest, which would experience about 8 acres of direct habitat loss as well as fragmentation. Impacts on Temporary and Permanent ROWs would be as described for West Range Access Road alignments. Impacts on wildlife would be as generally described in Section 4.8.2.1.

Table 4.8-14. Vegetation and Habitat Impacts (acres), Access Road (East Range Site)

ECS Codes[1]	Temporary ROW Impact[2]		Permanent ROW Change[3]	
	Revised Alignment	Original Alignment	Revised Alignment	Original Alignment
FPn73 - Northern Rich Alder Swamp	0.1	1.4	-0.1	-1.6
MHn35 - Northern Mesic Hardwood Forest	2.7	3.2	-4.8	-4.8
MHn44 - Northern Wet-Mesic Boreal Hardwood-Conifer Forest	4.6	12.0	-8.2	-17.9
MRn83 - Northern Mixed Cattail Marsh	—	0.2	—	-0.1
WFn55 - Northern Wet Ash Swamp	1.7	1.4	-2.7	-2.1
WMn82 - Northern Wet Meadow/Carr	—	—	—	—
XDXXOF - Old Field[1]	0.2	0.4	-0.3	-0.8
XDXXXX - Disturbed Land[1]	0.2	0.3	-0.1	-0.4
Total	**9.5**	**18.7**	**-16.1**	**-27.7**

¹ Codes were created for habitats not included in ECS classification system.
² Temporary ROW acreages do not include the area within the permanent ROW. There would be no permanent impacts to the temporary ROWs as these habitats will be restored following construction.
³ Negative values indicate a loss of habitat.

Aquatic Communities

There are no surface water crossings that would be associated with the Access Road.

Protected Species

As described in Section 4.8.2.1, adverse impacts on Canada lynx and gray wolf are not expected based on the results of the BA. During plant operation, the potential for collisions with vehicles would be the impact of most concern.

There are no known occurrences of state-listed protected or otherwise rare species within 1 mile of the Road Alignments.

4.8.5 Impacts of the No Action Alternative

For the purposes of this EIS, as explained in Section 2.1.1.2, the DOE No Action Alternative is assumed to be equivalent to a "No Build" Alternative. Under the No Action Alternative, no project-related development would occur and there would be no impact or change in baseline conditions relating to biological resources.

4.8.6 Summary of Impacts

Tables 4.8-15 and 4.8-16 (added for the Final EIS), respectively, compare the acreages of permanent vegetation and habitat change by ECS category for Mesaba Generating Station Phases I and II at the West Range and East Range Sites based on Excelsior's preferred configurations for

Table 4.8-15. Permanent Vegetation and Habitat Impacts (acres), West Range Site and Corridors

ECS Category	Power Plant Footprint	HVTL	Natural Gas Pipeline	Process Water Pipelines	Potable Water and Sewer	Rail Line	Access Road	Total
Preferred Alignment:	Both Phases (Shifted)	HVTL Alt 1	Alternative 1	All Segments	All ROW	Alternative 3B	Access Road 3	
AFXXXX - Aspen Forest	-7.6	-18.8	-10.4	-7.8	—	-3.5	-6.5	**-54.6**
APn80 - Northern Spruce Bog	—	-0.4	-1.0	—	—	—	—	**-1.4**
APn81 - Northern Poor Conifer Swamp		—		-1.8	-0.6	—	—	**-2.4**
APn90 - Northern Open Bog	—	+4.2	+1.0	—	—	—	—	**+5.2**
FPn63 - Northern Cedar Swamp		—		—	—	—	—	—
FPn73 - Northern Rich Alder Swamp	—	-7.7	-4.0	-1.5		-2.0	-0.2	**-15.4**
FPn81 - Northern Rich Tamarack Swamp (Water Track)	—	—	—	—	—	—	—	—
FPn82 - Northern Rich Tamarack Swamp (Western Basin)	—	-3.8	—	+4.1	—	—	—	**+0.3**
LKi54 - Inland Lake Clay/Mud Shore	—	—	—	—	—	—	—	—
MHn35 - Northern Mesic Hardwood Forest	-150.8	-19.5	-38.6	-23.0	—	-29.4	-5.2	**-266.5**
MHn44 - Northern Wet-Mesic Boreal Hardwood-Conifer Forest	-12.3	-14.7	-12.5	-11.5	-0.4	-42.0	—	**-93.4**
MRn83 - Northern Mixed Cattail Marsh	-0.5	—	—	—	—	-0.1	—	**-0.6**
MRn93 - Northern Bulrush-Spikerush Marsh	—	—	—	—	—	—	—	—
OW- Other Water Body	—	—	—	—	—	-0.6	—	**-0.6**
WFn55 - Northern Wet Ash Swamp	-23.3	-5.5	-9.0	-1.7	—	-10.2	—	**-49.7**
WFn64 - Northern Very Wet Ash Swamp	—	—	—	—	—	—	—	—
WMn82 - Northern Wet Meadow/Carr	-7.6	+13.3	+13.0	+0.8	+0.6	-2.1		**+18.0**
XDXXOF - Old Field	—	+53.0	+61.5	+42.3	+0.4	-1.9	-0.2	**+155.1**
XDXXXX - Disturbed Land		—	—	—		-2.3	-0.1	**-2.4**
Total	**-202.1**	—	**—**	**—**	**—**	**-93.8**	**-12.3**	**-308.4**

Table 4.8-16. Permanent Vegetation and Habitat Impacts (acres), East Range Site and Corridors

ECS Category	Power Plant Footprint	HVTL	Natural Gas Pipeline	Process Water Pipelines	Potable Water and Sewer	Rail Line	Access Road	Total
Preferred Alignment:	Both Phases	HVTL Alt 2	ROW	All Segments	All	Alternative 1	Revised Alignment	
AFXXXX - Aspen Forest		-9.0	—	-0.6	—	—	—	**-9.6**
APn80 - Northern Spruce Bog	-4.8	-46.4	-7.9	-0.2	—	-0.9	—	**-60.2**
APn81 - Northern Poor Conifer Swamp	-2.1	-7.3	—	—	—	-0.5	—	**-9.9**
APn90 - Northern Open Bog	—	+53.7	+8.1	—	—	—	—	**+61.8**
FPn63 - Northern Cedar Swamp	—	—	—	-0.8	—	—	—	**-0.8**
FPn73 - Northern Rich Alder Swamp	-1.1	-69.3	-9.0	-0.7	—	-0.7	-0.1	**-80.9**
FPn81 - Northern Rich Tamarack Swamp (Water Track)	—	-0.7	-0.2	—	—	—	—	**-0.9**
FPn82 - Northern Rich Tamarack Swamp (Western Basin)	—	—	—	—	—	—	—	—
LKi54 - Inland Lake Clay/Mud Shore	—	—	—	—	—	—	—	—
MHn35 - Northern Mesic Hardwood Forest	-13.9	-38.3	-0.8	-7.7	-0.4	-24.2	-4.8	**-90.1**
MHn44 - Northern Wet-Mesic Boreal Hardwood-Conifer Forest	-133.2	-25.8	-1.4	-10.8	-1.3	-13.6	-8.2	**-194.3**
MRn83 - Northern Mixed Cattail Marsh	-3.3	—	—	—	—	-2.7	—	**-6.0**
MRn93 - Northern Bulrush-Spikerush Marsh	—	—	—	—	—	—	—	—
OW- Other Water Body	—	—	—	—	—	—	—	—
WFn55 - Northern Wet Ash Swamp	-22.1	-19.2	-4.4	-0.1	-0.1	-8.6	-2.7	**-57.2**
WFn64 - Northern Very Wet Ash Swamp	—	-2.8	—	—	—	—	—	**-2.8**
WMn82 - Northern Wet Meadow/Carr	-1.8	+92.1	+13.4	+1.8	+0.1	-0.1	—	**+105.5**
XDXXOF - Old Field	-1.0	+73.1	+2.2	+19.1	+1.7	-0.8	-0.3	**+94.0**
XDXXXX - Disturbed Land		—	—	—	—	-1.2	-0.1	**-1.3**
Total	**-183.3**	—	—	—	—	**-53.2**	**-16.1**	**-252.7**

the Power Plant Footprint, HVTLs, utility pipelines, Rail Lines, and Access Roads at the respective sites.

4.8.7 Biological Resources Regulatory Implications and Mitigation

The following sections describe the Federal and state regulatory issues that would be associated with the Proposed Action as well as mitigation measures that could be employed to minimize potential adverse impacts of the Proposed Action.

4.8.7.1 Vegetation and Habitat

No designated Federal Wildlife Refuges, Waterfowl Production Areas, or National Preserves are within or immediately adjacent to the West or East Range Sites or their associated utility or transportation corridors. No MNDNR WMAs, SNAs, designated Game Lakes, or Designated Trout Streams are within or immediately adjacent to the West or East Range Sites. There is a Designated Trout Stream located 2,500 feet east of the West Range HVTL Phase 2 alignment (east of Pengilly) that drains into Swan Lake. This Designated Trout Stream is not directly connected to any wetland or water bodies within the West Range Site or its associated utility or transportation corridors. Because of these findings, no violations under the Fish and Wildlife Coordination Act would be expected as a result of the project for the West or East Range Sites.

Proposed mitigation to comply with the provisions of the Federal Migratory Bird Treaty Act (MBTA) includes limiting timber and land clearing activities, in particular within woodland and forest habitats, to periods outside of the songbird-nesting season (approximately April 15 through August 15). This minimizes the potential for incidental taking of the thousands of potential songbird nests, which would be violating the provisions of the MBTA. Limiting land clearing and/or timber removal to the winter months is the most effective means to comply with this provision. Bird diverters could be used as a BMP along HTVL corridors, where necessary to reduce/avoid impacts to migratory birds.

Given that the West and East Range Sites and their associated utility and transportation corridors are located within timber production areas in the state, subject to frequent clear cutting, comprised entirely of secondary growth, and within the forest setting of northern Minnesota, trees are not rare and no significant impacts to trees are expected. No tree mitigation would occur nor would any mitigation for impacts to terrestrial vegetation, because these are abundant throughout the region **(see Section 5.2.6)**.

For the various utility, pipeline, rail, and road alignments described for the West and East Range Sites, mitigation measures include compliance with the above-mentioned measures of the Federal MBTA to minimize impacts to nesting songbirds. Other mitigation for impacts to fauna would occur through the impact minimization and replacement standards set forth in the various Federal, state, and local permits that would be required when relevant requirements on fauna apply.

Impacts to fauna at the rivers, stream, and water body crossings would be mitigated through the requirements for the NPDES permit, wetland permits, and other environmental permits/approvals required for the respective utility corridors. Mitigation includes the compensatory replacement of wetlands through mitigation when permanent dredge and fill impacts are involved; implementation of erosion, sedimentation, and turbidity control standards specified in the NPDES permit and related erosion control plans; and restoration of grades and bottom contour topographies of water bodies that would be defined through the various permits required for the project. Section 4.7 describes in detail the compensatory mitigation that is expected for impacts to wetland communities based on the requirements set forth in state and Federal law.

4.8.7.2 Protected Species

The USFWS is the only agency that can make the final determination for significance of effects on the Federal resources it protects and determine the required avoidance, minimization, or mitigation measures needed. The USFWS may consider public and other agency comments when making its determination of the significance of effects.

DOE initiated formal consultation with USFWS for the Proposed Action as described in Section 4.8.2.1. USFWS concurred with DOE's determination that the Proposed Action would not likely adversely affect the bald eagle**. On August 15, 2008, DOE submitted a BA for the Canada lynx and a determination that the proposed action may affect, but is unlikely to adversely affect, Canada lynx or their critical habitat. In subsequent discussions, the USFWS requested that, due to uncertainty over the listing of the gray wolf, the BA be revised to include potential effects on the gray wolf. On February 25, 2009, DOE submitted the revised BA addressing impacts to both the Canada lynx and the gray wolf. As stated in this version of the BA (ENSR, 2009) (see Appendix E), "impacts associated with project habitat loss and disturbance, and collisions with vehicles and trains, could impact lynx and gray wolf. Using worst case assumptions, 618 acres of wildlife habitat would be lost within the West Range Site and associated utility and transportation corridors; 929 acres of habitat would be lost within the East Range Site and its associated corridors. Noise, light, and glare from the generating facility could cause lynx and wolves to avoid either area. Lynx and gray wolf could be hit by vehicles or trains. Other potential impacts include human encroachment in the backcountry, and increased interspecific competition facilitated by snow compaction." However, the BA concluded that given the large amount of similar habitat in the region and the low predicted density of Canada lynx and gray wolf in the area, these species and their critical habitat may be affected, but are unlikely to be adversely affected by the Mesaba Energy Project. In a letter sent on May 1, 2009, the USFWS concurred with DOE's conclusion that the proposed action may affect, but is unlikely to adversely affect, Canada lynx, gray wolf or their critical habitat at the West Range Site (Appendix E). In the event that the East Range would be selected for the Proposed Action, DOE would resubmit the BA for USFWS concurrence at the East Range Site.**

The MNDNR is the only agency that can make the final determination of significance of effects on the state resources it protects and determine the required avoidance, minimization, or mitigation measures needed. The MNDNR may consider public and other agency comments when making its determination of significance of effects. Species protected by the Minnesota Endangered Species Statute and species or sensitive habitats listed in the MNDNR NHIS database that may be affected would require coordination with the MNDNR Division of Ecological Services. Mitigation for any NHIS-listed elements, if necessary, would be addressed through this process. Minnesota Statutes provide legal protection for species listed as either "threatened" or "endangered" under the Minnesota Endangered Species Statute (Minnesota Statutes § 84.0895). "Species of special concern" and "non-status" (tracked) species are not legally protected under Minnesota Statutes § 84.0895; therefore, no avoidance, protection, or mitigation measures for taking of species so designated by the MNDNR is required.

Mitigation of impacts to state-listed species can incorporate a wide variety of options ranging from passive measures such as construction timing outside of critical breeding periods, permanent protection of known habitats elsewhere that contain the resource to be affected, or more aggressive measures including complete avoidance of impact. It should be noted that these are not the only mitigation measures that could be undertaken for a project. Each project that affects or potentially affects state-listed protected species is evaluated individually by the MNDNR to determine the appropriate mitigation measures that would be required, which are largely based on the significance of the impact.

The MNDNR NHIS would be reviewed again within a year prior to the start of construction to determine if any new NHIS occurrences have been recorded since the last review for this project was completed in 2005. This is especially important given the West and East Range Sites' proximity to mine pits or other habitats related to bald eagle breeding areas. Such a review accounts for species that are highly motile and/or have good dispersal ability.

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4.9 CULTURAL RESOURCES

4.9.1 Approach to Impacts Analysis

4.9.1.1 Region of Influence

The region of influence for **impacts to** cultural resources **and historic properties** consists of the APE used in cultural resource assessments. The cultural resources APE encompasses two types of cultural resources**:** archaeological and **architectural**. The archaeological APE is defined as all areas of potential effects from aspects of direct, physical impacts through the construction of the Proposed Action and its associated corridors and includes the total disturbance area within the site property and along the length of transportation, pipeline, and HVTL ROWs. The historical visual APE includes a radius of 1 mile surrounding the Mesaba Generating Station and 0.25 mile from the center line of the HVTL and transportation corridors. Although there are no Native American tribal lands within the cultural resources APE, in consideration of Native American concerns, the region of influence is extended to include tribal lands in Itasca and St. Louis Counties.

4.9.1.2 Method of Analysis

The evaluation of potential impacts on cultural resources considered whether the Proposed Action or an alternative would cause any of the following conditions:

- **Adversely affect (based on 36 CFR 800.5) any characteristics that qualify a historic property for inclusion in the National Register. Examples of adverse effects include: physical destruction, alteration, removal from its historic location, change in character, diminished integrity, deterioration through neglect;**
- Potential loss, isolation, or substantial alteration of a Native American cultural resource; or
- Introduction of visual, audible, or atmospheric elements that would adversely affect a Native American cultural resource.

Cultural resource assessments performed on the West Range and East Range Sites and their proposed transportation, HVTL, and pipeline corridors **did not address Native American traditional cultural properties**. **Once the project site and utility corridor routes are designated by the PUC (and in case of the utility corridors, once access to conduct surveys is secured), additional surveys would be conducted for traditional cultural properties under the terms of a Programmatic Agreement (PA) being developed among DOE, SHPO, the Advisory Council on Historic Preservation (ACHP), Excelsior, and Native American Tribes (see discussion of PA below).** As part of the cultural resources assessment, an archaeological sensitivity model was developed using information from previous archaeological testing and fieldwork (106 Group, 2005). This model was then used to determine areas of high archaeological sensitivity within the West Range and East Range Site project areas. Since there are neither recorded archaeological sites nor historic buildings located within the West Range or East Range power plant footprints, the model was generated based on records of documented archaeological sites and NRHP-eligible historic sites within in a 10-mile area around the power plant buffer area and along the associated corridors. Areas within the APE were then categorized in terms of high, moderate, and low potential for the location of archaeological sites. Additional information on the archaeological finds used in the study is discussed in Section 3.9.

The majority of the archaeological sites located in northern Minnesota are found near water bodies (e.g., lakes, rivers, streams, wetlands). Previous research (Anfinson, 1988) indicates that, throughout Minnesota history, rivers and lakes have been the primary location for base and seasonal camps. Criteria used for establishing archaeological sensitivity include topographically prominent areas, evidence for portage routes, and the presence of historic sites or structures. Generally, a higher level of archaeological sensitivity was given to areas located around lakes and rivers than to isolated wetlands.

Field surveys of the areas with high and medium archaeological potential would be performed before construction begins. Areas with low potential for archaeological and areas in which Holocene (i.e., less than 10,000 years old) deposits have been significantly disturbed in the project area and would be excluded from field surveys. The number of sites with high archaeological potential compared to the total disturbed area would determine the degree of the potential archaeological impacts at the Mesaba Generating Station and associated corridors.

4.9.2 Common Impacts of the Proposed Action

4.9.2.1 Impacts of Construction

Nearly all of the potential for impacts to the cultural resources would be during the construction phase of the Proposed Action. Any ground-disturbing construction activity would have the potential to alter or disturb a previously unknown archaeological resource. The previously identified or known archaeological resources within the APE of the selected site would be avoided or removed, pending consultation with the Minnesota SHPO**, the ACHP and Native American tribes**. A Phase I archaeology survey was conducted for area**s** with high archaeological potential on the East Range and West Range sites using the cultural assessment archaeological model. No archaeological resources were identified. **Additional surveys would be conducted for Native American Cultural Resources once the site and utility routes are selected by PUC. Treatment of unanticipated discoveries during construction would be consistent with provisions of a PA being developed among DOE, SHPO, ACHP, and Native American tribes (see discussion of PA below).**

For compliance with Section 106 of the National Historic Preservation Act, consultation was initiated with the Minnesota SHPO in August 2005. Correspondence letters between the SHPO and DOE are included in Appendix E. DOE supplied the SHPO with all of the cultural assessment reports. The SHPO reviewed the cultural assessment reports and in late December of 2006 forwarded to DOE a summary of the status and outstanding survey needs for the project from their perspective. The summaries of SHPO's recommendations are discussed further in the following West and East Range sections. Construction would not commence until all appropriate consultation, identification, and treatment of historic **properties** has occurred.

Depending on the location of historic properties in relation to the Mesaba Generating Station, views of the towers, plumes, and HVTL structures have the potential to affect scenic views of **such properties** in the region. To minimize the impact from adverse views, the power plant would be built in industrial-zoned locations and screened by forests. Sections 4.9.3 and 4.9.4 describe the site-specific historic resources, and Section 4.2 discusses the potential for impacts to the aesthetic resources surrounding the proposed Mesaba Generating Station locations and their corridors.

At either location, the footprints for both Phases I and II of the Mesaba Generating Station would be disturbed during construction for Phase I, because the Phase II footprint would be cleared and prepared as a staging and laydown area for construction of Phase I. Also, the rail and access road corridors, pipeline alignments, and new HVTL corridors would be disturbed for construction and operation of the Mesaba Phase I power plant. Therefore, impacts to cultural resources from a Phase I only outcome for the Mesaba Energy Project would be essentially indistinguishable from the impacts of constructing Phases I and II combined.

During construction for Phase II, offsite staging and laydown areas would be used to stockpile materials and store equipment, and for a cement batch plant. Excelsior would establish these offsite construction staging and laydown areas on 85 acres of land selected from potential sites as described in Section 2.3. All the candidate sites are located on lands that have been disturbed or cleared during prior use by mining companies or other entities that own them.

Following publication of the Draft EIS, DOE continued its outreach to Native American tribes and participated in conferences with tribal representatives as described in Section 1.8. Through meetings with Native American tribes, a private, voluntary Memorandum of Agreement among DOE, Excelsior, and Native American tribes is under consideration to address concerns of the tribes. That agreement would be separate from the PA being developed to address DOE's Section 106 responsibilities. The PA is under negotiation with the Minnesota SHPO, ACHP, Native American tribes and Excelsior Energy and is intended to ensure that: an appropriate APE is specified for any additional historic property surveys; traditional cultural resources are identified through a Phase I archaeological survey; architectural history resources within the APE are identified; eligibility of any potential historic properties for listing on the NRHP is determined; a determination of effects on such properties is made; a comprehensive Historic Property Treatment Plan is developed; and a plan for unanticipated discovery of potential historic properties during construction is implemented.

4.9.2.2 Impacts of Operation

Operation of the Mesaba Generating Station would not disturb the soils surrounding the facility, and therefore would not affect existing archaeological resources. Maintenance and repair of the corridors, especially the pipelines, may cause ground disturbance. However, the repairs would be limited to the areas previously disturbed during construction and with a low potential for archaeological artifacts. The facility personnel would be responsible for avoiding known cultural resources on the Mesaba Generating Station and corridors during operations and repairs. Facility operations would be conducted in compliance with applicable laws, regulations, policies, and procedures **governing historic properties (see Chapter 6, Regulatory and Permit Requirements)**.

4.9.3 Impacts on West Range Site and Corridors

4.9.3.1 Impacts of Construction

In June 2005, the archaeological model was used **in identifying potential historic properties** around the West Range Site and its associated corridors. Shovel testing was performed on potentially moderate- to high-risk areas in the IGCC buffer lands. No archaeological resources were identified in any of the survey trenches. In addition, no archaeological sites are known in the corridor APEs.

Table 4.9-1 provides the results of the 2005 archaeological assessment model at the West Range Site. Approximately 385 acres of the assessment study area were found to have high archaeological potential. The Mesaba Generating Station **footprint** and buffer land **consisted of** 55 acres **of land with high archaeological potential along** Dunning Lake. The rest of the high archaeological potential areas were located along the HVTL corridor, especially where the corridor crossed or passed by wetlands and lakes. Approximately 688 acres of the assessment study area were found to have moderate archaeological potential areas and were identified on drained, elevated areas near wetlands.

Table 4.9-1. Results of the 2005 Archaeological Assessment Model at the West Range Site

	Total Acreage	Total High Potential Areas (acres)	Percentage of Total Project Area	Total Moderate Potential Areas (acres)	Percentage of Total Surveyed Project Area
Total Surveyed Area	6332	385	6%	688	11%
IGCC Buffer Land	1344	55	1%	108	2%
Studied HVTL, Rail and Pipeline Corridors	4988	330	5%	580	12%

Source: 106 Group, 2005a

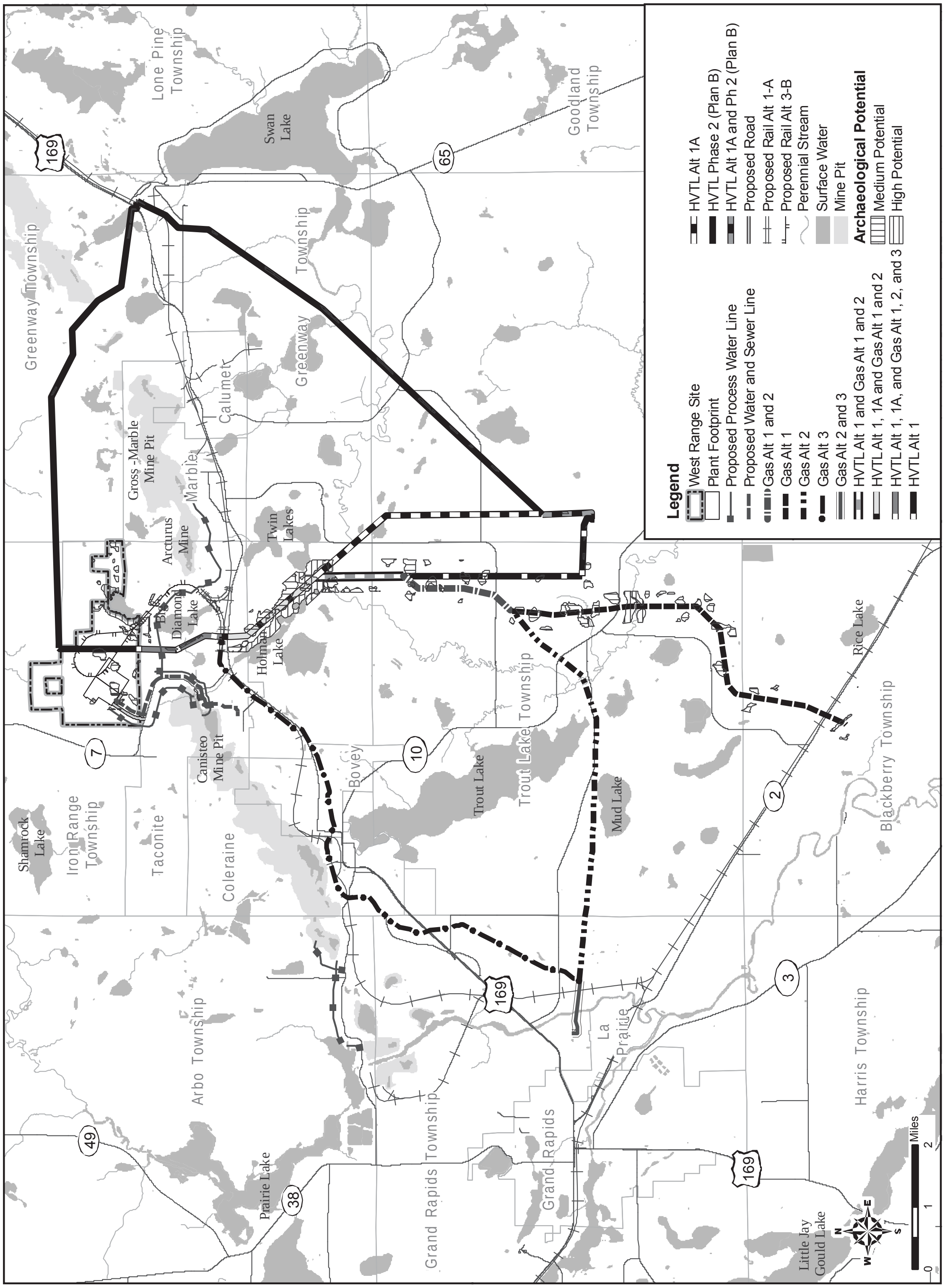

Figure 4.9-1. Archaeological Model for West Range

Figure 4.9-1 shows areas with high archaeological potential, which are located primarily around lakes and rivers. The assessment study area included the IGCC buffer lands, the WRA-1 and WRB-2A HVTL Alternatives, Process Water Segments 2 and 3, Rail Alignment Alternative 1A, and Access Roads 1 and 2. The Natural Gas Pipeline Alternatives 1, 2, and 3; the Process Water Segment 1; and Rail Alignment Alternative 3B were not studied as part of the assessment study area, however their archaeological potential is considered to be similar to the studied corridors. The Phase II HVTL, and Potable Water and Sewer pipelines were not surveyed. However, these corridors would be constructed on existing corridors and archaeological resources would likely not be present.

The cultural resources **report** also included an analysis of the local NRHP-listed or eligible properties to determine the potential for visual-related impacts from the Mesaba Generating Station and its transportation and utility. The West Range Site and associated corridors would be located in part of the Western Mesabi Iron Range Early Mining Landscape District, which includes portions of the mining landscape, the communities of Coleraine, Bovey, Taconite, and Holman, and specific railroad spurs.

Eleven architecturally historic properties recorded in SHPO records are found within the visual APE (Table 3.9-2). Two of them, the Great Northern Railway Nashwauk-Gunn Line and the Duluth, Missabe, and Northern Railway Alborn Branch, are eligible for listing on the NRHP. The rest of the properties are either not eligible, have not been evaluated, or are not extant. These rail lines are not located in the IGCC buffer lands. The construction or operation of the Mesaba Generating Station would not detract from the regional industrial character, which includes these rail lines. Potential views of the emission stacks and HVTL corridors would also be **partially** shielded by the surrounding forests. Additional consultation with the SHPO during construction would ensure that any changes to the historical character of the District would be considered and potential impacts avoided wherever possible.

In 2006, in accordance with Section 106 of the National Historic Preservation Act, DOE provided Minnesota SHPO with the results from the West Range cultural **resources report**. In response, the Minnesota SHPO provided DOE with a summary of outstanding survey needs from their perspective. In order to minimize the potential for uncovering previously unknown archaeological resources, SHPO recommended surveying the locations with a high and medium potential for archaeological sensitivity prior to construction. In addition, areas around NRHP-eligible properties (Table 3.9-2) would need to be surveyed if their terrain would be disturbed from construction activities.

A Phase I archaeological survey of locations with high and medium potential was conducted at the West Range site in 2007, consistent with the recommendations of the SHPO. The survey did not uncover any previously unknown resources within the site boundaries **and SHPO concurred with the findings of that survey in a December 2007 letter. An architectural survey was completed for the West Range plant site in January 2008, and identified the Holman-Cliffs Mine Landscape District as the only property in the area of potential effect that was potentially eligible for listing on the National Register of Historic Places. A subsequent report completed in June 2008 concluded that the property would not be adversely impacted by the Mesaba Energy Project (Summit Envirosolutions, 2008). If the West Range Site is specified in the PUC site permit, additional surveys for Native American Cultural Resources would be conducted. These surveys would use methodology agreed upon by DOE, Excelsior, and Native American Tribes who have signed the Programmatic Agreement once it is finalized.**

With regard to the roads, rail lines, HVTL and utility corridors related to the West Range site, archaeological surveys will only be conducted if the West Range site is selected as the site to be permitted by the PUC. And then, only those corridors that are permitted by the PUC will be surveyed. **As stated above,** DOE intends to enter into a **PA with the Minnesota** SHPO**, ACHP, Native American tribes, and Excelsior Energy** to ensure that**: an appropriate APE is specified for any additional historic property surveys; traditional** cultural resources are identified through a Phase I archaeological survey; architectural history resources within the APE are identified; eligibility of any resources for listing on the

NRHP is determined; a determination of effects on such resources is made; a comprehensive Historic Property Treatment Plan is developed; and a plan for unanticipated discovery of cultural resources during construction is implemented.

4.9.3.2 Impacts of Operation

There would be no impacts to archaeological resources due to project operation. All maintenance activities on the HVTL and pipeline corridors would occur either within land that was disturbed due to construction or within the construction study area.

4.9.4 Impacts on East Range Site and Corridors

4.9.4.1 Impacts of Construction

In September 2005, a cultural resources report for the East Range Site and HVTL corridors was completed. This study identified no known NRHP-eligible or known archaeological sites located within the Mesaba Generating Station APE (106 Group, 2005). Areas with high to moderate potential were delineated based on the sensitivity model described in Section 4.9.1.2. **As noted in section 4.9.1.2, traditional cultural property surveys would be conducted on the project site and utility corridors selected by the PUC, in accordance with an approved PA.**

The cultural resources assessment evaluated the archaeological potential for the East Range Plant Site and the corridors. As seen in Table 4.9-2, of the total 30,471 acres, 4,862 acres (16 percent) were delineated as high potential for archaeological artifacts. The areas with high archaeological potential were primarily identified around lakes, streams, and large wetland areas. The total moderate potential areas were calculated at 457 acres, or 1.5 percent of the total project area. Figure 4.9-2 shows the locations of the areas in the East Range Site with high archaeological potential. The Natural Gas Pipeline Route and HVTL corridors were not surveyed, however, the pipeline and HVTL would be **mostly** constructed within existing corridors with previous ground disturbance, and would not be expected to contain any archaeological artifacts. The process water supply pipelines are primarily located within areas that have been previously disturbed by mining activities, and would not be expected to contain archaeological artifacts.

Table 4.9-2. Results of the 2005 Archaeological Assessment Model at the East Range Site

	Total Project Acreage	Total High Potential Areas (acres)	Percentage of Total Project Area	Total Moderate Potential Areas (acres)	Percentage of Total Surveyed Project Area
Total Surveyed Area	30,471	**4,862**	16%	457	1.5%

Source: 106 Group, 2005b

Two confirmed archaeological sites are located within the APE of the **37L/39L** HVTL corridor, as shown on Figure 4.9-2. Sites 21SL0009 and 21SL0390 are located approximately 0.25 miles from the **37L**/39L HVTL **corridor**. These sites are located on the south side of Esquagama Lake approximately one half mile apart. The SHPO site survey forms characterize the sites as mounds, described from anecdotal evidence. These mounds are located at the very edge of the APE and outside the construction ROW.

One archaeological site (21SL0843) is located 0.5 miles west of the **38L** HVTL corridor. This site is outside the construction limits for the proposed HVTL and therefore would not be affected. A fourth archaeological site (21SL0836) (Figure 4.9-2) is outside of the region of influence.

During the cultural resources assessment for the East Range Site, four historic resources were identified within the East Range APE. The potentially eligible Eveleth City Hall and NRHP-listed

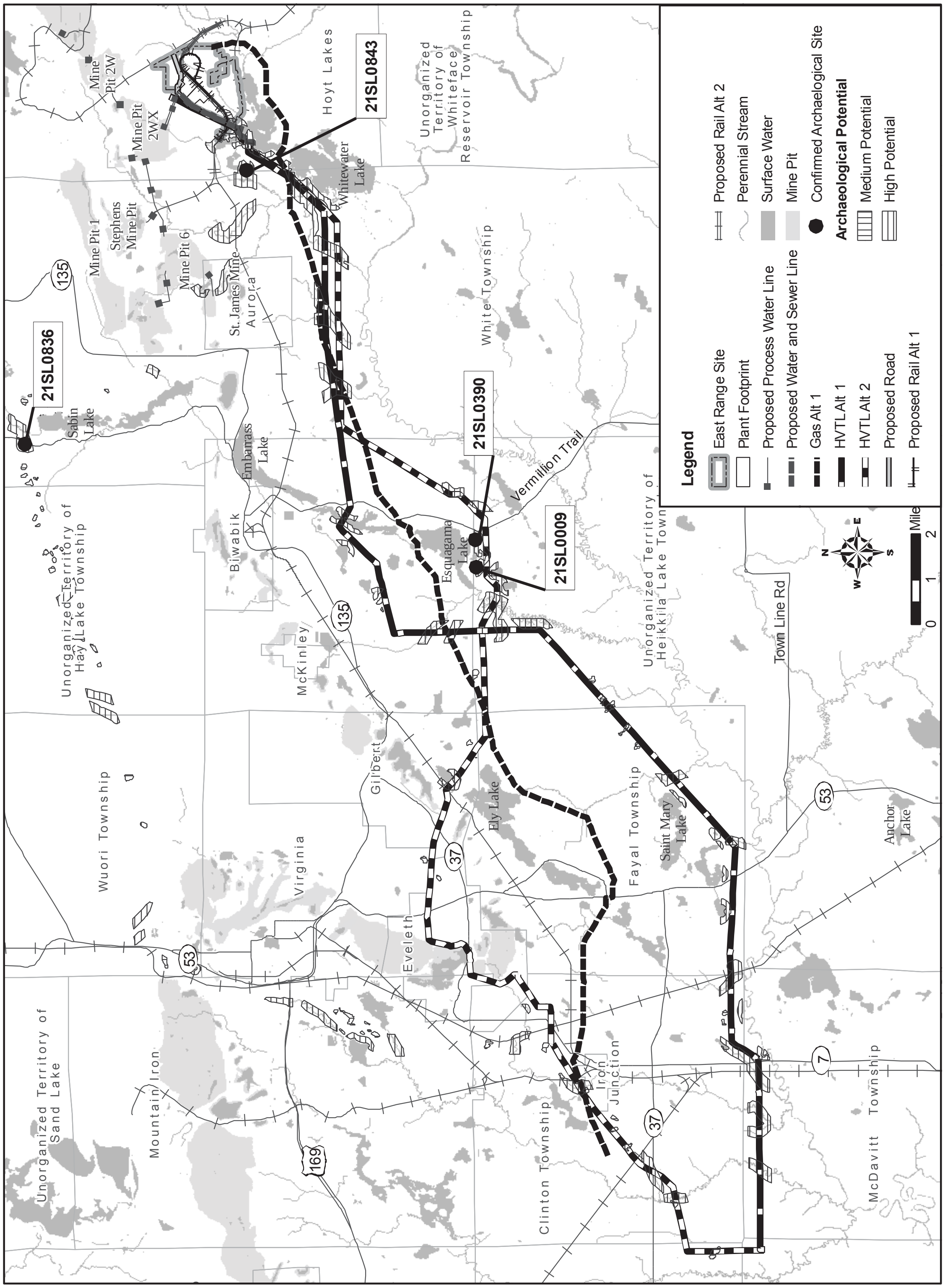

Figure 4.9-2. Archaeological Model for East Range

Eveleth Recreation Building are located within the town of Eveleth, which is crossed by 39L of the **37L/39L** HVTL corridor. The eligible Duluth, Winnipeg, and Pacific Railway Company would also be crossed by HVTL lines south of the Mesaba Generating Station. The NRHP-listed E.J. Longyear First Diamond Drill Site is connected to County Road 666 by a series of nature trails. The primary site is shielded by trees, so would not have line of site views of the proposed power plant; and all construction and operation activities would be conducted to the west of the Longyear site. Communication between DOE and the SHPO indicates that there may be slight positive effects due to new awareness connected with increased traffic flow along County Road 666 (Pukanic, 2006).

In 2006, in accordance with Section 106 of the National Historic Preservation Act, DOE provided Minnesota SHPO with the results from the East Range cultural **resources report**. In response, the Minnesota SHPO provided DOE with a summary of outstanding survey needs from their perspective. For the East Range power plant site, the Phase I surveys are completed, and no further study is needed, provided there would be no terrain disturbance at the Longyear historic site. **In a December 2007 letter, SHPO concurred with DOE's determination of no adverse impact to the Longyear and the Two Harbors to Tower Junction segment of the DM&IR railroad sites.** Prior to construction, the East Range corridors would need additional surveying at the locations with a high and medium potential for archaeological sensitivity. Along the East Range corridors, areas around NRHP-eligible properties (Table 3.9-3) would need to be surveyed if their terrain would be disturbed from construction activities.

If the East Range Site is specified in the PUC site permit, additional surveys for Native American Cultural Resources would be conducted. These surveys would use methodology agreed upon by DOE, Excelsior, and Native American Tribes who have signed the Programmatic Agreement once it is finalized.

With regard to the roads, rail lines, HVTL and utility corridors related to the East Range site, archaeological surveys will only be conducted if the East Range site is selected as the site to be permitted by the PUC. And then, only those corridors that are permitted by the PUC will be surveyed. **As stated above,** DOE intends to enter into a **PA with the Minnesota** SHPO**, ACHP, Native American tribes, and Excelsior Energy** to ensure that: **an appropriate APE is specified for any additional cultural resource surveys;** cultural resources are identified through a Phase I archaeological survey; architectural history resources within the APE are identified; eligibility of any resources for listing on the NRHP is determined; a determination of effects on such resources is made; a comprehensive Historic Property Treatment Plan is developed; and a plan for unanticipated discovery of cultural resources during construction is implemented.

4.9.4.2 Impacts of Operation

All operational activities associated with the East Range Mesaba Generating Station would be restricted to the areas previously disturbed by construction, so no additional impacts are anticipated. Additional cooperation with the SHPO, and state and Federal regulations would minimize the potential for additional impacts.

4.9.5 Impacts of the No Action Alternative

For the purposes of this EIS, as explained in Section 2.1.1.2, the DOE No Action Alternative is assumed equivalent to a "No Build" Alternative. The implementation of the No Action Alternative would not affect **potential historic properties**. The ground disturbance associated with construction would not occur, and in situ resources would remain in place. No structures would be built at the West Range Site or the East Range Site. Therefore, no NRHP or eligible properties would be impacted.

4.9.6 Summary of Impacts

Basis for Impact	No Action	West Range	East Range
Adversely affect any characteristics that qualify a historic property for inclusion in the National Register. (physical destruction, alteration, removal from its historic location, change in character, diminished integrity, deterioration through neglect).	No **potential historic properties** disturbed. **(No new structures built.)**	No documented archaeological sites within APE. **Two railroad spurs eligible for NRHP identified within visual APE, neither found on project property.**	Two archaeological sites identified within the APE of HVTL Alternative 2, but outside of the construction ROW. **One NRHP-listed building, one NRHP-listed historical site, one eligible building, and one eligible railroad spur located within HVTL visual APE.**
Cause loss, isolation or alteration of a Native American cultural resource.	No Native American cultural resources disturbed.	No known Native American cultural resources within APE. **If resources are discovered during subsequent surveys or construction, additional surveys and proper treatment of resources would be implemented in accordance with a Programmatic Agreement.**	No known Native American cultural resources within APE. **If resources are discovered during subsequent surveys or construction, additional surveys and proper treatment of resources would be implemented in accordance with a Programmatic Agreement.**
Cause the introduction of visual, audible or atmospheric elements near Native American **c**ultural resource.	No new structures would be built.	No known Native American cultural resources within 1 mile of power plant footprint. **If resources are discovered during subsequent surveys, construction or operation, additional surveys and treatment of resources would be implemented in accordance with a Programmatic Agreement.**	No known Native American cultural resources within 1 mile of power plant footprint. **If resources are discovered during subsequent surveys, construction or operation, additional surveys and treatment of resources would be implemented in accordance with a Programmatic Agreement.**

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4.10 LAND USE

4.10.1 Approach to Impacts Analysis

4.10.1.1 Region of Influence

The regions of influence for land use affected by the Mesaba Generating Station include the lands within the West Range Site and East Range Site boundaries and neighboring lands within 1 mile of the respective generating station footprints. The regions of influence for land use affected by utility and transportation corridors for the West Range and East Range locations include the alignments and neighboring lands within 0.5 mile of the centerline of each alignment.

4.10.1.2 Method of Analysis

The evaluation of potential impacts on land use considered whether the Proposed Action or an alternative would cause any of the following conditions:

- Conflict with existing land uses on surrounding properties in the regions of influence;
- Conflict with jurisdictional zoning ordinances applicable to project areas; or
- Conflict with local and regional land use plans applicable to project areas.

Relevant documents that were reviewed to determine potential adverse land use impacts include the following:

- City of Hoyt Lakes Zoning Ordinance;
- City of Taconite Zoning Ordinance;
- Itasca County Zoning Ordinance;
- Itasca County Comprehensive Land Use Plan;
- St. Louis County Zoning Ordinance No. 46 (St. Louis County, 2003);
- St. Louis County Proposed East Range Plan and Zoning; and
- St. Louis County Land Department Environmental Policy.

As an innovative energy project defined by Minnesota Statues § 216B.1694, the Mesaba Energy Project is exempt from the requirement for a Certificate of Need and would have the power of eminent domain limited to sites and alignments approved by the PUC.

4.10.2 Common Impacts of the Proposed Action

4.10.2.1 Impacts of Construction

Impacts on adjacent land uses during construction at sites, along existing roads used to transport equipment to the sites, and along corridors for HVTLs, natural gas pipelines, water and effluent pipelines would result from fugitive dust emissions, construction traffic, and noise. These temporary impacts would affect adjacent land uses during the periods of construction as described in Sections 4.3, 4.15, and 4.18, respectively.

During construction for Phase II, temporary offsite staging and laydown areas would be acquired and used to stockpile materials and store equipment, and for a cement batch plant. Excelsior would establish these offsite construction staging and laydown areas on 85 acres of land selected from potential sites as described in Section 2.3. All the candidate sites are located on lands owned by mining companies and all have been disturbed or cleared during prior use. Following construction, these areas would be restored to pre-existing conditions.

The proposed HVTL routes traverse remote areas with relatively few landowners as described in Section 3.10. Existing HVTL ROWs would be used to the extent practicable as described in Section 2.3.

Widening of the existing corridors as necessary may affect undisturbed lands adjacent to the existing ROWs. However, because the ROW is already cleared as a corridor for power transmission lines, it is not anticipated that additional widening of the corridor would affect adjacent land uses substantially. Easements across public and private lands would be required for new ROWs. New corridors would be cleared and replanted with grasses and low vegetation after construction. Landowners would have use of corridors subject to restrictions on permanent structures and the planting of trees and tall vegetation.

Minnesota Rules **7849.5930** specifically identifies prohibited HVTL routes. For example, no HVTL may be routed through state or national wilderness areas. HVTLs also may not be routed through state or national parks or state scientific and natural areas unless the HVTL would not materially damage or impair the purpose for which the area was designated, and no feasible and prudent alternative exists. Since none of the proposed HVTL routes pass through prohibited areas, there would be no land use impacts to these areas. Minnesota Rules **7849.5940**, Subpart 4 restricts the amount of prime farmland soils disturbed by electric power plants. Section 4.4 provides information on prime farmland on the West Range and East Range Sites.

The PUC has jurisdiction over natural gas pipelines within the state, which are subject to Minnesota Rules Chapter **7852**. Interstate natural gas pipelines are regulated by the Federal Energy Regulatory Commission under the Federal Natural Gas Act.

Excelsior or a pipeline owner would negotiate with landowners for easements to install gas pipelines on each tract that the route would cross. New pipeline corridors would be cleared for construction and would be replanted after installation of the pipeline. However, vegetation would be limited in height to permit access for pipeline maintenance. Also, the use of the corridors by landowners would be subject to certain restrictions whereby landowners would agree not to build any structures in the easement or remove any land cover from above the pipeline without the consent of the pipeline owner.

Construction of water and discharge pipelines would have impacts on land use comparable to those for natural gas pipelines. Construction of rail alignments and access roads would have similar impacts on adjacent land uses related to fugitive dust emissions, construction traffic, and noise as described in Sections 4.3, 4.15, and 4.18, respectively.

4.10.2.2 Impacts of Operation

The operation of the Mesaba Generating Station would have impacts on adjacent land uses mainly attributable to the impacts on environmental resource areas as described throughout this chapter. In particular, impacts on surrounding land uses would result from changes in viewsheds (Section 4.2), air emissions (Section 4.3), water use and effluent discharges (Section 4.5), socioeconomic conditions (Section 3.11), community services (Section 3.13), utility systems (Section 4.14), traffic and rail transport (Section 4.15), materials and wastes (Section 4.16), safety and health (Section 4.17), and noise (Section 4.18). Specific discussions of the land use compatibility of the Mesaba Generating Station and associated ROWs are provided separately for the West Range and East Range in the following sections.

4.10.3 Impacts on West Range Site and Corridors

Site features and corridor alignments for the Mesaba Generating Station on the West Range are described and illustrated in Section 2.3.1. **Because the entire West Range Site property, rail and access road corridors, pipeline alignments, and new HVTL corridors would be acquired for construction and operation of the Mesaba Phase I power plant, land-use impacts from a Phase I only outcome for the Mesaba Energy Project would be essentially indistinguishable from the Phase I and II impacts combined. The only exception would be the potential avoidance of the need to upgrade HVTLs in the event that MISO decisions require the implementation of Plan B, Phase II (see Section 2.3.1.5).**

4.10.3.1 Impacts of Construction

The proposed Mesaba Generating Station footprint on the West Range Site is located in the City of Taconite, within Iron Range Township, and entirely within an area zoned by Itasca County and the City of Taconite as an Industrial (I) District. There are no buildings on the site. The facility is compatible with an I District and would be approvable as a conditional use in the district. Therefore, construction of the proposed power station would not conflict with existing land use, zoning, or comprehensive plans affecting the West Range Site. Adjacent properties to the west of the site along CR 7 are zoned as Farm Residential and Rural Residential Districts. The residential properties on the north shore of Big Diamond Lake and southeast shore of Dunning Lake are zoned as Rural Residential Districts. As described in Section 3.10, approximately 50 residential properties would be located within one mile of the station footprint. Although buffered by 0.5 mile or more of densely wooded lands, these existing properties would experience the most adverse impacts during construction on the site. Impacts from construction activity would be as described in Section 4.10.2.1.

Both Excelsior's preferred Rail Alignment Alternative 3B and Rail Alignment **Alternative** 1A for the rail spur would pass between Big Diamond Lake and Dunning Lake on land zoned for industrial use by Itasca County and the City of Taconite. Rail Alignment Alternative 1B would pass to the east of both Big Diamond Lake and Dunning Lake also on land zoned for industrial use. Approximately 16 residences are located within 0.5 mile of the centerline of Alignment**s 3B and** 1A, while approximately eight residences are located within 0.5 mile of Alignment 1B. **Excelsior's preferred Access Road 3 alignment would pass within 1,250 feet of two residences located on CR 7 near the southwestern corner of the West Range Site property boundary. No other residences are located within 0.5 mile of the centerline of the proposed alignment of Access Road 3.** The proposed realignment of CR 7 **(recently deferred by Itasca County)** would pass between Big Diamond Lake and Dunning Lake and extend directly to the west, just north of Diamond Lake Road, which is an existing "heavy haul" road now used for access by local residents. Approximately 22 residences are located within 0.5 mile of the centerline of the proposed CR 7 realignment **(Access Road 1)** and the access road to the station footprint **(Access Road 2)**. Rail and road construction would have impacts as described in Section 4.10.2.1. Construction of these two transportation elements would likely take place over a two-year period, temporarily interrupting the residents' normal daily activities. Thereafter, increased levels of construction traffic would be ongoing over several years as construction of the Mesaba Generating Station proceeds.

The proposed alignments for process water supply pipelines would be located on lands zoned for industrial use but within 0.5 mile of 104 residences, most of which are in the vicinity of Marble. Only four residences would be located within 500 feet of the centerline. The proposed alignments for potable water, sanitary wastewater, and process water effluent pipelines would cross primarily industrial lands adjacent to existing transportation corridors. The process water effluent pipelines **(which would be eliminated by the use of an enhanced ZLD system)** would be located within 0.5 mile of 14 residences, two of which would be located within 500 feet. The potable water and sanitary pipelines would be located within 0.5 mile of 114 residences, primarily in the City of Taconite urban area, four of which only would be located within 500 feet. The construction of these pipelines would have impacts as described in Section 4.10.2.1.

Among the alternative alignments for the natural gas pipeline to serve the West Range Site, the Preferred Alignment 1 would be located in lands zoned for industrial and farm-residential uses and would pass within 0.5 mile of 153 residences. Only three residences would be located within 300 feet. Alternative Alignment 2 would pass within 0.5 mile of 339 residences in lands zoned for industrial and farm-residential uses, of which five residences would be located within 300 feet. The corridor for Alternative Alignment 3 would pass through populated areas in Bovey and Coleraine within 0.5 mile of 935 residences in industrial and farm-residential lands. Approximately 29 residences would be located within 300 feet. The construction of the pipeline would have impacts as described in Section 4.10.2.1.

Preferred HVTL route WRA-1 (WRB-1) and alternative route WRA-1A (WRB-1A) would traverse areas that have similar residential density profiles, and each would require the acquisition of approximately 6 miles of new ROW in lands zoned as I and Farm Residential Districts. Easements would be negotiated with several property owners, at which time the routing may be subject to minor changes. Route WRA-1 (WRB-1) would pass within 0.5 mile of 66 residences, four of which would be located within 500 feet of the centerline. Route WRA-1A (WRB-1A) would pass within 0.5 mile of 62 residences, seven of which would be located within 500 feet of the centerline. Alternative route WRB-2A would follow existing HVTL ROWs in I and Farm Residential Districts that pass within 0.5 mile of 214 residences, of which 29 are located within 500 feet of the existing centerline. The construction of the HVTLs would have impacts as described in Section 4.10.2.1.

4.10.3.2 Impacts of Operation

The operation of the Mesaba Generating Station at the West Range Site would be consistent with other activities on lands zoned for industrial use. The region of influence for land use would include the same properties as described for construction impacts in Section 4.10.3.1. Impacts on surrounding land uses during operations would be as described in Section 4.10.2.2.

Unit train operations on the rail spur and traffic on realigned CR 7 **(now deferred by Itasca County)** and the station access road at the West Range Site would have the most adverse effects on properties in the regions of influence for the respective alignments as described in Section 4.10.3.1. The impacts would be as described in Section 4.10.2.2.

Once constructed, the various pipelines for natural gas supply, process water supply, potable water supply, cooling tower blowdown discharge **(which would be eliminated by the use of an enhanced ZLD system)**, and sanitary wastewater would have limited impacts on adjacent land uses in the regions of influence for respective alignments. The principal impacts would result from the restrictions on land uses in the ROWs by property owners, the need to limit the height of vegetation in the ROWs, which would create linear clearings within wooded areas, and the need for utility vehicles to access the corridors periodically for inspection and maintenance. These impacts would be most adverse for properties affected by new ROWs as described in Section 4.10.3.1, because existing ROWs would experience little change in existing activities.

Once constructed, the HVTL facilities would have limited impacts on adjacent land uses in the regions of influence for respective alignments. The principal impacts would result from the changes in viewsheds caused by the HVTL towers and lines, restrictions on land uses in the ROWs by property owners, the need to limit the height of vegetation in the ROWs, which would create linear clearings within wooded areas, and the need for utility vehicles to access the corridors periodically for inspection and maintenance. These impacts would be most adverse for properties affected by new ROWs as described in Section 4.10.3.1.

There are no anticipated land use impacts to farmland on the West Range Site or associated corridors. Section 4.4 provides more discussion of prime farmland. The proposed operations would not affect land use on public lands adversely.

4.10.4 Impacts on East Range Site and Corridors

Site features and corridor alignments for the Mesaba Generating Station on the East Range are described and illustrated in Section 2.3.2. **Because the entire East Range Site property, rail and access road corridors, pipeline alignments, and HVTL corridor expansions would be acquired for construction and operation of the Mesaba Phase I power plant, the land-use impacts from a Phase I only outcome for the Mesaba Energy Project would be indistinguishable from the Phase I and II impacts combined.**

4.10.4.1 Impacts of Construction

The proposed Mesaba Generating Station footprint on the East Range Site is located on **former** CE property in the City of Hoyt Lakes, entirely within an area zoned as a MD. There are no buildings on the site. The facility is compatible with other uses in an MD zone and would be approvable as a conditional use in the district. Therefore, construction of the proposed power station would not conflict with existing land use, zoning, or comprehensive plans affecting the East Range Site. As described in Section 3.10, no residential properties are located within one mile of the proposed station footprint. The nearest residential land uses are located along the southeastern shore of Colby Lake more than one mile south of the station footprint and consist of areas zoned for single family residences (R-1) and two family residences and townhouses (R-5). These properties would be buffered from the station footprint by 0.5 mile or more of densely wooded lands, but they may experience adverse impacts during construction on the site as described in Section 4.10.2.1.

No residences are located within 0.5 mile of either alternative rail alignment or the access road for the generating station, which would be located on **former** CE property zoned MD. Therefore, the impacts from construction of these features on land use as described in Section 4.10.2.1 would be minimal.

The proposed alignments for process water supply pipelines would be located entirely on CE property on land zoned MD. No residences are located within 0.5 mile of any proposed process water supply pipeline segments, and there would be no process water effluent pipeline for the generating station at the East Range Site. No residences are located within 0.5 mile of the proposed potable water supply and sanitary wastewater pipeline alignments. Therefore, the impacts from construction of these features on land use would be minimal.

The proposed natural gas pipeline to serve the East Range Site would follow the existing ROW for NNG's smaller pipeline serving the **former** CE property, which crosses lands zoned for various uses. The alignment passes within 0.5 mile of 856 residences between Iron Junction and Hoyt Lakes, although only 46 residences are within 300 feet of the centerline. The construction of the pipeline would have impacts as described in Section 4.10.2.1.

Alternative HVTL routes for the East Range Site would follow existing HVTL ROWs that cross lands zoned for various uses between the **former** CE property and the Forbes substation. The 38L alignment passes within 0.5 mile of 271 residences, although only 22 are located within 500 feet of the centerline. The 39L and 37L alignments pass within 0.5 mile of 962 residences, although only 49 are located within 500 feet of the centerline. The construction for HVTLs would have impacts as described in Section 4.10.2.1.

4.10.4.2 Impacts of Operation

The operation of the Mesaba Generating Station at the East Range Site would be consistent with other activities on the **former** CE property that is zoned for mineral mining. There are no residential properties in the region of influence for land use. The impacts from operation of the generating station would be as described in Section 4.10.2.2.

Unit train operations on the rail spur and traffic on the station access road at the East Range Site would occur entirely within **former** CE property zoned MD. There are no residential properties in the region of influence. The impacts from rail and road operations would be as described in Section 4.10.2.2.

Once constructed, the various pipelines for natural gas supply, process water supply, potable water supply, and sanitary wastewater would have limited impacts on adjacent land uses in the regions of influence for respective alignments. The principal impacts would result from the restrictions on land uses in the ROWs by property owners, the need to limit the height of vegetation in the ROWs, which would create linear clearings within wooded areas, and the need for utility vehicles to access the corridors periodically for inspection and maintenance. Existing ROWs for natural gas pipelines would experience little change. New ROWs for other pipelines would be situated on mineral mining district lands that have been disturbed extensively from prior activities.

Once constructed, the HVTL facilities would have limited impacts on adjacent land uses in the regions of influence for respective alignments. The principal impacts would result from the changes in viewsheds caused by the HVTL towers and lines, restrictions on land uses in the ROWs by property owners, the need to limit the height of vegetation in the ROWs, which would create linear clearings within wooded areas, and the need for utility vehicles to access the corridors periodically for inspection and maintenance. Since the proposed HVTL alignments would follow existing ROWs for HVTLs, changes would relate mainly to the heights of towers and the increase in power lines that would be visible from adjacent properties, which would not affect adjacent land uses substantially and adversely.

There are no anticipated land use impacts to farmland on the East Range Site or associated corridors. Section 4.4 provides more discussion of prime farmland. The proposed operations would not affect land use on public lands adversely.

4.10.5 Impacts of the No Action Alternative

For the purposes of this EIS, as explained in Section 2.1.1.2, the DOE No Action Alternative is assumed to be equivalent to a "No Build" Alternative. Hence, this alternative would maintain the status quo with respect to existing land use in the West Range and East Range. No structures or corridors would be built at the West Range Site or the East Range Site, so no land clearing would be necessary and no residential properties would be affected.

4.10.6 Summary of Impacts

Basis for Impact	No Action	West Range	East Range
Conflict with existing land uses.	No change in land use.	Generating station on 1,**708**-acre site, currently undeveloped, ~50 residential properties within 1 mi of station (closest, 0.71 mi) buffered by ~0.5 mi of dense woodlands. Rail Alignment Alternative**s 3B and** 1A within 0.5 mi of 16 residences (closest, **470** ft). Alternative 1B within 0.5 mi of 8 residences (closest, 2,000 ft). CR 7 realignment **(Access Road 1)** and **A**ccess **R**oad **2** within 0.5 mi of 22 residences (closest within 300 ft). **Access Road 3 within 0.5 mi of 5 residences (2 within 1,000 ft).** Process water pipelines within 0.5 mi of 104 residences (4 within 500 ft). Process effluent pipelines **(eliminated by use of enhanced ZLD system)** within 0.5 mi of 14 residences (2 within 500 ft). Potable/sanitary pipelines within 0.5 mi of 114 residences (4 within 500 ft). Natural Gas Pipeline Alternative 1 within 0.5 mi of 153 residences (3 within 300 ft). Alternative 2 within 0.5 mi of 339 residences (5 within 300 ft). Alternative 3 within 0.5 mi of 935 residences (5 within 300 ft). HVTL route WRA-1 within 0.5 mi of 66 residences (4 within 500 ft). Route WRA-1A within 0.5 mi of 62 residences (7 within 500 ft). Route WRB-2A within 0.5 mi of 214 residences (29 within 500 ft). **No distinguishable differences in impacts for a Phase I only outcome.**	Generating station on **1,322**-acre site, currently undeveloped, no residential properties within 1 mi of station (closest, 1.28 mi) buffered by ~0.5 mi of dense woodlands. No residences within 0.5 mi of either rail alignment alternative (closest, ~1 mi). No residences within 0.5 mi of site access road (closest, >1 mi). No residences within 0.5 mi of process water pipeline segments (closest, >0.75 mi). No process effluent pipeline. No residences within 0.5 mi of potable/sanitary pipelines (closest >0.75 mi). Natural gas pipeline on existing ROW within 0.5 mi of 856 residences (46 within 300 ft). All HVTLs on existing ROWs. 38L corridor within 0.5 mi of 271 residences (22 within 500 ft). 39L/37L corridors within 0.5 mi of 962 residences (49 within 500 ft). **No distinguishable differences in impacts for a Phase I only outcome.**
Conflict with local and regional zoning ordinances.	No change.	No conflict with local and regional zoning ordinances. West Range Site zoned as Industrial District.	No conflict with local and regional zoning ordinances. East Range Site zoned as Mineral Mining District.
Conflict with local and regional land use plans.	No change.	No conflict with local and regional land use plans.	No conflict with local and regional land use plans.

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4.11 SOCIOECONOMICS

4.11.1 Approach to Impacts Analysis

4.11.1.1 Region of Influence

The proposed Mesaba Generating Station represents a large new investment in northeastern Minnesota. The wider region of influence for the socioeconomic analysis includes the seven counties in the Arrowhead Region: Aitkin, Carlton, Cook, Itasca, Koochiching, Lake, and St. Louis. The local regions of influence are defined as Census Tract 9810 in Itasca County for the West Range Site (including Iron Range Township and the City of Taconite) and Census Tract 140 (the City of Hoyt Lakes) in St. Louis County for the East Range Site.

4.11.1.2 Method of Analysis

The evaluation of potential impacts on demographic and socioeconomic conditions considered whether the Proposed Action or an alternative would cause any of the following conditions:

- Require demolition of housing and cause displacement of people residing in the region of influence.
- Reduce the desirability of local housing and residential property values in the region of influence.
- Cause population and housing growth in the region of influence either by the direct construction of new housing with an influx of residents or by providing new public roads or infrastructure that would influence new housing construction and population growth not otherwise expected to occur.
- Reduce employment opportunities by displacing businesses in the region of influence or by otherwise eliminating existing jobs.
- Reduce the desirability of local businesses and commercial property values in region of influence.
- Induce population influx into the region of influence by providing new employment opportunities not otherwise anticipated, which may exert pressure on the housing market and public services.

Economic and employment projections by the Bureau of Business and Economics Research (BBER) in the University of Minnesota at Duluth using the IMPLAN software model provided the basis for the impacts analyses. BBER estimated the regional and state economic and employment impacts of the Mesaba Energy Project (Phase I) in 2005. The results of that study were updated in 2006, at which time BBER used the model to estimate the economic and employment impacts of Phase II for the proposed Mesaba Generating Station (BBER, 2006). The following definitions are necessary to interpret the IMPLAN model results:

- “Direct Effect” is defined as initial new spending in the study area resulting from a project and represents the direct expenditures for construction and/or operation of the Mesaba Generating Station.
- “Indirect Effect” is defined as the additional inter-industry spending caused by a project and represents spending generated and jobs created by local companies to provide goods and services to support the Mesaba Generating Station.
- “Induced Effect” is defined as the additional household expenditures resulting from the direct and indirect expenditures for a project and represents the additional consumer spending and jobs created by increased local and regional disposable income resulting from the Mesaba Generating Station.

- "Value Added" is a measure of a project's contribution to the local community as represented by the direct, indirect, and induced effects of wages, rents, interest, and profits for the Mesaba Generating Station.
- "Total Output" is defined as the value of local production required to sustain activities and represents the sum of the direct, indirect, and induced effects from total project expenditures for construction and/or operation of the Mesaba Generating Station.

Based on the construction and operating cost estimates, BBER used the IMPLAN model to predict the direct, indirect, and induced economic and job multiplier benefits of the Mesaba Generating Station, both for the Arrowhead Region and for the State of Minnesota. These predictions, along with information about project activities provided in Chapter 2, were also used to evaluate potential impacts on the local regions of influence for the West Range and East Range Sites.

Note that the years stated in this section for construction (2008 through 2013) are based on the years depicted in the 2006 BBER study, and they have not been revised to reflect project schedule changes. As stated in Chapter 2, Excelsior's schedule was revised to reflect current planned construction of Phase I from 2010 through 2014 and Phase II from 2012 through 2016. Likewise, the BBER study assumed that the demonstration of Phase I would commence in 2011, which is now expected to occur in 2014. Therefore, the years stated in this section should be viewed and adjusted accordingly.

In response to a specific request by USACE, DOE revised Section 4.11 of this Final EIS where appropriate to describe the impacts of a Mesaba Energy Project Phase I (only) outcome. Because the infrastructure requirements for both phases would be essentially the same for Phase I, the principal differences relating to socioeconomic impacts would be associated with the increase in power plant size and activity levels (e.g., rail and truck deliveries) resulting from the addition of Phase II. These differences are generally described for other resource subjects (Aesthetics, Air Quality, Transportation, Safety and Health, and Noise) as they affect the regional population.

4.11.2 Common Impacts of the Proposed Action

4.11.2.1 Impacts of Construction

Employment, Income, Business and Economy

Employment and income impacts would stem from the hiring of construction workers in the region of influence. For a major construction project such as the Mesaba Generating Station, labor would be drawn from throughout the Arrowhead Region and beyond. Based on data provided by Excelsior, BBER estimated that total direct construction jobs for the Mesaba Generating Station would reach a peak during Phase I in year 2009 **(second year of construction)** at 1,555 jobs and a peak during Phase II in year 2011 **(fourth year of construction)** at 1,483 jobs. If both phases would be constructed on schedule, the total direct construction jobs in the peak construction year (2011) for the Mesaba Generating Station would be 1,617. These employment estimates are summarized in Table 4.11-1. BBER estimated the number of construction jobs as full-time, part-time, and temporary jobs for all construction activities on site and off site, including the generating station and associated utility and transportation corridors. Therefore, the estimates in Table 4.11-1 differ somewhat from the estimated peak onsite construction personnel described in Section 2.2.4.4.

Table 4.11-1. Estimated Employment – Construction Jobs (Mesaba Generating Station)

Year	Phase I	Phase II
2008	736	
2009	1,555	
2010	862	629
2011	134	1,483
2012		900
2013		167

Source: BBER, 2006

As described in Section 3.11.3, unemployment has historically been one or two percentage points higher in most of the Arrowhead Region than in the State of Minnesota as a whole. Although regional unemployment rates have declined recently, the historically persistent higher unemployment rates suggest that the region will have a skilled labor force available unless international demand for taconite and other mining products continues to increase. At least some researchers believe that the unemployment rates in the Arrowhead Region will return to their historically higher levels before project construction is scheduled to begin, and the gap between the unemployment rates in the region and the rest of the state may grow even wider as employment in manufacturing and iron mining industries in the Northeast region again declines (BBER, 2006).

The Department of Employment and Economic Development workforce data (DEED, 2006a) for the Arrowhead Region indicates that in 2005, the regional labor force was 169,200 with 160,500 employed. Minnesota Department of Employment and Economic Development estimated that there is an ample supply of labor in the area in general, but the aging population threatens to create a labor shortage in some industries by 2015 (DEED, 2006b). The extent to which temporary and permanent jobs can be filled by local residents would be driven in part by the local labor market characteristics, the availability of unemployed or underemployed skilled construction workers, and prevailing wages. Given the labor market characteristics in northeastern Minnesota, and the size of the labor force in the Arrowhead Region relative to the number of construction jobs expected to be created, the effect on labor availability is not expected to be adverse.

BBER obtained construction cost estimates from Excelsior and generated model inputs for annual expenditures on capital costs, wages, rents, interest, and profits for the Mesaba Generating Station. Tables 4.11-2 and 4.11-3 summarize the projected economic impacts on the Arrowhead Region based on the construction cost estimates. Table 4.11-2 shows that construction of Phase I would provide value added benefits to the regional economy of $587 million, while construction of Phase II would provide value added benefits of $387 million, resulting in a total value added benefit to the regional economy of nearly $1 billion during the period 2008 through 2013 **(entire period of construction)**. These value added benefits include the direct, indirect, and induced effects of the wages, rents, interest, and profits associated with the project. Dividing the total value added impact for Phase I ($587 million) by direct expenditures ($369 million) results in a value added multiplier of 1.59. This means that for each dollar spent on wages, rents, interest, and profits for construction of Mesaba Phase I, the regional economy will spend another $0.59. Using the IMPLAN model, BBER also determined that the Mesaba project would have additional value added benefits throughout the State of Minnesota.

Table 4.11-2. Value Added Economic Impacts for the Arrowhead Region During Construction of Mesaba Phases I and II ($ millions)

Period	Direct	Indirect	Induced	Total
Phase I (2008 – 2011)	$369	$119	$99	$587
Phase II (2010 – 2013)	$178	$114	$95	$387
Total	$547	$233	$194	$974

Source: BBER, 2006

Table 4.11-3 shows the total output impact on the regional economy predicted by the model for construction of Phases I and II. The total output impact for the Mesaba Generating Station ($3 billion) represents the sum of direct, indirect, and induced effects from construction of the project between 2008 and 2013. The total output for Mesaba Phase I ($1.96 billion) divided by the total direct project costs ($1.56 billion) would result in a regional economic output multiplier of about 1.26. Using the IMPLAN model, BBER also determined that the Mesaba project would have additional total output benefits throughout the State of Minnesota.

Table 4.11-3. Total Output Economic Impacts for the Arrowhead Region During Construction of Mesaba Phases I and II ($ millions)

Period	Direct	Indirect	Induced	Total
Phase I (2008 – 2011)	$1,561	$237	$162	$1,960
Phase II (2010 – 2013)	$743	$225	$156	$1,124
Total	$2,304	$462	$318	$3,084

Source: BBER, 2006

The model results in Table 4.11-4 show jobs created in the region during construction of both phases of the Mesaba Generating Station. During the peak construction year 2011, an estimated 1,100 new indirect jobs, in addition to the 1,617 direct construction jobs, would be created in the region to provide goods and services for the project. Another 955 new jobs in numerous industries would be induced by the project through increased consumer spending. Overall, the model predicted that the project would result in an estimated 3,672 jobs in the region during the peak year of 2011 **(fourth year of construction)** when both phases of the generating station would be under construction. **For Phase I only, the combined estimate of jobs created in the region would peak at 3,521 in the second year of construction.**

Table 4.11-4. Estimated Jobs Created in the Arrowhead Region During Construction of Mesaba Phases I and II

Year	Direct	Indirect	Induced	Total
2008	736	559	451	1,746
2009	1,555	1,050	916	3,521
2010[1]	1,491	962	865	3,318
2011[2]	1,617	1,100	955	3,672
2012	900	573	520	1,993
2013	167	147	108	422

Source: BBER, 2006
[1] Results distributed as approximately 58% for Phase I and 42% for Phase II based on Table 4.11-1
[2] Results distributed as approximately 8% for Phase I and 92% for Phase II based on Table 4.11-1

If construction workers needed for the Mesaba Generating Station were to come from outside Minnesota, a portion of the socioeconomic benefits would accrue to states where these workers hold permanent residences. Though there is no data to determine the share of out-of-state workers that might be needed to meet the labor demands of the plant, there is anecdotal evidence that out-of-state labor may be prevalent in the construction industry particularly for power plant projects such as the Mesaba Generating Station (Excelsior, 2006b).

Nonetheless, the construction of the Mesaba Generating Station would have a net beneficial impact on the regional economy by stimulating more than $3 billion of economic activity during the six-year construction phase and creating between 400 and 3,600 annual jobs from 2008 through 2013 **(entire period of construction)**. **For Phase I only, the project would have a net beneficial impact on the regional economy by stimulating nearly $2 billion of economic activity during the four-year construction period and creating between 300 and 3,500 annual jobs from 2008 through 2011.** Based on the higher relative unemployment rates in the Arrowhead Region, a considerable number of the expected jobs would likely benefit regional workers.

Population and Housing

The need for construction workers would be limited in duration, and a potential influx of temporary residents is not expected to cause an unsustainable increase in permanent regional population. However, a potential influx of construction workers for the Mesaba Generating Station may have an adverse short-term impact on the regional housing market. As indicated in Section 3.11.2, the Arrowhead Region has about 35,300 vacant housing units of which approximately 7,700 are not vacant on a seasonal basis only. Itasca County accounts for approximately 1,000 of these vacant units, while St. Louis County accounts for approximately 4,300. Additionally, Itasca County and St. Louis County have approximately 3,000 and 21,000 renter-occupied houses, respectively. Therefore, depending upon the percentage of construction jobs that could be filled by existing residents, the influx of workers from outside the region could create a demand for rental housing and lodging that may exceed available capacity. It is likely that many temporary workers could be accommodated through the renting of rooms in private residences, which could provide additional economic stimulus to local communities in the region.

4.11.2.2 Impacts of Operation

Employment, Income, Business and Economy

Although the economic and employment benefits from construction of the Mesaba Generating Station would be considerable, they would only last six years **(four for Phase I alone)** and would provide the greatest effect during a three-year period. Economic and employment benefits during operations, on the other hand, would occur throughout the service life of the Mesaba Generating Station. Permanent labor would be drawn from throughout the Arrowhead Region and beyond. The permanent employment data that were used in the BBER study were provided by Excelsior as summarized in Table 4.11-5. **Note that as stated in Chapter 2, Excelsior's schedule has been revised to reflect initial start-up of Phase I in 2014 and of Phase II in 2016. Therefore, the years stated in this section should be viewed and adjusted accordingly.**

Table 4.11-5. Estimated Employment, Permanent Operating Jobs (Mesaba Generating Station)

Year	Phase I	Phase II	Total (Phase I and II)
2011	28		28
2012	79		79
2013	107	15	122
2014	107	63	170
Typical	107	78	185

Source: BBER, 2006

Tables 4.11-6 and 4.11-7 summarize the projected economic impacts on the Arrowhead Region from operation of the Mesaba Generating Station. Table 4.11-6 shows that a typical year of operation for Phase I would provide value added benefits to the regional economy of $370 million, while typical operation of Phase II would provide value added benefits of $392 million. The total value added benefit to the regional economy from both phases would be $762 million per year beginning in 2015 as planned. Dividing the total value added impact for Phase I ($370 million) by direct expenditures ($316 million) results in a value added multiplier of 1.17. BBER also determined that the Mesaba project would have additional value added benefits throughout the State of Minnesota.

Table 4.11-7 shows the total output impact from operation of the Mesaba Generating Station on the regional economy as predicted by the model. Assuming full operation of Phases I and II as planned, the Mesaba Generating Station would have a total output economic impact on the Arrowhead Region of $1.1 billion annually beginning in 2015. Dividing the total output for Mesaba Phase I ($535 billion) by the total direct project costs ($440 billion) results in a regional economic output multiplier of about 1.22. BBER also determined that the Mesaba Energy Project would have additional total output benefits throughout the State of Minnesota.

Table 4.11-6. Value Added Economic Impacts for the Arrowhead Region for a Typical Year of Operation, Mesaba Phases I and II ($ millions)

Period	Direct	Indirect	Induced	Total
Phase I	$316	$14	$40	$370
Phase II	$335	$15	$42	$392
Total	$651	$29	$82	$762

Source: BBER, 2006

Table 4.11-7. Total Output Economic Impacts for the Arrowhead Region for a Typical Year of Operation, Mesaba Phases I and II ($ millions)

Period	Direct	Indirect	Induced	Total
Phase I	$440	$30	$65	$535
Phase II	$466	$32	$69	$567
Total	$906	$62	$134	$1,102

Source: BBER, 2006

Table 4.11-8 summarizes the projected impact on job creation in the Arrowhead Region attributable to the operation of the Mesaba Generating Station. In addition to the 185 direct jobs that Excelsior expects the plant to require for operation of both phases, the model predicted that plant operation would indirectly create an additional 59 permanent jobs in industries such as commercial machinery repair and maintenance. Also, the model indicated that plant operation would induce the creation of an additional 189 permanent jobs attributable to increased consumer spending in food services and numerous other industries. Overall, the model predicted that the project would result in a regional increase of 432 full- and part-time jobs in a typical operating year. On a statewide basis, the model predicted an increase of 472 full- and part-time jobs in a typical operating year.

Table 4.11-8. Estimated Jobs Created in the Arrowhead Region During a Typical Year of Operation, Mesaba Phases I and II

Year	Direct	Indirect	Induced	Total
Phase I	107	34	109	250
Phase II	78	25	80	182
Total	185	59	189	432

Source: BBER, 2006

Based on the higher relative unemployment rates and labor market characteristics in the Arrowhead Region, the Mesaba Generating Station is not expected to compete with other local businesses to attract skilled labor for the permanent jobs and would be able to hire staff at prevailing wages. Therefore, the project is expected to have a net beneficial impact on employment in the region.

Population and Housing

On a regional basis, the relatively small number of permanent positions to be filled for the operation of the Mesaba Generating Station would not affect the rate of population growth. Even if all 185 positions were filled by newcomers to the Arrowhead Region, the increase would be small. The region is expected to increase in population by an average of 1,000 to 2,000 individuals annually through 2030 (MSDC, 2002). Similarly, a small influx of permanent workers would not impose an unsupportable demand on the regional housing supply.

4.11.3 Impacts on West Range Site and Corridors

4.11.3.1 Impacts of Construction

The construction of the Mesaba Generating Station (Phases I and II) and associated facilities (rail lines, access roads, water pipelines, effluent pipelines, gas pipelines, and HVTLs) at the West Range Site would not require the destruction of existing housing or commercial businesses and would not displace existing local population or eliminate jobs. Temporary traffic and noise impacts to property-owners along Diamond Lake Road would occur during the proposed relocation of CR 7 by Itasca County as discussed in Sections 4.15, Transportation and 4.18, Noise. Construction of rail lines, pipelines, and HVTLs would also cause temporary adverse impacts for adjacent property owners as described throughout this chapter.

The potential increase in demand for lodging by construction workers may have adverse impacts on the local market for rental housing in Taconite, Bovey, Marble and other local communities in Census Tract 9810 of Itasca County. This census tract has less than 3,000 housing units, of which 375 were renter-occupied and 138 were vacant (not seasonal) in the 2000 Census. In the event that a substantial percentage of construction workers are drawn from outside the region, adequate local housing may not be available in Census Tract 9810. Therefore, these workers would be required to seek and compete for temporary lodging or rental housing in the larger communities of Grand Rapids, approximately 12 miles to the west, and Hibbing, approximately 25 miles to the east, as well as other smaller communities in between and farther away. Also, local homeowners with available rooms may take in lodgers to supplement their incomes.

The numbers of workers anticipated during the peak years of construction for Phases I and II would strain the local rental housing and temporary lodging markets, particularly in Taconite and adjacent communities along US 169. Therefore, local officials and business leaders would expect to coordinate with Excelsior and its contract management consultant to address the needs for temporary housing and lodging to accommodate the potential influx of construction workers.

The Final EIS for the Minnesota Steel Project in Nashwauk (MNDNR and USACE, 2007) addressed the impacts of constructing that project in combination with the Mesaba Energy Project and other projects in the Grand Rapids-Hibbing area. The Minnesota Steel Final EIS concluded that: "With a limited number of rental units and a very low vacancy rate, the rental housing market is initially expected to experience a lot of pressure, which may cause rent levels to escalate, causing affordability issues for certain households." (MNDNR and USACE, 2007) However, the document also pointed out that local governments and other groups have been working with Minnesota Steel in anticipation of the workforce needs. Therefore, the Minnesota Steel Final EIS did not anticipate significant socioeconomic impacts.

4.11.3.2 Impacts of Operation

The operation of the Mesaba Generating Station and associated facilities at the West Range Site would not require the destruction of existing housing or commercial businesses and would not displace existing population or eliminate jobs. The impacts of additional permanent workers drawn from outside the region on the demand for local housing in Census Tract 9810 may be considerable. However, the numbers of permanent workers **(107 for Phase I and 185 for both phases)** would be well below the numbers of construction workers, and they would likely find suitable housing within reasonable commuting distance of the site in the region between Grand Rapids and Hibbing along the US 169 corridor. **In comparison, the Minnesota Steel Final EIS estimated a permanent workforce of 700 for that project.**

The existence of the plant and rail facilities and the operation of these facilities, as well as the relocation of CR 7 by Itasca County along the alignment of Diamond Lake Road, would have the potential to adversely impact the desirability of nearby residential properties and cause reductions in home values for properties within visual and audible range of these facilities. Block 3083 of Block Group 3 in Census Tract 9810, in which the West Range Site is located, has approximately 33 housing units. However, none is within 3,500 feet of the power plant footprint, and all would be separated from the plant by a minimum 2,000-foot width of wooded buffer land. Three residences near Big Diamond Lake and Dunning Lake would be located within 1,000 feet of **either** the **prior Excelsior** preferred rail alignment (Alternative 1A) **or the new Excelsior preferred rail alignment (Alternative 3B)**; one of these residences would be located within 500 feet **of the common alignment of both rail alternatives**. These units would be most adversely affected by the Proposed Action. The alternative rail alignment (Alternative 1B) would be located 2,000 feet away from the closest residence. **The new Excelsior preferred road alignment (Access Road 3) would be located within 1,250 feet of two residences along CR 7 near the southwestern corner of the property.** At least five residences along Diamond Lake Road north of Big Diamond Lake would be adversely affected by the relocation of CR 7 **(although this action has been deferred by Itasca County since publication of the Mesaba Draft EIS)**. Perhaps a dozen or more of the other residential properties along CR 7 and Diamond Lake Road closest to the plant site or rail alignment may experience reductions in values or at least slower rates of growth in values.

The proposed new HVTL corridors for the preferred (WRA-1 or WRB-1) and alternative (WRA-1A or WRB-1A) routes would pass through sparsely populated areas between the retired Greenway Substation near US 169 and existing ROWs near the Blackberry Substation. The corridors would run parallel to Twin Lakes Road, passing respectively to the west and east of the road by 0.5 miles. **[Sentence in Draft EIS at this point deleted in conjunction with the addition of the new paragraph below.]** One residence would be located within 300 feet of preferred alignment WRA-1 (or WRB-1) and three others would be located within 500 feet. Two residences would be located within 300 feet of Alternative Alignment WRA-1A (or WRB-1A) and five others would be located within 500 feet. The alternative corridor for Plan B (WRB-2A) would affect residences along existing ROWs for HVTLs. Eight residences are located within 300 feet of the existing ROWs and 21 others are located within 500 feet.

In a recent article, Pitts and Jackson (2007) found that prior studies reported an average discount of 1 percent to 10 percent in property values when negative impacts of HVTLs are evident. Although these impacts can extend to a quarter mile when views of lines and towers are completely unobstructed, the impacts were found to diminish with distance and disappeared at a distance of 200 feet if HVTL structures are at least partially screened by trees, landscaping, or topography. Therefore, a small number of the closest residences may experience adverse effects on property values depending upon the visibility of HVTL structures. Excelsior expects to compensate property owners for the granting of easements.

Once installed, gas pipelines would have minimal aboveground features that would affect adjacent property owners. Generally, pipeline ROWs would limit the height of vegetation planted and require accessibility for inspection and maintenance. Three residences would be located within 300 feet of Natural Gas Pipeline Alternative 1 (Excelsior's preferred alignment), five residences would be located within 300 feet of Natural Gas Pipeline Alternative 2; and 29 residences would be located within 300 feet of Natural Gas Pipeline Alternative 3. **As discussed in Section 2.3.1.4, Excelsior proposes to negotiate with Nashwauk PUC for the purchase of natural gas to supply the Mesaba Generating Station. Nashwauk PUC received a permit in April 2008 (after publication of the Mesaba Draft EIS) to construct its pipeline along essentially the same alignment as Excelsior's Alternative 1.** Other pipelines (water and effluent) generally would not be located near residential properties.

There are few commercial properties in the vicinity of the West Range Site, and it is unlikely that any would be impacted by the operations of the plant or rail line. However, the existence of the plant near Taconite and the US 169 corridor would likely stimulate the development of additional commercial businesses in the vicinity that would cater to the routine needs of plant workers.

The proposed realignment of CR 7 by Itasca County, as shown previously in Figure 2.3-2, could open adjacent properties to residential and commercial development due to improved access. Although the realignment is not a component of the proposed Mesaba project, it is considered a connected action for the purpose of this EIS. **However, as described in Section 2.3.1.2, Itasca County has deferred its plan to realign CR 7 due to changes in funding priorities.**

4.11.4 Impacts on East Range Site and Corridors

4.11.4.1 Impacts of Construction

The construction of the Mesaba Generating Station and associated facilities at the East Range Site would not require the destruction of existing housing or commercial businesses and would not displace existing local population or eliminate jobs. Construction of rail lines, access roads, and water pipelines would occur in unpopulated areas. Construction of gas pipelines and HVTLs would occur along existing ROWs for such facilities and would cause temporary adverse impacts for adjacent property owners as described throughout this chapter.

The potential increase in demand for lodging by construction workers may have adverse impacts on the local market for rental housing in Hoyt Lakes and other local communities in the vicinity because people not associated with construction of the plant would have to compete for housing. Hoyt Lakes (Census Tract 140 of St. Louis County) has less than 1,000 housing units, of which 76 were renter-occupied and 67 were vacant (not seasonal) in the 2000 Census. In the event that a substantial percentage of construction workers are drawn from outside the region, adequate local housing would not be available in Hoyt Lakes. Therefore, these workers would be required to seek lodging in the larger community of Virginia, approximately 20 miles to the west, as well as other communities in between and farther away. Also, local homeowners with available rooms may take in lodgers to supplement their incomes.

The numbers of workers anticipated during the peak years of construction for Phases I and II would strain the local rental housing and temporary lodging markets, particularly in Hoyt Lakes and adjacent communities along CR 100 and CR 110. Therefore, local officials and business leaders would expect to coordinate with Excelsior and its contract management consultant to address the needs for temporary housing and lodging to accommodate the potential influx of construction workers.

4.11.4.2 Impacts of Operation

The operation of the Mesaba Generating Station and associated facilities at the East Range Site would not require the destruction of existing housing or commercial businesses and would not displace existing population or eliminate jobs. The impacts of additional permanent workers drawn from outside the region on the demand for local housing in Hoyt Lakes may be considerable. However, the numbers of permanent workers would be well below the numbers of construction workers, and they would likely find suitable housing in the region between Hoyt Lakes and Virginia along the CR 110, CR 100, SR 135, and US 53 corridors within a radius of 30 miles.

Because there is no population or housing in Block 1008 of Block Group 1 in Census Tract 140, in which the East Range Site is located, no residential properties would be directly impacted by the existence and operation of the plant and rail facilities. The closest populated census units to the plant site, Blocks 1023 and 1024 of Block Group 1, had approximately 46 and 7 housing units, respectively, at the 2000 Census. These residential properties are located near the southeast shore of Colby Lake more than 1 mile south of the proposed plant footprint and less than 1 mile east of the Syl Laskin Energy Center. Because the properties that would have the clearest lines of sight to the Mesaba Generating Station are lakefront and lake-view properties, some of which already have views of the Syl Laskin power plant (Figure 4.11-1), it is not known whether the values of these properties would be adversely affected by their proximity to the Mesaba plant. The properties also would be separated from the proposed Mesaba plant power block and rail line by a minimum 3,000-foot width of wooded buffer land. There are no residential properties located in the vicinity of potential new rail lines or access roads for the plant. The proposed gas pipeline would be constructed within an existing ROW for a natural gas pipeline that has 46 residences located within 300 feet.

Figure 4.11-1. View of Syl Laskin Plant from Residences on Colby Lake

The proposed widening of HVTL corridors along either the preferred or alternative routes from the Laskin Substation to the Forbes Substation would affect existing ROWs that already contain HVTLs. Approximately 16 residences are located within 300 feet of the ROWs for the preferred 39L/37L route and 33 others are located within 500 feet. Approximately 11 residences are located within 300 feet of the ROWs for the alternative 38L route and 11 others are located within 500 feet. Because these residences are already located near existing HVTL ROWs, it is unlikely that property values along these corridors would be affected by the additional HVTLs. Also, local property owners would be compensated for the granting of additional easements.

It is unlikely that any commercial properties in Hoyt Lakes would be impacted by the operations of the plant or rail line, because most establishments are located near CR 110, approximately 2 miles south of the East Range Site. However, the existence of the plant in Hoyt Lakes near the CR 110 corridor would likely stimulate the development of additional commercial businesses in the vicinity that would cater to the routine needs of plant workers.

4.11.5 Impacts of the No Action Alternative

For the purposes of this EIS, as explained in Section 2.1.1.2, the DOE No Action Alternative is assumed to be equivalent to a "No Build" Alternative. Hence, this alternative would maintain the status quo with respect to demographic and socioeconomic conditions in the Arrowhead Region and local communities. Given the status of the local economy, employment, and income, the region would lose the potential for a stimulus to support economic stability.

4.11.6 Summary of Impacts

Basis for Impact	No Action	West Range	East Range
Demolish housing stock and displace population.	No houses demolished; no population displaced.	No houses demolished; no population displaced.	No houses demolished; no population displaced.
Reduce the desirability of local housing, thereby affecting residential property values.	No impact on property values.	**Residences closest to power plant, rail alignment and HVTL corridors may experience reductions in property values.** No residences within 3,000 feet of power plant footprint. Three residences within 1,000 feet of Rail Alignment Alternative**s** 1A **and 3B**. No residences within 1,000 feet of Rail Alignment Alternative 1B. **Between 4 and 29 residences within 500 feet of HVTLs depending upon route.**	**Residences closest to power plant, rail alignment and HVTL corridors may experience reductions in property values.** No residences within 3,000 feet of power plant footprint. No residences within 1,000 feet of rail alignment alternatives. **71 residences within 500 feet of existing HVTLs that may be expanded for the project.**
Directly construct new housing stock.	No direct construction of new housing stock.	No direct construction of new housing stock.	No direct construction of new housing stock.

Basis for Impact	No Action	West Range	East Range
Provide new public roads and infrastructure that may influence new housing and population growth.	No construction of new public roads or infrastructure.	Related realignment of CR 7 by Itasca County **(deferred since publication of the Draft EIS)** may influence local housing development in vicinity.	No construction of new public roads or infrastructure that would influence growth.
Displace businesses and/or eliminate jobs.	No displacement of businesses or elimination of jobs.	No displacement of businesses or elimination of jobs.	No displacement of businesses or elimination of jobs.
Reduce the desirability of local businesses, thereby affecting commercial property values.	No impact on commercial property values.	No commercial businesses within 3,000 feet of power plant footprint.	No commercial businesses within 3,000 feet of power plant footprint.
Create new employment not otherwise anticipated that would induce population influx and exert pressure on the housing market and public services	No new jobs created.	Peak construction-related employment would affect short-term demand for housing locally. Operation-related employment would not exceed estimates for regional population growth.	Peak construction-related employment would affect short-term demand for housing locally. Operation-related employment would not exceed estimates for regional population growth.

4.12 ENVIRONMENTAL JUSTICE

4.12.1 Approach to Impacts Analysis

4.12.1.1 Region of Influence

The regions of influence for environmental justice are determined for each resource area by the potential for minority and low-income populations to bear a disproportionate share of high and adverse environmental impacts from activities within the project area. The municipalities nearest to the West and East Range Sites, respectively, are Taconite and Iron Range Township and Hoyt Lakes. The wider demographic areas for analysis and comparison include the larger census units in proximity to the respective sites, nearby communities, the counties of Itasca (West Range) and St. Louis (East Range), and American Indian tribal communities and reservations in the Arrowhead Region.

4.12.1.2 Method of Analysis

The evaluation of potential environmental justice impacts considered whether the Proposed Action or an alternative would cause any of the following conditions:

- Disproportionately high and adverse effects on minority populations in the region of influence.
- Disproportionately high and adverse effects on low-income populations in the region of influence.

The CEQ's December 1997 Environmental Justice Guidance (CEQ, 1997) provides guidelines regarding whether human health effects on minority populations are disproportionately high and adverse. Agencies were advised to consider the following three factors to the extent practicable:

1) Whether the health effects, which may be measured in risks and rates, are significant (as employed by NEPA), or above generally accepted norms. Adverse health effects may include bodily impairment, infirmity, illness, or death;

2) Whether the risk or rate of hazard exposure by a minority population, low-income population, or Indian tribe to an environmental hazard is significant (as employed by NEPA) and appreciably exceeds or is likely to appreciably exceed the risk or rate to the general population or other appropriate comparison group; and

3) Whether health effects occur in a minority population, low-income population, or Indian tribe affected by cumulative or multiple adverse exposures from environmental hazards.

Based on the definitions in Section 3.12 and criteria outlined above, the analysis for environmental justice in this EIS was performed in the following sequence:

First, determine the potential for an adverse impact from site-specific or corridor-specific project activities (construction or operation) to affect a minority population in the vicinity disproportionately based on the definitions outlined by CEQ and described in Section 3.12.1 and using data from the 2000 Census.

Second, determine the potential for an adverse impact from site-specific or corridor-specific project activities (construction or operation) to affect a low-income population in the vicinity disproportionately based on the definitions outlined by CEQ and described in Section 3.12.1 and using data from the 2000 Census.

Third, determine the potential for adverse health risks in a wider radius from respective project sites and corridors based on impacts analyzed in Section 4.17, Safety and Health, and then assess the potential that an adverse health risk would affect a minority population, low-income population, or American Indian tribe at a higher rate than the general population.

Fourth, determine whether health effects may occur in a minority population, low-income population, or American Indian tribe affected by cumulative or multiple adverse exposures from environmental hazards based on impacts analyzed in Section 4.17, Safety and Health.

4.12.2 Impacts on West Range Site and Corridors

4.12.2.1 Impacts on Minority Populations

As described in Section 3.12.2.2, the smallest census unit in which the West Range Site is located (Census Tract 9810, Block Group 3, Block 3083) had no minority population in the 2000 Census. Furthermore, the larger census units surrounding the site (Iron Range Township and Census Tract 9810) had lower distributions of minority populations than Itasca County, the Arrowhead Region, and the state.

The proposed new utility corridors for the Mesaba Energy Project at the West Range Site would pass through sparsely populated areas in Census Tract 9810 and other census units in Itasca County. As described in Section 3.12.2.2, this census tract and Itasca County as a whole had distributions of minority populations comparable to the Arrowhead Region and lower than the state.

Based on the demographic analysis, any potential adverse impacts from the Mesaba Energy Project at the West Range Site or along associated utility corridors would not have a disproportionate effect on minority populations; therefore, no potential environmental justice impacts are indicated relating to minority populations.

4.12.2.2 Impacts on Low-Income Populations

As described in Section 3.12.3.2, the smallest census unit in which the West Range Site is located and for which poverty statistics are published by the U.S. Census Bureau (Census Tract 9810, Block Group 3) had poverty rates lower than those in Taconite and comparable to the larger census unit of Iron Range Township in the 2000 Census. Although local poverty rates are higher than in Itasca County and the Arrowhead Region, the residential properties closest to the West Range Site include lakefront properties along Diamond Lake Road to the south and large-sized lots along CR 7 to the west. Therefore, it is reasonable to assume that the poverty rates in neighborhoods closest to the West Range Site are more comparable to those in Census Tract 9810, Itasca County, and the Arrowhead Region in general than to those in Taconite and Iron Range Township.

The proposed new utility corridors for the Mesaba Energy Project near the West Range Site would pass through sparsely populated areas in Census Tract 9810 and other census units in Itasca County. As described in Section 3.12.3.2, the census tract had poverty rates comparable to Itasca County and the Arrowhead Region as a whole.

Based on the demographic analysis, any potential adverse impacts from the Mesaba Energy Project at the West Range Site or along associated utility corridors would not have a disproportionate effect on low-income populations; therefore, no potential environmental justice impacts are indicated relating to low-income populations.

4.12.3 Impacts on East Range Site and Corridors

4.12.3.1 Impacts on Minority Populations

As described in Section 3.12.2.3, the closest populated census unit to the East Range Site (Census Tract 140, Block Group 1, Block 1023) had no minority population in the 2000 Census. Furthermore, the larger census units surrounding the site (Tract 140, Block Group 1 and Hoyt Lakes) had lower distributions of minority populations than St. Louis County, the Arrowhead Region, and the state.

Proposed new utility corridors for the Mesaba Energy Project at the East Range Site would be located along existing ROWs for HVTLs and pipelines that generally pass through sparsely populated areas in St. Louis County. As described in Section 3.12.2.3, St. Louis County had distributions of minority populations comparable to the Arrowhead Region and lower than the state. Furthermore, the largest concentrations of minority populations in St. Louis County are found in the vicinity of Duluth and in Indian tribal reservations far removed from the proposed corridors.

Based on the demographic analysis, any potential adverse impacts from the Mesaba Energy Project at the East Range Site or along associated utility corridors would not have a disproportionate effect on minority populations; therefore, no potential environmental justice impacts are indicated relating to minority populations.

4.12.3.2 Impacts on Low-Income Populations

As described in Section 3.12.3.3, the smallest census unit in which the East Range Site is located and for which poverty statistics are published by the U.S. Census Bureau (Census Tract 140, Block Group 1) had lower poverty rates than the larger census units of Hoyt Lakes and St. Louis County as a whole in the 2000 Census. Furthermore, the poverty rates in St. Louis County were comparable to those in the larger Arrowhead Region.

Proposed new utility corridors for the Mesaba Energy Project at the East Range Site would be located along existing ROWs for HVTLs and pipelines that generally pass through sparsely populated areas in St. Louis County. As described in Section 3.12.3.3, St. Louis County had percentages of low-income populations comparable to the Arrowhead Region, and low-income populations are widely distributed throughout the county and region.

Based on the demographic analysis, any potential adverse impacts from the Mesaba Energy Project at the East Range Site or along associated utility corridors would not have a disproportionate effect on low-income populations; therefore, no potential environmental justice impacts are indicated relating to low-income populations.

4.12.4 Health Risk-related Environment Justice Impacts

American Indian tribes in northern Minnesota include populations of subsistence fishers who may consume higher amounts of fish than the general population. Mercury contamination of fish is a well-documented problem in the state, and the Minnesota Department of Health currently advises people to restrict their consumption of sport fish due to mercury levels in virtually every lake that has been tested (MPCA, 2005).

The largest proportion—perhaps 98 percent—of the mercury in Minnesota lakes and rivers comes from the atmosphere. About 30 percent of the mercury in the atmosphere is the result of the natural cycling of mercury. The other 70 percent of atmospheric mercury is the result of human activities that have released mercury from the geological materials in which it had been stored. These activities include the mining of ores containing mercury, the use of mercury in products and manufacturing, and the incidental release of trace concentrations of mercury naturally present in coal, crude oil, and metal ores, such as taconite. Mercury emissions in Minnesota declined significantly (about 68 percent) from 1990 to 2000, and there is evidence that concentrations of mercury in Minnesota's fish have declined by about 10 percent, which is considered an encouraging response (MPCA, 2005).

Excelsior conducted a human health risk assessment to estimate the risk for subsistence fishers as a result of mercury emissions from the proposed Mesaba Generating Station. The results of this study are described in Section 4.17. The study evaluated the worst-case mercury deposition and subsistence fishers receptor scenario, which would occur near the West Range Site at Big Diamond Lake, located less than 2 miles from the proposed plant stacks. The study found that the background mercury deposition to the lake would be **16.5** grams per year from all existing sources, while the highest deposition attributable to the Mesaba power plant would be approximately **0.08** grams per year. The incremental increase in health risk from ingestion of fish as posed by mercury from plant emissions would be within the MPCA acceptable risk quotient. Therefore, although the Mesaba Generating Station would be an additional source of atmospheric mercury, it would not by itself cause unacceptable health risks.

The concentrations of American Indian populations closest to either the West Range Site or East Range Site are located approximately 20 miles away. Because of the distance of these populations, the prior existence of fish consumption advisories, and the relatively low mercury emissions expected from the Mesaba Generating Station compared to other power plant technologies, the incremental impacts to local American Indian populations from the project would be negligible. Therefore, no potential environmental justice impacts are indicated relating to disproportional health risks for American Indian tribes.

A Native American Tribal retirement complex may be constructed in the vicinity of the West Range Site. The complex is believed to be planned on property along the west shores of Twin Lakes, off Cherokee Road, south of US 169, about 3 miles southeast of the West Range IGCC Power Station footprint. Based on the exposure risks determined by the AERA analysis in Section 4.17.2.3, the retirement complex would be situated farther away from the Mesaba facility than the adult and child residents with highest risk of exposure to hazardous emissions, which are located 1.2 miles away. The AERA analysis determined that the highest risk exposure scenario for these adult and child residents would be below the risk thresholds established by MPCA and EPA for both cancer risk and non-cancer morbidity hazard. Therefore, it is concluded that the exposure risk to residents of the planned retirement complex would also be below the MPCA and EPA risk thresholds.

4.12.5 Impacts of the No Action Alternative

For the purposes of this EIS, as explained in Section 2.1.1.2, the DOE No Action Alternative is assumed to be equivalent to a "No Build" Alternative. Although the No Action Alternative would not create the potential for direct environmental justice impacts, the area would lose the potential for the new jobs and economic stimulus described in Section 4.11, Socioeconomics that would help reduce the proportions of low-income populations in the region.

4.12.6 Summary of Impacts

Basis for Impact	No Action	West Range	East Range
Cause potential for disproportionately high and adverse effects on minority populations in the region of influence.	No Impact to minority populations.	No potential environmental justice impacts are indicated relating to minority populations.	No potential environmental justice impacts are indicated relating to minority populations.
Cause potential for disproportionately high and adverse effects on low-income populations in the region of influence.	No impact on low-income populations.	No potential environmental justice impacts are indicated relating to low-income populations.	No potential environmental justice impacts are indicated relating to low-income populations.

4.13 COMMUNITY SERVICES

4.13.1 Approach to Impacts Analysis

4.13.1.1 Region of Influence

The region of influence for impacts on community services is defined both regionally and locally. The larger region of influence is the Arrowhead Region of Minnesota, including Aitkin, Carlton, Cook, Itasca, Koochiching, Lake, and St. Louis counties. The local regions of influence are defined as the City of Taconite (West Range Site) in Itasca County and the City of Hoyt Lakes (East Range Site) in St. Louis County.

4.13.1.2 Method of Analysis

The evaluation of potential impacts on community services considered whether the Proposed Action or an alternative would cause any of the following conditions:

- Increase the demand on service capacities of local and regional law enforcement agencies (directly or indirectly).
- Impede effective access by law enforcement services in the region of influence.
- Displace law enforcement facilities or conflict with local and regional plans for law enforcement.
- Increase the demand on service capacities of local and regional emergency response agencies (directly or indirectly).
- Impede effective access by emergency services in the region of influence.
- Displace medical facilities or conflict with local and regional plans for emergency services.
- Increase the demand on local and regional recreational lands and facilities (directly or indirectly).
- Displace designated recreational uses or conflict with local and regional plans for recreation and open space.
- Increase enrollment in local school systems (directly or indirectly).
- Displace school facilities or conflict with local and regional plans for school system capacity and enrollment.

The analysis was based on information about project features and activities, as well as estimated employment during construction and operations, and other data as provided in Chapter 2. Background information about community services has been provided in Section 3.13.

4.13.2 Common Impacts of the Proposed Action

4.13.2.1 Impacts of Construction

As described in Section 4.11.2.1, although the BBER study listed the years of construction as 2008 through 2013, Excelsior's schedule has been revised to reflect current planned construction of Phase I from 2010 through 2014 and Phase II from 2012 through 2016. Therefore, the years stated throughout this section should be viewed and adjusted accordingly. The BBER study (Section 4.11.2.1) estimated that employment during the seven-year construction period for the Mesaba Generating Station (Phases I and II) would range between approximately 160 and 1,600 workers with highest annual employment (over 1,500 workers) in years 2009 through 2011. Due to the relatively high rates of unemployment in the Arrowhead Region (Section 3.11.3), it is expected that a considerable number of these positions would be filled from the regional and local labor pools. Additional construction workers would be drawn to the area to satisfy the demand and fill specialized needs. Though the influx is not expected to result in substantial increases in permanent residents due to the temporary duration of the construction phase, short-term impacts on community services can be expected.

As projected by the BBER study, the project would also stimulate the creation of approximately 2,000 additional jobs in the Arrowhead Region during each of the three years of peak construction. These jobs could be located anywhere in the seven-county region, which had a regional labor force of 169,200 in 2005 with 160,500 employed (Section 4.11.2.1).

In general, both Phases I and II would require twice as much time to construct compared to Phase I alone. Therefore, impacts on community services associated with the duration of large numbers of construction workers located in or commuting to the plant site and utility corridors would last twice as long.

Law Enforcement

Law enforcement agencies in the Arrowhead Region have a lengthy history of maintaining order in an area where mining, lumbering, and other trades comparable to heavy construction predominate. On a regional basis, the project is not expected to increase the demand on these services substantially beyond available capacities. Nor would construction activities impede effective law enforcement or conflict with regional plans.

Emergency Response

On a regional basis, the incidents and injuries during construction predicted in Section 4.17, Safety and Health are not expected to increase the demand on emergency services and medical facilities substantially beyond available capacities; nor would construction of the project conflict with regional plans. During construction of utilities and transportation features, temporary road closings could impede access by emergency vehicles. However, such closings would be coordinated with local and regional authorities to minimize impacts and ensure that alternative routes would be provided for emergency vehicles.

Parks and Recreation

The construction of the Mesaba Generating Station would not displace existing designated recreation areas or conflict with regional plans. Regional recreational opportunities are sufficient to meet the demands of additional workers drawn to the Arrowhead Region for project construction.

School Systems

Though some portion of the work force drawn to the region during construction may relocate with families, a large influx of school-aged children would not be anticipated. Furthermore, project construction would not displace existing school facilities or conflict with school system plans.

4.13.2.2 Impacts of Operation

As stated in Chapter 2, Excelsior's schedule has been revised to reflect initial start-up of Phase I in 2014 and of Phase II in 2016. Therefore, the years stated in this section should be viewed and adjusted accordingly. The completion of the Mesaba Generating Station would establish a large industrial facility in the Arrowhead Region that would require regular deliveries of coal via unit trains and generate additional traffic as described in Section 4.15. With the completion of **Phase I, the station would employ approximately 107 personnel, and after completion of** Phase II, the station would employ approximately 185 personnel. Due to the specialized requirements of some positions, a small influx of new workers may be anticipated. Impacts on community services would be related to the particular needs of the generating station and the increase in regional residents caused by the influx of operating personnel and their families. The BBER study (Section 4.11.2.2) also estimated that the operation of **Phase I would stimulate the creation of more than 140 additional jobs throughout the Arrowhead Region; the operation of** the **two-phase** generating station would stimulate the creation of nearly 250 additional jobs throughout the Arrowhead Region.

The Mesaba Generating Station Phases I and II would be nearly twice the size of Phase I alone and would require nearly twice the number of rail and truck deliveries on a weekly basis. Phase II would also increase the plant workforce by approximately 79 percent over Phase I. Therefore, impacts on community services associated with the size of the plant workforce and numbers of trains and trucks accessing the plant would be roughly proportional to these increases.

Law Enforcement

Though concerns have been raised about the vulnerability of nuclear power plants to terrorist attack (Behrens and Holt, 2005), the potential for such attacks on coal-based power plants has not been identified as a threat of comparable magnitude. IGCC power plants do not use or store nuclear materials that may be the targets of a terrorist raid, and the bombing of a coal-based plant by terrorists would not release radioactive substances. However, the sabotage of a large generating station, such as Mesaba, could disrupt power supply in a large region of the country comparable to the Great Northeast Power Blackout in August 2003, which resulted from an accident. Therefore, security for the Mesaba Generating Station would be among the priorities of regional law enforcement agencies.

The relatively small number of permanent jobs created by the Mesaba Generating Station, and stimulated elsewhere throughout the Arrowhead Region, would have the potential for a very small increase in regional population that would have a negligible impact on the regional demand on law enforcement agencies.

Emergency Response

The Mesaba Generating Station would be subject to an Emergency Response Program to be developed in compliance with OSHA Standard 1910.120, which would include an Emergency Response Plan (1910.120(q)). On a regional basis, the incidents and injuries during operation of the generating station as predicted in Section 4.17, Safety and Health are not expected to increase the demand on emergency services and medical facilities substantially beyond available capacities; nor would the operation of the station conflict with regional plans.

The 115- to 135-car unit trains required for coal delivery to the Mesaba Generating Station would range in length from 6,600 to 7,700 feet. Assuming a more conservative travel speed of 10 miles per hour, a unit train would take approximately eight to nine minutes to pass through each grade crossing. Hence, medical and fire emergency response vehicles would be delayed at grade crossings when trains are present. **Under Minnesota law, train crossing times are limited to a maximum of 10 minutes (Minnesota Statute 219.383, Subdivision 3).** The impacts on emergency response vehicles are described respectively for the West Range (Section 4.13.3.2) and East Range (Section 4.13.4.2) below.

Parks and Recreation

Tourism is a key sector of Minnesota's economy, and northern Minnesota is the second-most popular destination for travelers (after the Twin Cities). It is difficult to predict the economic impact of the Mesaba Energy Project on tourism revenues, because tourism in the region has coexisted historically with extensive ore mining, timber harvesting, and associated industrial activities. Surface water resources were lost or degraded by these activities in the past, while other valued surface water resources are the direct result of these past activities, as in the case of the flooded CMP, Hill Annex Mine Pit, and other flooded mine pits. And, it should be recognized that the CMP and other flooded pits could be lost to potential dewatering and mineral extraction in the future. The historic existence of mining operations and industrial facilities in the region has not affected tourism or recreational revenue substantially as reflected in the modest employment growth of 3 percent in this sector between 2002 and 2004 (DEED, 2006b).

The operation of the Mesaba Generating Station would not conflict with regional plans for recreation. Regional parks and recreational opportunities are sufficient to meet the demands of additional workers drawn to the Arrowhead Region for station operation. Site-specific impacts on recreational uses are described separately for the West Range (Section 4.13.3.2) and East Range (Section 4.13.4.2) below.

School Systems

Regional school systems have sufficient capacities to meet the demands of workers with school-aged children drawn to the Arrowhead Region for station operation.

4.13.3 Impacts on West Range Site and Corridors

4.13.3.1 Impacts of Construction

Law Enforcement

As described in Section 4.13.2.1, the large numbers of construction jobs created by the Mesaba Energy Project, especially during the peak three-year period of 2009 through 2011, could create an influx of temporary residents to the communities between and beyond Grand Rapids and Hibbing. The increased temporary resident population may affect the capacities of the East End patrol district of the Itasca County Sheriff's Office as well as other law enforcement agencies in the vicinity, including the Grand Rapids Police Department, the St. Louis County Regional Sheriff's Office in Hibbing and the Hibbing Police Department. However, the locations where itinerant construction workers would reside during the period of construction would depend on the availability of local lodging, which would effectively disperse workers throughout local communities within an approximate 10- to 50-mile commuting distance of the site (as far away as the City of Virginia).

Emergency Response

Locally, the incidents and injuries during construction predicted in Section 4.17 are not expected to increase the demand on emergency services substantially beyond available capacities of facilities in Grand Rapids and Hibbing. Other impacts would be as described in Section 4.13.2.1.

Parks and Recreation

The construction of the Mesaba Generating Station would not displace designated recreation areas or conflict with local plans. Local recreational opportunities are sufficient to meet the demands of additional workers drawn to eastern Itasca County and western St. Louis County communities for project construction.

School Systems

Impacts would be as described in Section 4.13.2.1.

4.13.3.2 Impacts of Operation

Law Enforcement

Local impacts on law enforcement during the operation of the Mesaba Generating Station at the West Range Site generally would be as described in Section 4.13.2.2. The site is located within the East End patrol district of the Itasca County Sheriff's Office.

Emergency Response

The operation of the proposed generating station would increase demand for emergency response in the City of Taconite. The city's volunteer fire department may need to expand from the current staff of 14 to a staff of approximately 20, which is comparable to the number of fire and emergency personnel in the City of Cohasset. The Cohasset fire and emergency response staff of 21 has served Minnesota Power's Clay Boswell plant successfully for over 25 years with a response requirement of three or four visits a year (Excelsior, 2006b). **The City of Cohasset had a population of 2,481 in 2000 compared to a population of 2,087 for Bovey, Coleraine, and Taconite combined.** Also, to comply with OSHA

Standard 1910.120, the Mesaba Generating Station would be expected to provide and train its own first responders and first aid specialists to respond until local emergency personnel arrive. The Itasca County Director of Emergency Management (Itasca County Sheriff) would have principal responsibility for oversight of response to a major emergency involving the Mesaba Generating Station at the West Range Site. Locally, the incidents and injuries during operation of the generating station, as predicted in Section 4.17, are not expected to increase the demand on medical services substantially beyond available capacities of facilities in Grand Rapids and Hibbing.

As described in Section 4.13.2.2, medical and fire emergency response vehicles would be delayed by eight to nine minutes at a grade crossing when a unit train is passing (assuming train speed is 10 miles per hour). **Under Minnesota law, train crossing times are limited to a maximum of 10 minutes (Minnesota Statute 219.383, Subdivision 3).** Rail lines serving the West Range Site have grade crossings at 17 locations between Taconite and western Grand Rapids, including two crossings in Taconite, one in Coleraine, and eight in downtown Grand Rapids. The Grand Itasca Clinic and Hospital is located on the south side of the railroad tracks, which bisect Grand Rapids from east to west. The Mesaba Generating Station (Phases I and II) would require a maximum of two unit trains per day round trip, which would cause trains to pass through affected intersections four times per day. Hence, trains serving the generating station would create a total of 36 minutes of delay at grade crossings each day on average, which represents a 2.5 percent probability that an emergency vehicle would be delayed at a grade intersection on any given day. Currently, six trains per day on average pass through Grand Rapids in either direction (Excelsior, 2006c). Assuming that these six trains require 3.6 minutes each (assuming 25 miles per hour speed for existing trains, which is typically observed in this region) to pass through a grade crossing, the total effect in combination with the trains serving Mesaba would result in a 4 percent probability that an emergency vehicle could be delayed at a grade crossing in downtown Grand Rapids on any given day.

Parks and Recreation

Local recreational opportunities are sufficient to meet the demands of additional workers and families drawn to the Taconite area for station operation. Currently, the CMP is used for recreational boating and fishing by area residents and visitors as described in Section 3.13.3.1. Excelsior has requested that the pit be closed for recreational uses to meet the security requirements for process water intake facilities to serve the generating station. Therefore, the existing recreational use of the CMP could be displaced if the generating station were located at the West Range Site **and if MNDNR agreed to restrict access to the pit**. **However, Excelsior recognizes that demands for recreational access to the CMP would affect the MNDNR decision and expects further discussion with the agency on the issue. In general, Excelsior intends to work with stakeholders to identify options in providing security measures for the proposed cooling water intake structure and pump house (e.g., establishing a designated exclusion zone within the CMP cordoned off with buoys and posted with "No Entry" signs). DOE and MDOC are confident that agreement on an appropriate solution can be reached between Excelsior and MNDNR that would maintain the security of the cooling water intake structure without adversely restricting access to the majority of the CMP for fishing, boating, and other recreational uses.**

As described in the update to Section 2.2.3.2, the use of enhanced ZLD at the West Range Site would eliminate all potential plant discharges to surface waters including Holman Lake, which has a swimming beach at Gibbs Park. This recreational use of Holman Lake would not be displaced by the operation of the generating station.

Water levels in the CMP would remain stabilized during withdrawals for Mesaba plant operations. As described in Section 3.5.1.1, water levels in the CMP have ranged between 1,290 and 1,309 feet msl in recent years but are increasing. As explained in Section 4.5.3.1, Excelsior expects to maintain water levels in the CMP during power station operations between 1,260 and 1,290 feet

msl in normal weather conditions, with a maximum range of 1,250 to 1,300 feet msl. However, in a typical year, Excelsior expects to maintain the water levels in the CMP at 1,290 ± 2 feet msl. Below a level of 1,260 feet msl, land bridges could be exposed in the CMP that could interfere with boating. Also, as described in Section 4.8.2.2, significant water level reductions could interfere with lake trout natural reproduction in the CMP, as this species deposits eggs in the fall on boulder or cobble habitats in depths usually less than 40 feet and incubation lasts 4 to 6 months after spawning.

School Systems

Impacts would be as described in Section 4.13.2.2.

4.13.4 Impacts on East Range Site and Corridors

4.13.4.1 Impacts of Construction

Law Enforcement

The increased temporary resident population described in Section 4.13.2.1 may affect the capacities of the Hoyt Lakes Police Department, as well as other law enforcement agencies in the vicinity, including St. Louis County Sheriff's Office detachments in Aurora and Virginia, and police departments in Gilbert and Eveleth. However, the locations where itinerant construction workers would reside during the period of construction would depend on the availability of local lodging, which would effectively disperse workers throughout local communities within an approximate 10- to 50-mile commuting distance of the site (as far away as the City of Hibbing).

Emergency Response

Locally, the incidents and injuries during construction predicted in Section 4.17 are not expected to increase the demand on emergency services substantially beyond available capacities of facilities in Aurora and Virginia. Other impacts would be as described in Section 4.13.2.1.

Parks and Recreation

The construction of the Mesaba Generating Station would not displace designated recreation areas or conflict with local plans. Local recreational opportunities are sufficient to meet the demands of additional workers drawn to St. Louis County communities for project construction.

School Systems

Impacts would be as described in Section 4.13.2.1.

4.13.4.2 Impacts of Operation

Law Enforcement

Local impacts on law enforcement during the operation of the Mesaba Generating Station at the East Range Site generally would be as described in Section 4.13.2.2. The site is located within the jurisdiction of the Hoyt Lakes Police Department which is supported by St. Louis County Sheriff's Office detachments in Aurora and Virginia.

Emergency Response

The operation of the proposed generating station would increase demand for emergency response in the City of Hoyt Lakes. Currently, the number of EMT and fire calls for the 25-person cooperative regional EMT and fire department is enough to support the cost of the service (i.e., about 400 runs per year). The Hoyt Lakes city manager estimates that the city can easily absorb up to five hundred new residents without needing a new dedicated Hoyt Lakes EMT or fire department or increasing the number of personnel in the existing cooperative agreement with neighboring communities (Excelsior, 2006b). To comply with OSHA Standard 1910.120, the Mesaba Generating Station would be expected to provide and train its own first responders and first aid specialists to respond until local emergency personnel arrive. The St. Louis County Director of Emergency Management (St. Louis County Sheriff) would have principal responsibility for oversight of response to a major emergency involving the Mesaba Generating Station at the East Range Site. Locally, the incidents and injuries during operation of the generating station as predicted in Section 4.17 are not expected to increase the demand on medical services substantially beyond available capacities of facilities in Aurora and Virginia.

Rail lines serving the East Range Site have grade crossings at eight locations between Hoyt Lakes and Clinton Township south of Iron Junction, including one crossing in Aurora, one near McKinley, and three near Iron Junction. As described in Section 4.13.3.2, trains serving the generating station would cause a 2.5 percent probability that an emergency vehicle would be delayed at a grade intersection on any given day (assuming train speed is 10 miles per hour). Currently, 12 trains per day on average travel between Hoyt Lakes and Iron Junction in either direction (Excelsior, 2006c). Hence, the total effect in combination with the trains serving Mesaba would result in a 5.5 percent probability that an emergency vehicle could be delayed at a grade crossing on any given day (assuming 25 miles per hour speed for existing trains, which is typically observed in this region).

Parks and Recreation

Local recreational opportunities are sufficient to meet the demands of additional workers and families drawn to the Hoyt Lakes area for station operation. The generating station would not displace designated recreation areas in Hoyt Lakes or otherwise impede recreational uses in the vicinity or conflict with recreational plans.

School Systems

Impacts would be as described in Section 4.13.2.2. The loss of population by Hoyt Lakes following the LTV Industries shutdown in 2001 resulted in the closing of a local school.

4.13.5 Impacts of the No Action Alternative

For the purposes of this EIS, as explained in Section 2.1.1.2, the DOE No Action Alternative is assumed to be equivalent to a “No Build” Alternative. Therefore, demands on community services would remain unchanged.

4.13.6 Summary of Impacts

Basis for Impact	No Action	West Range	East Range
Increase the demand on service capacities of local and regional law enforcement agencies.	No change in demand.	Large number of construction workers (>1,500 during three years of peak construction) may affect capacities of local agencies. Security requirements for the generating station may affect local agencies.	Large number of construction workers (>1,500 during three years of peak construction) may affect capacities of local agencies. Security requirements for the generating station may affect local agencies.
Impede effective access by law enforcement services in the region of influence.	No change in existing conditions.	Refer to emergency response access below.	Refer to emergency response access below.
Displace law enforcement facilities or conflict with local and regional plans for law enforcement.	No change in existing conditions.	No displacement or conflict.	No displacement or conflict.
Increase the demand on service capacities of local and regional emergency response agencies.	No change in demand.	Emergency response demands for the generating station may affect local agencies.	Emergency response demands for the generating station may affect local agencies.
Impede effective access by emergency services in the region of influence.	No change in existing conditions.	Potential for delays at rail grade crossings; approximately 2.5% probability of delay at crossing caused by train serving Mesaba plant; 4% probability of delay from combined rail traffic.	Potential for delays at rail grade crossings; approximately 2.5% probability of delay at crossing caused by train serving Mesaba plant; 5.5% probability of delay from combined rail traffic.
Displace medical facilities or conflict with local and regional plans for emergency services.	No change in existing conditions.	No displacement or conflict.	No displacement or conflict.
Increase the demand on local and regional recreational lands and facilities.	No change in demand.	No substantial change in demand.	No substantial change in demand.
Displace designated recreational uses or conflict with local and regional plans for recreation and open space.	No change in existing conditions.	Security requirements for process water intake at Canisteo Mine Pit **may** restrict access and displace existing recreational use of the pit.	No displacement or conflict.
Increase enrollment in local school systems.	No change in existing conditions.	No substantial increase in enrollment.	No substantial increase in enrollment.
Displace school facilities or conflict with local and regional plans for school system capacity and enrollment.	No change in existing conditions.	No displacement or conflict.	No displacement or conflict.

4.14 UTILITY SYSTEMS

4.14.1 Approach to Impacts Analysis

4.14.1.1 Region of Influence

The regions of influence for potential utility impacts from the Proposed Action include locations of existing and proposed potable water, sewer, HVTL, and natural gas utility lines and corridors. Process water supply and potential wastewater impacts to water quality are discussed in Section 4.5, Water Resources.

4.14.1.2 Method of Analysis

The evaluation of potential impacts on utility systems considered whether the Proposed Action or an alternative would cause any of the following conditions:

- Potential for increase in demand directly or indirectly on capacity of public water or wastewater utilities;
- Potential for insufficient water supply capacity for fire suppression demands;
- Disruptions of power or impaired electricity service in the region; or
- Potential for new construction of HVTLs, gas pipelines, and other transmission/conveyance utilities or extensive upgrades to existing utilities resulting in offsite impacts on other resources.

There are different options of routing HVTLs for each site alternative. Each HVTL option was evaluated for impacts and compared within each site alternative. Similarly, impacts associated with proposed natural gas lines, water lines and sewer lines were evaluated for the West Range Site and the East Range Site. Process water supply and industrial wastewater discharges are evaluated in Section 4.5, Water Resources.

4.14.2 Common Impacts of the Proposed Action

The Mesaba Energy Project would provide up to 1,200 MW of power within the Iron Range of Minnesota. This amount of electricity generation could supply approximately 900,000 households (CBO, 2003). Based on CapX2020 projections, this project could supply approximately one-fifth of the additional regional electricity demand projected for 2020 (see Section 3.14.3.2) (CapX2020, 2004).

4.14.2.1 High Voltage Transmission Lines

One bundled connector 230-kV transmission line could carry the peak electrical output of a single phase of the Mesaba Energy Project. A single 345-kV bundled conductor could carry the full 1,212-MW power output from both Phase I and II. However, to satisfy the North American Electric Reliability Council (NERC) N-1 single failure criterion design element (loss of one generator outlet HVTL without interrupting the Power Plant's delivery of its peak output to the point of interconnection [POI]), a minimum of three 230-kV, two 345-kV or a combination of two 230-kV and one 345-kV HVTL would be required (NERC, 2005).

The choice between transforming the output power of Phase I and/or Phase II to 230-kV or 345-kV is not solely dependent upon the distance between the Mesaba Generating Station and the POI, but also upon the voltage at which the substation currently operates and existing "down stream" power flow constraints.

The regional high voltage transmission system on the Iron Range operates mainly at 115-kV and 230-kV. Efforts to bolster Minnesota's ability to exchange power between regions with fewer attendant losses would dictate that new transmission developments in the region operate on higher voltages. Excelsior believes that 345-kV would be the future standard on which such transmission developments on the Iron

Range would be focused and has based its decision for the Mesaba Energy Project interconnection voltage on that premise.

Based upon the results of studies completed to date, MISO has determined that the output of Mesaba Phase I would be fully deliverable within the MISO footprint, and that no network upgrades would be required for either the West or East Range Sites. New text has been added to Sections 4.14.3.1 and 4.14.4.1 regarding the implications of these results. Also, see new text in Section 2.2.2.4 on the latest status of MISO's planning process.

4.14.2.2 Potable Water Supply

During construction of Phase I and II, the peak estimated potable water requirement would be 45,000 gallons per day, based on 1,500 construction personnel using an average of 30 gallons per day. The 30 gallon per day rate is based on estimated rates for construction (31 gallons per day) and heavy construction (20 gallons per day) (http://www.haestad.com/AWDMOnline). The annual usage for the construction phase is estimated at 16.5 million gallons. Once operational, potable water demand would drop to approximately **5,500** gallons per day for Phase I and II**, based on 182 workers and a 30-gallons per day rate (107 personnel for Phase I would consume 3,200 gallons per day and the additional 75 personnel for Phase II would increase potable water consumption by 2,300 gallons per day)**. The annual usage for the facility during normal operations is estimated at approximately 2.7 million gallons. Water used for fire-fighting or fire suppression would come from the process water sources, not the potable water sources, so there will be no potential for insufficient potable water supply capacity during fire fighting or suppression events.

4.14.2.3 Sanitary Wastewater

Approximately 1,500 construction personnel would be expected on site during peak construction activity. Assuming each worker would generate an average of 30 gallons per day of sanitary wastewater, the estimated peak wastewater flows would be approximately 45,000 gallons per day. Sanitary wastewater produced during the operation phase of the project would be reduced due to the smaller operational work force of both phases (approximately 182 workers), resulting in approximately 5,500 gallons of wastewater per day **(107 personnel for Phase I would generate 3,200 gallons per day and the additional 75 personnel for Phase II would increase wastewater generation by 2,300 gallons per day)**. To accommodate additional flows as a result of additional people on site during tours, special maintenance/construction activities, and outages, the capacity of the system would be designed to accommodate 7,500 gallons per day of sanitary wastewater. This flow is based on the facility providing restrooms, locker rooms, showers and break room facilities. Wastewater would contain 200 to 250 milligrams per liter BOD, 220 to 270 milligrams per liter TSS and 6 to 8 milligrams per liter total phosphorous. Impacts of discharge of water with this quality to surface water are discussed in Section 4.5.

4.14.2.4 Natural Gas

Natural gas would be used to start up Phase I and Phase II and as a backup fuel when syngas from the gasifiers is unavailable. When operating on natural gas, the power plant would not achieve the nominal **600** $MWe_{(net)}$ output attainable when operating on syngas. This is due, in part, to the lack of nitrogen that would otherwise be available for nitrogen dilution and power augmentation when operating the ASU to supply oxygen to the gasifiers. The maximum one day natural gas flow is expected to be about 105 million standard cubic feet of gas per phase of the Mesaba Generating Station. The Proponent would purchase natural gas through a series of contracts with gas suppliers in order to obtain the lowest overall fuel price and best contract conditions for this commodity. Due to the volume of natural gas required to fuel the Mesaba Generating Station, the Proponent would install and operate accurate metering equipment to confirm the extent of such purchases. The Proponent would contract with either GLG or NNG or both entities for natural gas transportation capacity for quantities and at pressures sufficient to operate the Mesaba Generating Station at its limited capability when firing its backup fuel.

Minnesota Rule 4415.0010, Subpart 32, defines the permitted gas pipeline "route" as "the proposed location of a pipeline between two end points. A route may have a variable width from the minimum required for the pipeline ROW up to 1.25 miles." Excelsior is requesting a narrower 0.5-mile wide route for each of the proposed gas pipeline corridors. Within each alternative route, a minimum 100-foot wide temporary ROW for construction of the pipeline and a minimum 70-foot wide permanent ROW would be provided. New pipeline segments would consist of 16-inch diameter steel pipe, buried in trenches approximately 72 inches deep (Figure 4.14-1).

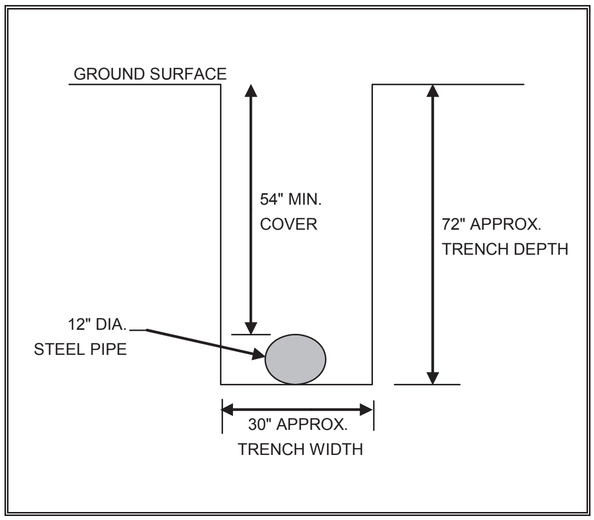

Figure 4.14-1. Typical Cross Section, Natural Gas Pipeline Open Trench Installation

The pipeline would fall under the jurisdiction of the Minnesota Office of Pipeline Safety. All facilities proposed for the natural gas pipeline project would be designed, operated and maintained in accordance with DOE Minimum Federal Safety Standards in Title 49, CFR Part 192.

4.14.3 Impacts on West Range Site and Corridors

4.14.3.1 High Voltage Transmission Lines

As discussed in Chapter 2, the West Range Site would connect to the Blackberry Substation via one or more HVTL routes depending on the voltage allowed. There are three plausible routes for HVTLs from the Power Plant to the Blackberry Substation. Plan A would connect to the substation using 345-kV lines, utilizing either route WRA-1 (preferred route) or WRA-1A (alternative route) (see Figure 2.3-4). If Plan A was not found to be viable, Plan B would be constructed to connect the Mesaba Generating Station to the Blackberry Substation using a combination of a double 230-kV lines for Phase I (WRB-1 (preferred) or WRB-1A (alternative)) and a single 230-kV or 345-kV line for Phase II (WRB-2 (preferred) or WRB-2A (alternative)). The **plans** and alternative routes are shown in Figure **2.3-4 (Chapter 2),** described in **Section 2.3.1.5, and listed in** Table 4.14-1**.**

Table 4.14-1. HVTL Route and Voltage Options for the West Range Site

Route	Plan A Preferred*	Plan A Alternative	Plan B Preferred*	Plan B Alternative
1 (also known as WRA-1 or WRB-1)	Double 345-kV (both phases) [Phase I initially at 230-kV]		Double 230-kV Phase I	Single 230-kV Phase II
1A (also known as WRA-1A or WRB-1A)		Double 345-kV (both phases) [Phase I initially at 230-kV]	Single 230-kV Phase II	Double 230-kV Phase I
2 (also known as **WRB**-2A, utilizes the 28L and 62L corridors)			Single 345-kV Phase II Alternative	Single 345-kV Phase II Alternate

***Preferred by Project Proponent (Excelsior)**

Plan A (WRA-1)

Plan A would utilize double-circuit 345-kV HVTLs, carried on single-pole steel structures. Single-pole structures are taller than wooden H-frame structures or other alternatives, but have longer spans and require less ROW. Longer spans between poles also mean fewer poles would be required compared to other structure types.

Excelsior estimates that approximately 80 single-pole HVTL structures would be required along the alignment ranging in height from 132 to 168 feet. Approximately 10 structures would be 150 feet or taller. The new structures would exceed the height of the existing 115-kV HVTL structures by a maximum of 70 to 85 feet. The existing abandoned section of 45L would be removed. The 115-kV 20L must be overbuilt or moved to the existing cross arms under the 83L. The line changes in the 83L/20L ROW would likely result in 1 mile of taller transmission structures for the double-circuit 345-kV line with its 115-kV underbuild (Excelsior, 2006b).

WRA-1 would follow two segments of existing ROW: 1) approximately 1.6 miles of existing ROW between the southern boundary of the West Range Site property and the retired Greenway Substation, and 2) approximately 1 mile of existing ROW shared with MP's 230-kV 83L and 115-kV 20L HVTLs just before their interconnection with the Blackberry Substation. This route would require acquisition of approximately 6 miles of new ROW between the former Greenway Substation and the point of intersection with MP's 83L and 20L HVTLs.

Plan A-Alternative (WRA-1A)

The alternative HVTL route, WRA-1A, would follow the same alignment as the preferred route for the first 3.2 miles from the southern boundary of the West Range Site property. This route would also share 0.9 miles of ROW in common with the 115-kV 62L route just prior to its interconnection with the Blackberry Substation.

The major difference between this route and the preferred route is that it runs 0.44 miles east of and parallel to Twin Lakes Road. It would require approximately the same length of new ROW (approximately 5.8 miles) and would be 0.5 mile shorter in overall length than WRA-1.

Plan B Preferred Route (WRB-1 (Phase I) and WRB-2 (Phase II))

> An **electrical bus** is a physical electrical interface where many devices share the same electric connection. This allows signals to be transferred between devices (allowing power to be shared). A **busbar** is an electrical conductor that makes a common connection between several circuits.

In the event MISO would determine that the 345-kV transmission infrastructure was incompatible with regional transmission planning initiatives, or Excelsior determines that the timing for building 345-kV transmission in the region would be outside the proposed timeframes, then Excelsior would construct and install the 230-kV transmission scheme. **Excelsior's** preferred route **(WRB-1)** for the double-circuit 230-kV HVTLs for Phase I would be the same as route WRA-1 **(Plan A)**. However, the single-pole HVTL structures required for 230-kV HVTLs would be shorter, ranging in height from 107 to 143 feet. Approximately 10 structures would be 125 feet or taller.

Excelsior's preferred route for Phase II would be the route not selected for the double-circuit 230-kV HVTLs in Phase I of Plan B. Thus, assuming route WRA-1 were approved as the preferred route (WRB-1) for Phase I, the preferred route (WRB-2) for a single-circuit 230-kV HVTL in Phase II would be the same route as WRA-1A in Plan A.

Plan B – Alternative Route (WRB-1A (Phase I) and WRB-2A (Phase II))

For the alternative route in Phase I for Plan B**,** the 230-kV double circuit HVTLs would follow **the same alternative** route **(**WRA-1A**) as Plan A**. The structures and new ROW requirements would be comparable to those described for WRB-1.

The alternative route for Phase II would follow route WRB-2A, which combines segments from two existing HVTL corridors over 18 miles. These corridors (45L/28L and 62L/63L) are presently occupied by 115-kV HVTL structures owned by MP. Excelsior would use delta configuration 345-kV structures with an underbuild feature that would carry the existing 115-kV HVTLs below the arms holding the 345-kV conductors (Excelsior, 2006b).

Switchyard

The electrical layout of the switchyard for Phase I would be designed for 230-kV. Prior to commencing Phase II, additional autotransformers, a 345-kV busbar and associated breakers would be added to convert Phase I to a 345-kV operation.

Network Upgrades

Original text and Table 4.14-2 in the Draft EIS relating to potential network upgrades for the West Range Site have been deleted based on the results of MISO studies completed to date. MISO has determined that the output of Mesaba Phase I would be fully deliverable within the MISO footprint, and that no network upgrades would be required for the West Range Site. As discussed in Section 2.2.2.4, the original System Impact Study conducted in June 2006 had indicated a need for network upgrades between the Boswell and Riverton substations. More recently, an Optional System Impact Study conducted for Mesaba Phase I on behalf of MISO (Siemens PTI, 2008) confirmed that no network upgrades would be required to interconnect and inject 600 MW of power from Mesaba Phase I to the regional electric grid at the Blackberry Substation. The Optional System Impact Study was justified (1) by the addition of MISO Transmission Expansion Plan Projects to the regional electric grid after the original June 2006 System Impact Study for Mesaba Phase I had been completed, and (2) by the commencement of construction of energy-intensive projects in the immediate vicinity of the IGCC Power Station.

MISO studies are underway to identify network upgrades required to ensure that Mesaba Phase II would be deliverable within the MISO footprint at the West Range Site. A Feasibility

Study Report prepared by MISO's Transmission Asset Management (MISO, 2006) provided the starting point for such efforts by identifying the potential number and location of HVTLs that would exceed their rated capacity if the total electric power output of Mesaba Phase II (i.e., nominally 600 MWnet) was injected at the Blackberry Substation. Since completion of the Feasibility Study Report, MISO has completed System Impacts Studies for Mesaba Phase II, but each time the results of such studies have been rendered useless due to changes in the status of projects queued ahead of it (Sherner, 2009). Regardless of the uncertainties, it is likely that additional 230-kV and/or 345-kV network upgrades would be required to resolve local injection issues at the West Range Site and to ensure the full power deliverability of Mesaba Phase II to the regional grid.

With proper planning and conformance to MISO requirements, the addition of new HVTL lines and corridors would not have an adverse effect on the existing electric grid. During construction of HVTLs, existing electric service would remain uninterrupted to customers. Upgrades at the Blackberry Substation and other regional substations as required by MISO would ensure that interconnection of the Mesaba Energy Project would have no adverse impact on regional electricity transmission. The Mesaba Energy Project would utilize at least two HVTL routes to tie-in to the existing electricity grid, ensuring that a single failure of a line would not cause service interruption.

4.14.3.2 Potable Water Supply

Alternative 1 (Obtain Potable Water from the City of Taconite)

Excelsior's preferred alternative for potable water supply to the Mesaba Generating Station would be to connect to a municipal water system. The closest potable water source to the West Range Site is the City of Taconite, located 2.5 miles south of the West Range Site. To provide water to the Mesaba Generating Station, an 8-inch diameter pipeline would be constructed from the existing city's system to the plant. The preferred route (shown in Figure 2.3-3) is the most efficient route and installation would be more economical because it would be bundled along with pipelines serving other purposes (subject to required pipeline separation distances). The other alternative route considered would have extended the pipe east from the city to US 169, run parallel along the west side of US 169 to CR 7, parallel the west side of CR 7 and crossed under the highway to the generating station footprint. This routing is longer, would require more piping, and increased the cost of installing the pipe. A booster station would be needed near the connection point to the city water distribution system in order to provide the required water pressure to the Plant. The booster station would pump water at a variable rate from 20 to 100 gallons per minute, due to the fluctuations in water use that would occur throughout the day at the Mesaba Generating Station.

The Mesaba Energy Project would require a peak usage rate of 16.5 million gallons per year during construction and average roughly 2.7 million gallons of potable water during operations. The city of Taconite is presently authorized via MNDNR Water Appropriation Permit No. 1976-2206 to withdraw a total of 20 million gallons of groundwater per year to provide for its potable water needs. The most recently published records from the MNDNR show that between 1988 and 2005, inclusive, the Taconite's groundwater withdrawal rates varied between 11.3 and 17.3 million gallons per year. This indicates that, at present, the Taconite water supply system does not have sufficient capacity to supply potable water to the Mesaba Energy Project during the construction phase and that the system will be close to full capacity once operations of the Mesaba Energy Project begin.

In March 2007, the City of Taconite prepared and adopted a Water Management Plan (SEH, 2007) that identified the improvements required to supply for the needs of the community and the Mesaba Energy Project. These improvements include two additional groundwater wells, additional pumping facilities and booster stations, along with future expansion of water storage facilities. If these system improvements are completed by the time construction begins on the Mesaba Energy Project, there will be sufficient water supply capacity, without impacting the existing firefighting and community needs.

However, if these improvements are not completed prior to construction, Excelsior would provide potable water to meet construction workers' needs by bringing in tanker trucks or through development of its own wells.

Though fire suppression water demands have not been calculated for the project, it is likely that Excelsior would provide a water tower or other storage for fire suppression use and that the source of this water would be the same as the process water (mine pits) and not the City of Taconite drinking water supply system.

Due to the possible expansion of the water system to the north, the City of Taconite is considering adding a residential/industrial sub-division on the south side of CR 7 south of the West Range Site. The City has estimated the potable water requirement for the sub-division to be approximately 10,000 gallons per day with an annual use of 4 million gallons. The City has the capacity to supply water to both the proposed sub-division and the power plant after completion of the system improvements. Subsequently, there would be no adverse impact on current potable water supplies under this alternative.

Residential water use fluctuates widely over the course of a day so that a 50,000-gallon elevated water tank tower would be required to provide adequate flow and pressure for high use periods. If the city decides to install the tower, the size of the booster station pumps would need to be increased to accommodate the increased head pressure. The pumps in the booster station would be increased to a 200-gallon per minute capacity. The booster station would pump water into the tower and the tower would provide water to both the subdivision and the power plant. Water from the proposed water tower could also flow back to the city when the pumps were not running and provide additional water capacity to the city's existing system. Due to the higher elevation of the proposed tower, water pressure must be reduced prior to entering the existing system. The City of Taconite would own and maintain the booster station, pipeline, and tower and Excelsior would enter into an agreement with the city to purchase water (Excelsior, 2006b).

Construction of the potable water pipeline and booster station would require a full construction season. To ensure that potable water is available at the West Range Site during peak construction activities, construction of the pipeline and booster station must be initiated as soon as Excelsior obtains the preconstruction permits for the power plant. Until such time as potable water could be obtained from the City of Taconite, potable water could be supplied by tanker truck.

Alternative 2 (Construct On-Site Water Treatment Facility)

Alternative 2 would consist of constructing an on-site treatment facility with the capacity to treat 7,500 gallons per day of water from the CMP and HAMP Complex to provide potable water to the Mesaba Generating Station. A micro-filtration system would be used to treat raw water pumped to the site from the local mine pits at a rate of 10 gallons per minute to meet potable drinking water standards. This treatment rate was determined based on a run time of approximately 12.5 hours to provide the daily water requirement of the facility. Construction of a building to house the filtration system, a 5,000-gallon underground reservoir, and pump would be required. The pump would supply the water from the reservoir to the facility at the required flow rate and pressure. Excelsior would own the water treatment facility and be responsible for the operation and maintenance of the facility (Excelsior, 2006b).

The EPA classifies any facility that provides potable water to 25 or more of the same individuals every day as a non-transient non-community public water supply system. Because the Mesaba Generating Station would employ 182 permanent employees it would fall into that classification. Therefore, the treatment facility must be operated by a certified water operator and the treated water must meet all standards of the Federal Safe Drinking Water Act and the Minnesota Department of Health. **Also, plans and specifications of any new water treatment facility would require MDH approval prior to construction.**

During construction of the Mesaba Generating Station, potable water would not be available until the process water features were completed. Therefore, potable water would be supplied to the site by other means (e.g., tanker trucks) during construction.

The preferred alternative for obtaining potable water at the West Range Site is to connect to the City of Taconite potable water system.

4.14.3.3 Sanitary Wastewater

Sanitary wastewater from the West Range Site could be addressed through the following alternatives.

Wastewater Alternative 1 (On-Site Treatment)

The first alternative would be to construct a stabilization pond WWTF to treat 45,000 gallons of sanitary wastewater per day (the maximum projected flow from Phase I and Phase II). Once Phase I of the power plant is placed into operation, the WWTF would receive a maximum of 7,500 gallons of sanitary wastewater per day due to reduced staff as compared to the construction period. Due to the decrease in flow, part of the WWTF would be closed and abandoned in accordance with Minnesota Rules. Other modifications would be made to the WWTF at that time to link it to the power plant's domestic wastewater collection system.

Once treated, effluent from the WWTF would be routed off-site through 1) an 8-inch diameter gravity sewer pipeline to Little Diamond Lake (approximately 1.4 miles south-southeast of the Plant); or 2) via a cooling tower blowdown line leading to Canisteo Mine Pit and/or Holman Lake.

The MPCA has regulatory requirements for discharges to surface water. A new NPDES permit and a part-time licensed operator would be required in order to discharge treated sanitary wastewater to surface water. Section 4.5, Surface Water, discusses these regulatory requirements and potential impacts to surface water.

Wastewater Alternative 2 (Tie-in to Municipal Wastewater System)

The second option to dispose of sanitary wastewater would be to connect the Mesaba Generating Station to the CBT wastewater collection system connecting to the WWTF. This would consist of constructing approximately 1.9 miles of 12-inch gravity sewer pipeline, a pump station, and 2,400 feet of force main from the West Range Site, in a southerly direction, to the City of Taconite's main pump station, located in the northeast corner of the city (shown in Figure 2.3-3).

This alternative is **Excelsior's** preferred alternative as it holds several advantages over the on-site treatment option. First, the gravity sewer system would be an asset to the City of Taconite, allowing future connections to other residential, commercial, or industrial establishments north and east of the city. Second, Excelsior would not be required to hire an operator to monitor the system. Third, potential concern surrounding the addition of a new outfall discharging effluent from a sanitary wastewater treatment system to public waters would be avoided.

One issue concerning Taconite's collection system is the amount of inflow and infiltration entering the system during periods of rainfall or high groundwater. At such times, excess flow can exceed the capacity of the main wastewater pump station in Taconite, creating a need to bypass untreated wastewater into a natural pond system. The amount of I/I entering the Taconite collection system can cause the natural pond system to overflow, releasing untreated wastewater into nearby surface waters. Larger pumps could be installed in the pump station to remedy this problem, or the City's collection system could be rehabilitated to prevent extraneous water from entering the sewers.

The addition of new flow to the Taconite collection system could possibly exacerbate existing overflow conditions. As a commercial user of the system, sanitary sewer revenue from the Mesaba Project could provide additional sources of funding for providing the necessary upgrades. With the necessary upgrades put in place by the sewer authority, the Mesaba Energy Project would have no adverse impact on the capacity or operation of the current sanitary sewer system.

As discussed above, the CBT WWTF has the capacity available to treat sanitary wastewater from the Mesaba Energy Project; however, peak flows in collection sewers during wet-weather conditions can exceed the capacity of Taconite's main wastewater pump station and result in untreated sewage overflowing into a nearby wetland upstream of the Swan River. Also, during periods of heavy rainfall, the CBT collection system just north of Trout Lake can become overwhelmed by incoming wastewater. At such times, overflow pumps are activated to transfer untreated wastewaters into an adjacent holding tank. If the tank's capacity is exceeded, untreated wastewater can overflow into Trout Lake.

Therefore, in its commitment announced on January 21, 2008, Excelsior agreed to make significant capital improvements to the CBT WWTF when construction commences on the Mesaba Energy Project and to address excessive I/I rates exhibited by the Taconite collection system during periods of high rainfall or high groundwater (Excelsior Energy, 2008). Excelsior proposes to help address this concern by expanding I/I studies for Taconite, helping fund efforts to fix major problems, and/or expanding the capacity of the overflow tank. Such improvements would be a beneficial impact to regional water quality.

Also, although the CBT WWTF is equipped for addition of alum to flocculate dissolved phosphorus entering the system, no such additions are currently in practice. Excelsior proposes to fund the addition of such flocculants for as long as the Mesaba Project is operative and the disposal of the biosolids collected. This would significantly reduce phosphorus loading to the Swan River from the CBT WWTF. Finally, Excelsior proposes to fund studies to determine whether sand filters would be effective for reducing mercury concentrations in the CBT WWTF effluent.

4.14.3.4 Natural Gas

Natural gas would be supplied through a direct connection to the GLG Pipeline located approximately **12** miles due south of the West Range Site and/or from NNG's tapping point located in La Prairie, Minnesota, approximately **10** miles west-southwest of the West Range Site. Excelsior would contract with either or both entities for natural gas transportation capacity for quantities and at pressures sufficient to operate the power plant at maximum load while operating on backup fuel. There is sufficient regional capacity of natural gas to supply the Mesaba Energy Project.

There are three possible routes for the natural gas line (Figure 2.3-4 and Table 4.14-**2**). **Excelsior's** preferred alternative, Alternative 1, would have a permanent ROW length of approximately 13.2 miles, of which 10.7 would be new corridor. Alternative 2 would be 15 miles in length of which 4.5 miles would be new corridor. Alternative 3 would be 12.5 miles in length, of which 5.5 would be new corridor. All three alternatives would require four stream crossings. The Alternative 1 route would have the least number of residential dwellings within 300 feet of the proposed pipeline. The natural gas lines installed for the Mesaba Energy Project would be governed by the safety, design, and construction requirements of state and Federal pipeline safety offices. Subsequently, all three routes would have no adverse impact on existing natural gas service and would potentially expand service and capacity in the area of the West Range Site.

As described in Section 2.3.1.4, after publication of the Mesaba Draft EIS, the Minnesota PUC issued a Pipeline Route Permit dated April 16, 2008 for Nashwauk Public Utilities Commission to construct a proposed natural gas pipeline. The new pipeline would follow essentially the same alignment as proposed by Excelsior for its natural gas pipeline Alternative 1 between Blackberry and Taconite near the West Range Site. From Taconite, the proposed pipeline would follow an additional 9-mile alignment to the City of Nashwauk. Excelsior intends to enter into negotiations with Nashwauk Public Utilities Commission for the purchase of natural gas from the approved

pipeline and has stated that, if the pipeline is constructed in time to supply the requirements for the Mesaba Energy Project and negotiations are successful, Excelsior would not construct a separate pipeline for the Mesaba Energy Project.

Table 4.14-2. Environmental Comparison of Natural Gas Pipeline Alternatives – West Range Site

Environmental Attribute		Alternative 1	Alternative 2	Alternative 3
Pipeline Length	Existing Corridor	2.5 miles	10.5 miles	7 miles
	New Corridor	10.7 miles	4.5 miles	5.5 miles
Residential Dwellings	Pipeline within 300 feet	3	5	22
Water Crossings	Stream	4	4	4
	Lake	0	0	0

4.14.4 Impacts on East Range Site and Corridors

4.14.4.1 High Voltage Transmission Lines

Excelsior's transmission plan for the East Range Site consists of constructing two new 345-kV HVTLs to link the plant to the Forbes Substation POI. Even though one 345-kV HVTL is sufficient to accommodate the full load output of Phase I and Phase II, two lines must be constructed concurrently with the installation of Phase I to address the single failure criterion. Each line would follow existing corridors now occupied by 115-kV HVTLs owned by MP that interconnect the Syl Laskin Generating Station with the Forbes Substation**. The routes are shown in Figure 2.3-8 (Chapter 2) and described in Section 2.3.2.5**.

The **transmission plan** would utilize both the existing 39L/37L and 38L corridors. The 39L/37L corridor would be expanded by 30 feet on one side **for Excelsior's preferred alternative**. **Excelsior's** preferred configuration for the two 345-kV/115-kV double circuit HVTLs would require the acquisition of two new ROW segments. One new segment would be approximately 2 miles in length and travel alongside the 43L corridor and connect the power plant to the initiation point of the 39L and 38L corridors. The second section of new ROW would be approximately 2 miles in length and would link the 39L and 37L corridors.

The alternative configuration would be nearly the same as the preferred configuration. The only difference is that the 38L corridor would be widened by 30 feet on one side instead of widening the 39L/37L corridor.

According to MISO, there would be no additional transmission infrastructure required for these routes beyond those elements necessary to connect to the substation at the Forbes 230-kV bus. Because both alternatives would use or expand existing HVTL ROWs and the construction of new lines in these corridors would not interrupt existing electric service, neither alternative would have an adverse impact on the local electricity supply.

Based upon the results of studies completed to date, MISO has determined that the output of Mesaba Phase I would be fully deliverable within the MISO footprint, and that no network upgrades would be required for the East Range Site. The System Impact Study (Siemens PTI, 2006a) concluded that no network upgrades are required; however, the study was based on a maximum winter output of 552 MW. A sensitivity analysis conducted by the same contractor that performed the East Range Site System Impact Study, and using the same base models and methodology as that study, demonstrated that no injection limits requiring network upgrades were

identified if the East Range IGCC Power Station would distribute 600 MW (Siemens PTI, 2006b and Sherner, 2006).

4.14.4.2 Potable Water Supply

There are two alternatives for supplying potable water to the East Range Site.

Alternative 1 (Obtain Water from the City of Hoyt Lakes)

Excelsior's preferred alternative is to connect to the Hoyt Lakes Water System. Under this alternative, a 6-inch pipeline approximately 11,000 feet in length would connect the plant to the 12-inch water main that serves MP (Figure 2.3-7). The proposed routing would require a portion of the water main to cross Colby Lake. Directional drilling and installation of high-density polyethylene pipe would be assumed for the portion of the water main to be installed under Colby Lake. However, if bedrock were encountered beneath the lake, directional drilling could not be used and instead would be installed by microtunneling. The proposed pipeline would provide the required flow and pressure to Phases I and II without the need for a booster station. The City of Hoyt Lakes potable water treatment plant has sufficient capacity to provide the water needs of the power plant. Although fire suppression water demands have not been calculated for the project, it is likely that Excelsior would provide a water tower or other storage for fire suppression use and that this additional water use would not cause the City of Hoyt Lakes to exceed its current water allocation.

MP has discussed with the City the possibility of increasing their water usage in the future, but has not submitted a request at this time. The City has the potential to provide water to other industries that may locate to the north of the East Range Site. If the water demand from the existing 12-inch water main is increased, the flow and pressure of the water supplied to the power plant may be decreased, requiring Excelsior to consider adding a booster station and/or storage tower.

Under this alternative, the City of Hoyt Lakes would own and maintain the pipeline and Excelsior would enter into an agreement with the City to purchase water. This is the preferred alternative for obtaining potable water for the East Range Site. With proper planning and design, this alternative would not have an adverse impact on existing potable water supplies.

Alternative 2, On-Site Potable Water Treatment Facility

The second potable water supply option is the construction of an on-site water treatment facility with the capacity to treat and supply 7,500 gallons per day of water for Phase I and Phase II, combined. A micro-filtration system would be used to treat a portion of the process water procured for project cooling systems that would be pumped from nearby mine pits near the East Range Site. Chemicals, in addition to chlorine, may be required for this treatment based on the chemical constituents in the source water and would be determined during the engineering design phase of the project.

One advantage of this alternative is that Excelsior would not have to purchase water from the City and would have control over its own water supply. However, Excelsior would be required to operate, maintain and upgrade the water treatment system per Minnesota Department of Health standards.

4.14.4.3 Sanitary Wastewater

Sanitary wastewater would either be discharged to the Hoyt Lakes POTW or to on-site septic tanks coupled to a leach field. **Excelsior's** preferred alternative is to tie-in to the POTW (shown in Figure 2.3-7). This alternative would consist of constructing approximately 1.8 miles of 12-inch gravity sewer pipeline, a pump station, and approximately 0.5 mile of 4-inch force main. The wastewater pipeline would parallel the high voltage power line easement along the west side of the proposed property boundary, south to Colby Lake. The pump station would be located on the north side of Colby Lake. The force main would be directionally drilled beneath Colby Lake and then connected to the existing city gravity sewer near MP on the north end of Colby Lake Road. The POTW has adequate capacity to treat wastewater from the Mesaba Energy Project and the project would not pose an adverse impact on the current system.

4.14.4.4 Natural Gas

The only natural gas supplier within the immediate vicinity of the East Range Site is NNG. NNG's existing pipeline serves CE and abuts the East Range Site on its eastern boundary. In order to provide natural gas in the quantity and at the pressure required to supply Phase I and Phase II, the following would be required:

- Installation of approximately **28.8** miles of new, 16- to 24-inch pipe placed within the existing ROW for the 10-inch branch line currently serving CE.
- Addition of a new 2,500-horsepower compressor at the existing point where the GLG and NNG pipelines interconnect.
- Installation of an ultrasonic meter facility to serve the power plant.

For the East Range Site, the proposed natural gas pipeline (see Figure 2.3-8) would be constructed, owned and operated by NNG, and would be an extension of NNG's interstate pipeline system. As an interstate pipeline, the East Range natural gas supply pipeline would not be subject to Minnesota Pipeline Route Permit requirements, but would be permitted by NNG under the FERC review process. The installation of this pipeline would provide the benefit of providing additional natural gas infrastructure in the region. The addition of this new pipeline would comply with all Minnesota and Federal natural gas pipeline safety standards and would not have an adverse impact on existing natural gas supplies.

4.14.5 Impacts of the No Action Alternative

Under the No Action Alternative, expansion of commercial, industrial and residential areas would continue to occur in the vicinity of the West Range and East Range Sites. Expansion of potable water lines, sanitary sewer, electrical power and natural gas would continue to occur as a result of overall economic growth in the area. It is probable that some of the expansion, such as the proposed residential growth north of the West Range site may proceed at a slower pace due to the lack of cost sharing with the Mesaba Energy Project.

4.14.6 Summary of Impacts

Basis for Impact	No Action	West Range	East Range
Cause potential for increase in demand directly or indirectly on capacity of public water or wastewater facilities.	No additional demand on public water or wastewater treatment would occur, except for that posed by other planned projects in the region. The Taconite wastewater collection system is in need or repair and upgrade, which would need to occur regardless of the outcome of the Mesaba Energy Project. However, the upgrades may occur at a slower pace in the absence of cost-sharing that could occur if the Mesaba Energy Project at the West Range went forward.	The Mesaba Energy Project would not adversely affect sanitary wastewater treatment capacity. The wastewater collection system in Taconite currently overflows during heavy rain and high water table events, which may be exacerbated by new flow from the West Range Site. **To address this issue, Excelsior agreed to make significant capital improvements to the CBT WWTF.** The Taconite potable water system would need to be expanded to accommodate the project and anticipated future growth. This planned expansion has been adopted by the City of Taconite.	The East Range Alternative would not adversely impact existing potable and sanitary sewer systems, as both have capacity to serve the project.
Cause potential for insufficient water supply capacity for fire suppression demands.	No additional demand on existing potable water systems serving the Taconite and Hoyt Lakes areas, except for that posed by other planned projects in the region.	The mine pits would be the source of water for fire suppression; therefore there would be no increased demand from public water systems. The mine pits have sufficient capacity for fire-fighting needs.	The mine pits would be the source of water for fire suppression; therefore there would be no increased demand from public water systems. The mine pits have sufficient capacity for fire-fighting needs.
Cause disruptions of power or impaired electricity service in the region.	Power disruptions due to tie-in of the Mesaba Energy Project to the grid would not occur. Power disruptions due to mishaps and force majeure may still occur in the region. The region would not benefit from the additional source of power from the Mesaba Energy Project.	The project would tie-into the existing grid without service interruptions and would ensure necessary upgrades to substations and other infrastructure are installed to prevent system failures. The project would provide another source of power for the region that could reduce outages and help meet future demand.	Same as West Range site.
Cause potential for new construction of HVTLs, gas pipelines, and other transmission/ conveyance utilities or extensive upgrades to existing utilities resulting in offsite impacts on other resources.	No new construction of utility lines would occur except for those for other planned projects in the region.	The project's proposed utility lines would be constructed in accordance with all Federal and state regulations and would pose no adverse impact on other resources.	The project's proposed utility lines would be constructed in accordance with all Federal and state regulations and would pose no adverse impact on other resources.

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4.15 TRAFFIC AND TRANSPORTATION

4.15.1 Approach to Impacts Analysis

4.15.1.1 Regions of Influence

The region of influence for transportation resources is described in terms of the existing public roadways in the vicinity of the proposed sites and the rail lines that would service the Mesaba Generating Station. Both alternative sites under the Proposed Action would be located within the Mn/DOT District #1 planning area. The proposed sites and associated project components (i.e., new utility lines) are located either in Itasca County or St. Louis County.

With respect to roadways, discussions of traffic impacts were limited to the vicinity of the alternative sites for the Mesaba Generating Station (i.e., Phases I and II). Any reference to the proposed utility corridors (e.g., HVTL, natural gas pipelines) and their impacts to local traffic were generally discussed and specific roads were not identified.

The primary rail lines that serve northeast Minnesota are the BNSF and CN railways. Discussions of rail impacts were focused on the potential routes provided by these railways that would serve the Proposed Action. More specifically, the region of influence for rail lines servicing the West Range includes the BNSF line from Grand Rapids to the project site. For the East Range site, the region of influence includes the CN line from Clinton Township to the project site.

4.15.1.2 Method of Analysis

The evaluation of potential impacts on transportation resources considered whether the Proposed Action or an alternative would cause any of the following conditions:

- Increase in traffic volumes so as to degrade level of service (LOS) conditions to unacceptable levels (e.g., increase traffic delays and cause significant congestion);
- Increase in rail traffic compared to existing conditions on railways in the region of influence; and
- Conflicts with local or regional transportation plans.

Impacts to vehicular traffic on the local roadway network are analyzed based on three elements:

- Existing traffic volumes;
- "No Build" volumes – estimated future traffic volumes *without* the project; and
- "Build" volumes – estimated future traffic volumes *with* the project ("No Build" volumes in addition to the project-generated traffic volumes).

Existing traffic data for the West Range and East Range project areas were provided by Mn/DOT and discussed in Section 3.15.2. In addition to the AADT volumes, historical annual growth rate factors for traffic were estimated to forecast future traffic volumes. Based on the projected traffic volumes, LOSs, as defined in Section 3.15.2, were then estimated using the Highway Capacity Manual guidelines.

In this section, impacts related to the use of rail transport were examined in terms of rail traffic densities. Impacts to emergency vehicles and safety issues at railroad crossings are discussed in Sections 4.13, Community Services and 4.17, Health and Safety, respectively.

The following planning documents were reviewed to identify any potential conflicts with transportation projects: *Minnesota Statewide Transportation Plan (2003-2023); Northeast Minnesota Long Range Transportation Plan (2008-2030); Itasca County 5-Year Plan for Highway Improvement Projects; Itasca County Comprehensive Land Use Plan;* and *Zoning Ordinance of St. Louis County*.

4.15.2 Common Impacts of the Proposed Action

Potential impacts to transportation resources would arise during the construction and operation of the Mesaba Generating Station as a result of additional employee vehicles and material deliveries. The potential impacts include increased rail and vehicular traffic that could lead to traffic congestion and delays and increased road hazards.

The distribution of site-generated trips (i.e., traffic patterns) is based on the characteristics of the road network, existing traffic patterns, historical and projected development in the area, locations where workers would likely reside, and the location of other potential trip origins and destinations.

4.15.2.1 Impacts of Construction

Excelsior's schedule has been revised to reflect current planned construction of Phase I from 2010 through 2014 and Phase II from 2012 through 2016. Therefore, the years stated throughout this section have been adjusted accordingly. Phase I construction would require approximately 48 months, during which time the size of the work force would vary. Construction for Phase I is anticipated to start **in 2010** and end **in 2014**. Phase II construction is expected to **begin** in **2012** and operation is expected to begin in **2016**. The majority of the construction activities are expected to occur between 7:00 am and 5:30 pm, Monday through Saturday. In the event that additional hours would be necessary to complete critical construction activities, a second shift during the warm weather season may be used.

Project-generated traffic volumes during construction would be produced by employees commuting to and from the job site, as well as owner, contractor, supplier, regulator, and service vehicles (including trucks of various sizes) doing business at the site. Excelsior has estimated the number of personnel and supply/material deliveries, which is discussed in further detail below. These estimates are based on the potential number of workers on-site for each construction craft and trade, the number of management staff on-site, truck deliveries of equipment, heavy equipment deliveries, and deliveries of site preparation materials.

Construction material and equipment would be delivered to the construction site by truck and rail. It is expected that semi-trailer trucks would be required to initially bring material to the construction site. This number may be reduced depending on availability of rail delivery once the rail spur is constructed (anticipated to be completed near the start of the construction period). The rail spur would also allow major plant equipment to be delivered to the construction site. It is anticipated that because project-related rail traffic during construction would be limited to approximately two trains per week, impacts to baseline rail traffic conditions would be minimal.

<u>Construction Traffic Volume</u>

Staff and Visitors

It is estimated that the work force on site would peak at approximately 1,500 personnel, which includes Excelsior staff and visitors. The peak period for Phase I is expected to occur from **approximately 2011** through **2012**.

For the purposes of the traffic analysis, it is assumed that there would be a 20 percent vehicle reduction as a result of car pooling (SEH, 2006c). Therefore, it is estimated that there would be a total of 1,200 vehicles per day during the peak construction period, which translates into 2,400 vehicle trips per day. A vehicle trip is defined as a single or one-direction vehicle movement with either the origin or destination (exiting or entering) inside the project site.

Material and Supply Trucks

Construction materials would be procured by the contractor. Materials would be shipped from suppliers located throughout the country and globally. Materials and equipment would be transported to the site by rail and truck. Local procurement can be expected to be the cost-effective choice for concrete ready-mix suppliers, road base and gravel fill suppliers, reinforcing steel fabrication, construction equipment rentals, office supplies, temporary sanitation facilities, and other commodities and services. Construction deliveries would likely total two trains per week. At this time the number of truck deliveries that may be reduced because of potential rail transport use for construction purposes is uncertain. As a conservative estimate, it is projected that a maximum of 140 trips per day would result from construction supply and material deliveries (SEH, 2006c).

Construction of Utility Corridors

Access to the HVTL, gas, and other utility corridors would come from various existing roadways at the points that they are crossed by the proposed utilities. As design and construction progress, there could be a need for temporary access roads to be constructed to facilitate utility construction.

Most construction traffic would use the temporary HVTL ROW for construction, with possible placement of a few temporary access roads to the ROW. In some areas additional temporary ROW would be required for access.

In general, construction of utility lines would cause temporary and localized congestion, particularly where these lines would cross existing roads that would provide access to the construction areas.

4.15.2.2 Common Impacts of Operation

Operations Traffic Volume

Personnel & Staff

During Phase I operations, approximately 107 employees would be needed to staff the power plant daily, with an additional 75 employees for Phase II. It is expected that the majority of the employees would work during standard office hours. **The number of total personnel vehicle trips per day would be 165 and 280 for Phases I and II, respectively (assumes approximately 23 percent commuters carpool).**

Material Transport

During operations most of the feedstock would be transported via rail; however, some materials and supplies would still require trucking. Depending on economic feasibility, the truck volumes would vary. It is anticipated that project-generated average daily traffic (ADT) volumes for material transport during Phase I operations would be minimal **(approximately 30 truck trips per day)** because a majority of the required material (e.g., coal) would be shipped via the rail line. **For Phase II operations, the number of truck trips would double.**

The project would require coal and other materials to be delivered to the power plant by train. Coal is the most significant material input that would be delivered to the project site. It is anticipated that most of the coal requirements would be met with supplies from the PRB, which is located approximately 1,200 miles from the northeast region of Minnesota. The PRB is the largest coal-producing region in the U.S. and spans an area from northeastern Wyoming to southeastern Montana. Wyoming alone is the single largest coal-producing state in the U.S. with its PRB region producing approximately 390.2 million tons of coal in 2005 (BLM, 2006). Under peak use scenarios for both Phases I and II, the Mesaba Energy Project could utilize up to 6 million tons of coal annually, which represents 1.5 percent of the PRB's annual output for 2005. Other incoming materials using train delivery could include petroleum coke, slag, and flux. Material shipped out via train would likely include elemental sulfur and slag. Coal and petroleum coke feedstocks would be received by rail in dedicated unit trains from the mine (or refinery).

It is estimated that during Phase I operations, one unit train per day would be required for the transport of coal to the proposed facility. For Phase II a maximum of two unit trains per day would be required for coal transport. Assuming an average speed of 25 miles per hour, it would take a unit train approximately two days to travel from the PRB region to the northeast region of Minnesota. A unit train would consist of up to 135 cars with the average unit train shipment expected to comprise 115 cars. Three unit trains per day (midnight to midnight) is the maximum feedstock shipment that could be received and unloaded at the Mesaba Generating Station, but such a schedule would not normally occur. One 135-car unit train can deliver about 16,100 tons of coal and each 115-car unit train about 13,700 tons. Approximately four hours time would be required to unload one unit train.

Potential impacts to receptors along existing rail corridors would result from the increase in the number of additional unit trains (up to two roundtrips per day during Phase II). Impacts include increased levels of fugitive dust emissions, noise, and vibration along the existing rail corridors and increased vehicular traffic congestion and delays, frequency of train horns, and safety hazards at grade crossings. The magnitude of noise (including train horns at grade crossings) and vibration levels from project-related train pass-bys would essentially remain the same as existing train passing events; however, the frequency at which these impacts occur would increase with the additional train trips. As previously stated, Phases I and II would require up to 6 million tons of coal annually, which represents 1.5 percent of what the PRB produced in 2005. Therefore, although receptors along the existing rail corridors would endure these impacts more often, it is expected that the incremental increase in train frequency is small enough as to not create significantly different conditions as what currently exists given the existing levels of coal production and rail transportation in the PRB.

The impacts of rail operations on resources other than traffic-related resources are described elsewhere in this chapter. The risks from accidents involving trains at grade rail crossings are discussed in Section 4.17.2.2. The impacts of rail noise and vibration on local receptors are described in Section 4.18.2.2. Sections 4.13.3.2 and 4.13.4.2 for the respective West Range and East Range corridors describe the potential delays for emergency vehicles at grade rail crossings that may be caused by the additional trains for the Mesaba Generating Station. Air quality impacts from fugitive dust and train emissions are addressed in Section 4.3. **Section 4.3.2 has been updated to include a subsection on emissions from truck and train deliveries.**

4.15.3 Impacts on West Range Site and Corridors

4.15.3.1 Impacts of Construction (West Range)

<u>Site Access</u>

As described in the Draft EIS, Excelsior considered two access road components to provide access to the West Range Site—Access Road 1 (i.e., the proposed realignment of CR 7) and Access Road 2. The proposed realignment of CR 7 was under consideration by Itasca County when the scope of the EIS was initially determined. Following publication of the Draft EIS, Itasca County deferred its planned realignment of CR 7 due to changes in funding priorities at the state level. Also, following publication of the Draft EIS, DOE coordinated with Excelsior toward the consideration of an additional road access alternative, Access Road 3, to meet the objective of avoiding and minimizing impacts on wetlands in response to comments by USACE and other agencies. Therefore, the construction of Access Road 1 and Access Road 2 as presented in this section of the Draft EIS is no longer anticipated to be practicable for the Mesaba Energy Project. Access Road 3, now Excelsior's preferred alternative, would directly connect the existing alignment of CR 7 to the plant footprint via the southwestern corner of the property boundary as shown in Figure 2.3-2. This section has been revised to reflect these changes for the Final EIS. [Text in the Draft EIS discussing the construction of Access Roads 1 and 2 has been deleted at this point.]

Construction traffic would be required to access the site through use of the existing CR 7. Access Road **3** would be extended to the existing CR 7 from the **plant footprint**. Special turning lanes onto CR 7 and US 169 would be required to improve the safety conditions at this intersection. Although no formal plans have been submitted to Mn/DOT to date, conceptual plans have been initiated. The following improvements are recommended by the conceptual plan (SEH, 2006d and e):

- The northbound left turn lane on US 169 would be lengthened to allow for deceleration on the downhill grade;
- An acceleration lane (i.e., truck climbing lane) on US 169 traveling south from CR 7 would be constructed;
- A standard right turn lane from CR 7 to US 169 would be added;
- CR 7 would be widened to allow for a southbound left turn lane; and
- A standard northbound right turn lane from CR 7 to the plant entrance road (i.e., Access Road 3) would be constructed.

As described in Sections 2.2.4.1 and 2.3.1.1, Excelsior would establish off-site construction staging and laydown areas on 85 acres of land selected from among four potential sites for Phase II construction. Figures 2.3-1 and 2.3-3 show the candidate locations for the West Range Site. All of the sites are located on lands that have been disturbed or cleared during prior uses by mineral extraction companies and all have access to local roadways. Excelsior would select appropriate sites for the necessary acreage prior to construction of Phase II taking into consideration potential effects on traffic. Additional traffic volumes (up to eight vehicle trips for each peak a.m. and p.m. hour) from construction truck deliveries would potentially result in increased congestion, delays, and traffic hazards on routes between the potential laydown areas and the construction site. However, these impacts are expected to be minor as this increase in traffic would be relatively minor and the routes between the laydown areas and the construction site do not traverse large towns.

The 30 acres located adjacent CR 7 would present the least traffic impacts as it would require driving approximately 1,500 feet on CR 7, between the laydown area and the new Access Road 3. The 30-acre laydown area just south of Taconite would also result in minimal traffic impacts, but driving distance is approximately 3 miles from the Phase II construction site. A half mile north of this laydown area, another 30-acre area may potentially be used. This location is situated adjacent the western edge of the Taconite residential area, and driving distance is approximately 5 miles to the construction site. A 250-acre laydown area is located approximately 7 miles from the construction site and would require driving on CR 7, US 169, and CR 10 between sites.

Rail access into the West Range Site would be from existing BNSF and CN tracks. Since the frequency of rail use is considered low during the construction phase (deliveries would likely total two trains per week), the impacts to existing rail resources and traffic safety are expected to be minimal. **In response to concerns raised by USACE and other agencies about the need to avoid and minimize wetland impacts identified in the Draft EIS, Excelsior identified a new preferred rail alignment, Alternative 3B. The alignment would follow the same route as Alternative 1A from the point of interconnection with the CN and BNSF main line to the Mesaba plant site. However, Alternative 3B would begin its rail loop approximately at a point in between the footprints for Phases I and II (see Figure 2.3-2). Impacts to transportation resources from the new alignment are expected to remain unchanged.**

Traffic Volumes and Level of Service

New traffic volume projections were performed for Excelsior's new preferred road alignment, Access Road 3. This section has been revised to reflect the new analysis. Table 4.15-1 has been revised to include updated traffic projections during construction for Phase I (i.e., 2010).

As discussed in Section 4.15.1.2, historic traffic data was collected and used to forecast future traffic volumes in the vicinity of the West Range Site. Existing ADT volumes were gathered along US 169 and CR 7 (see Section 3.15). In addition, historic traffic volumes along other nearby routes were analyzed to develop historic average annual traffic growth rates for the project area. A 1.5 percent average annual traffic growth rate was applied to the existing traffic volumes to determine future traffic volumes with and without the project during construction ("Build" and "No Build" volumes, respectively). **The "No Build" traffic volumes were revised as new data from 2006 was obtained after publication of the Draft EIS and incorporated for the Final EIS.**

The historical traffic volumes were projected to the year 2010 (approximate time that construction for Phase I would peak) as shown in Table 4.15-1 **(revised for Final EIS)**. The construction-related traffic (during peak conditions) was added on top of the "No Build" volumes to estimate the "Build" volumes.

Table 4.15-1. "No Build" and "Build" ADT Volumes and LOS at West Range Site (to year 2010)

Year	US 169		CR 7	
	West of CR 7	East of CR 7	North of New Access Road 3	South of New Access Road 3
2000	5,800	5,500	1,100	1,100
2002	6,500	5,800	NA	NA
2004	7,200	5,700	NA	NA
2006	7,000	6,500	1,300	1,300
2010 "No Build"				
2010 "No Build" (construction)	7,400 (LOS C)	6,900 (LOS C)	1,380 (LOS A)	1,380 (LOS A)
2010 "Build"				
2010 Additional Traffic Volumes (construction)	1,170 total (70 trucks)	1,170 total (70 trucks)	260 total (0 trucks)	2,340 total (140 trucks)
2010 "Build"	8,570 (LOS C)	8,070 (LOS C)	1,640 (LOS A)	3,720 (LOS B)

Note: Revised estimates for the "No Build" scenario reflect more recent data (i.e., 2006) collected since publication of the Draft EIS (see Table 3.15-1). "Build" volumes for Access Road 1 as shown in the Draft EIS have been deleted with Excelsior's decision to construct Access Road 3 as their preferred alternative.
Source: SEH, 2006 (f and g); (SEH, 2009)

The traffic forecast in Table 4.15-1 assumes peak construction conditions (i.e., 2,400 personnel vehicular trips and 140 truck trips per day) to provide an upper bound estimate for traffic volumes. Therefore, the percent increases in traffic represent conservative estimates as it uses the peak number of personnel and the initial use of trucks prior to completion of the rail spur. It is anticipated that truck trips would begin to decrease as the construction period progressed because of rail use and the fact that the majority of construction equipment would remain on site.

Table 4.15-1 shows that ADT volumes on US 169 would increase between 15 to 17 percent and volumes on CR 7 (north of the plant site) would increase at approximately 20 percent as a result of Phase I construction activities. Traffic flow on CR 7 (south of the plant site) would **increase 1.7-fold**.

Based on the ADTs estimated in Table 4.15-1, the LOSs were also determined. Although traffic volumes on US 169 and CR 7 would generally see an increase in traffic volume and delays, these roads would continue to operate at **an** LOS **C or better, which represents stable and manageable traffic flow**. Though plans to renovate the intersection of CR 7 and US 169 are in a conceptual phase, it is anticipated that the improvements would be implemented before the peak construction period began and would help minimize the traffic hazards currently associated with this intersection.

[Text in the Draft EIS relating to the realignment of CR 7 (Access Road 1) has been deleted.]

In general, construction-related impacts to traffic would be localized and temporary and have the greatest influence at CR 7 and US 169 nearest the project site. Since the West Range Site is located in a characteristically rural area that does not typically see heavy traffic flows, the existing regional roads would have the capacity to handle the additional traffic volumes resulting from peak construction activities and would, therefore, have a moderate impact to the regional roadway system.

4.15.3.2 Impacts of Operation

Site Access

For the Draft EIS, Excelsior considered two access road components—Access Road 1 (i.e., realignment of CR 7) and Access Road 2 (connecting with the realignment of CR 7)—to provide access to the West Range Site. This section has been revised to reflect Excelsior's decision to implement Access Road 3 as their preferred alternative; discussions on Access Road 1 and Access Road 2 have been deleted in this section for the Final EIS based on the deferment by Itasca County of plans to realign CR 7.

Primary access to the West Range Site during operations would be **the** same as that during construction—via the new Access Road **3 (see Figure 2.3-2)**. Access Road **3** would be used by all of the site-generated traffic, including truck hauls, during operation of the power plant.

Traffic Volumes and Levels of Service

Projected traffic volumes during plant operations were estimated in the same manner as that which were calculated for the projected construction traffic volumes. Table 4.15-2 **(revised for Final EIS)** includes ADT traffic estimated during operations for both Phases I and II and is projected to the year 2028.

The incremental increase of traffic resulting from the Mesaba Generating Station would be minor with respect to "No Build" conditions in 2028. ADT volumes on US 169 and CR 7 (north of Access Road 1) would increase approximately 2 percent, except for CR 7, which would actually decrease because of the new CR 7 (south of new Access Road 1).

Table 4.15-2. "No Build" and "Build" ADT Volumes and LOS at West Range Site (to year 2028)

Year	US 169		CR 7	
	West of CR 7	East of CR 7	North of New Access Road 3	South of New Access Road 3
2000	5,800	5,500	1,100	1,100
2002	6,500	5,800	NA	NA
2004	7,200	5,700	NA	NA
2006	7,000	6,500	1,300	1,300
2028 "No Build"				
2028 "No Build"	9,700 (LOS D)	9,000 (LOS D)	1,800 (LOS B)	1,800 (LOS B)
2028 "Build"				
2028 Additional Traffic Volumes	190 total (30 trucks)	190 total (30 trucks)	40 total (0 trucks)	340 total (60 trucks)
2028 "Build"	9,870 (LOS D)	9,170 (LOS D)	1,840 (LOS B)	2,140 (LOS B)

Note: Revised estimates for the "No Build" scenario reflect more recent data (i.e., 2006) collected since publication of the Draft EIS (see Table 3.15-1). "Build" volumes for Access Road 1 as shown in the Draft EIS have been deleted with Excelsior's decision to construct Access Road 3 as their preferred alternative.
Source: SEH, 2006 (f and g); (SEH, 2009)

The ADTs estimated in Table 4.15-2 **show that traffic volumes on US 169 and CR 7 (north of the plant site) for the "Build" scenario in 2028 would have moderate increases that are not significantly different from the forecasted "No Build" scenario and** the LOSs for the "Build" condition would remain the same as the "No Build" condition. Though the LOS for traffic on US 169 would operate at an LOS of D (in either condition), flow of traffic is still considered stable at this level. **CR 7 (between US 169 and the plant site) would see its maximum volumes (about 3,720 vehicles per day) during peak construction periods expected in 2010, then decline after construction with an estimated 2,140 vehicles per day in 2028.** Because the West Range Site is located in a relatively rural area that sees very little traffic congestion, the operating capacity of US 169 and CR 7 would be able to handle the new traffic. The conceptual plans for improving the intersection of CR 7 and US 169 would help minimize the traffic congestion and hazards associated with this area.

Rail Transport

Existing Rail Routes for Material Transport to West Range Site

The existing rail routes to the West Range Site were discussed in Section 3.15 and are shown in Figure 2.3-2. The shortest route for delivering coal from the PRB to the West Range Site is via the BNSF trackage across North Dakota. The preferred route would pass through Fargo, North Dakota, north to Grand Forks, North Dakota, and across Minnesota through Grand Rapids to Gunn and then to Taconite (approximately 1,200 miles).

An alternative route to the West Range Site via BNSF trackage would be from Brookston northward to Kelly Lake and Keewatin and westward to the plant site. It is anticipated that this route would primarily be used for non-coal train operations because of its greater distance and significant grade changes north of Brookston.

The CN delivery of coal would be from the Superior, Wisconsin area northward to Virginia and then west past Hibbing and Keewatin to Taconite/Bovey. CN unit coal trains would be required to undertake the following steps to access the West Range Site:

1) Approach the West Range IGCC power plant from the east;
2) Travel past the site and either
    a) Back into the site, or
    b) Stop in Bovey, have the locomotives disconnect from in front of the train, reconnect to the other end of the train, and access the site from the west.

A reverse move would be required for the empty train. To accommodate such maneuvers, unit coal trains supplied by CN would use an existing siding in Bovey that would need to be lengthened. Other CN deliveries to the plant would occur via the same type of movement, but with much shorter trains. Neither CN unit train movements nor non-coal movements required to access the West Range site in the manner described would block any public at-grade crossings near the site.

The short length of CN track in the vicinity of the West Range Site is temporarily out of service because of rising water levels in the CMP as was discussed in Section 3.15.3.2. **[Text in the Draft EIS relating to the Mesaba Energy Project's involvement in maintaining water levels in the CMP has been removed.]** At the request of the BNSF or another local shipper, the track would be required to be placed back in service under current common carrier regulations of the Surface Transportation Board.

Rail Alignment Alternatives

In response to concerns raised by USACE and other agencies about the need to avoid and minimize wetland impacts identified in the Draft EIS, Excelsior identified a new preferred rail alignment, Alternative 3B. The alignment would follow the same route as Alternative 1A from the point of interconnection with the CN and BNSF main line to the Mesaba plant site. However, as

shown in Figure 2.3-2, Alternative 3B would begin its rail loop approximately at a point in between the footprints for Phases I and II. The rail loop would follow a relatively level grade around a hill located northeast of the plant footprint and rejoin the rail spur near Dunning Lake at the southeastern corner of the property. The coal dumper would be located on the straight segment of rail alignment before the first curve in the loop, at a point approximately 2,000 feet closer to the southeastern property boundary.

Impacts to transportation resources as discussed below are expected to remain unchanged regarding Alternative 3B. Alternative 1B was eliminated from further consideration by Excelsior following publication of the Draft EIS. Therefore, text regarding Alternative 1B in this section has been deleted.

In considering siting criteria as described in Chapter 2, two rail alignments were evaluated by Excelsior as being feasible (Alternative 1A and **3**B). The physical descriptions and layout of the alternative rail alignments are discussed in Chapter 2 and shown in Figure 2.3-2.

Both Alternatives 1A and **3**B would meet acceptable alignment, grade, and rail operations criteria. The length of rail line required for construction of these alternatives would total approximately 4 miles **each**. A rail bridge over **Diamond Lake Road** to the West Range Site would be constructed to avoid an at-grade crossing that could **block local traffic on Diamond Lake Road during unloading of coal trains.**

4.15.4 Impacts on East Range Site and Corridors

4.15.4.1 Impacts of Construction

Site Access

After publication of the Draft EIS, Excelsior reconsidered the need for a looped access road based on comments received from USACE regarding potential impacts on wetlands. Access to the East Range Site would still be provided from CR 666 (Kensington Drive) to the east; however, instead of a looped access road with two connection points, only the southern portion would be implemented—the northern portion would not be constructed (see Figure 2.3-6). Therefore, this section has been revised to reflect this change and discussion of a looped access road system with two access points on CR 666 as included in the Draft EIS has been deleted. Traffic impacts as discussed in the Draft EIS would essentially remain the same (e.g., same number of projected traffic volumes), except that the flexibility of having two access points as discussed in the Draft EIS would no longer be available to vehicles entering/exiting the East Range Site.

Section 3.15.2.2 discusses the existing roadway system near the East Range Site, shown in Figure 2.3-5. A new road would be constructed off of CR 666. The proposed access road would be a new two-lane roadway **directly accessed from** CR 666, just east of the plant. The road would be utilized for worker daily access and trucked material deliveries. It is expected that most of the construction traffic to the site would be from the west where some of the larger communities in the area of St Louis County are located.

[Text describing traffic flow on the looped access road in the Draft EIS has been deleted.] As part of the Proposed Action, other roadway improvements near the East Range site include a proposed 2-inch mill and overlay of CR 666 **(Kensington Drive)** from Hoyt Lakes to the plant site and a full reconstruction of Hampshire Drive, a short connector between CR 110 and CR 666.

In order to access the East Range Site, traffic approaching from the west would travel on CR 110 and turn north onto CR 666 at the first major intersection in Hoyt Lakes. This intersection is controlled as a four-way stop. CR 666 travels to the north about 1.6 miles where it adjoins the eastern boundary of the East Range Site for a distance of about 1.4 miles. CR 666 continues beyond the East Range Site a distance of approximately 2 miles further north-northeast to the CE administration building. Traffic approaching Hoyt Lakes from the east would travel on CR 110, turn north onto Hampshire Drive at the first major intersection upon coming into town and turn northeast onto CR 666 toward the site.

As described in Sections 2.2.4.1 and 2.3.2.1, Excelsior would establish off-site construction staging and laydown areas on 85 acres of land from two potential sites for Phase II construction. Figures 2.3-5 shows the candidate locations for the East Range Site. Both sites are located on lands that have been disturbed during prior uses by mineral extraction companies and are accessible by mining roads and an abandoned rail grade that would be improved for truck access. The laydown areas are located approximately 2 to 3 miles from the project site. Additional traffic volumes (up to eight vehicle trips for each peak a.m. and p.m. hour) from construction truck deliveries would potentially result in increased congestion, delays, and traffic hazards on CR 110 and CR 666 between the potential laydown areas and the construction site. However, these impacts are expected to be minor as potential routes between the laydown areas and the construction site are located outside of any residential area and the routes currently experience very limited traffic since the surrounding land use is primarily industrial.

It is anticipated that large equipment required at the site would be shipped by rail. The Duluth, Missabe, and Iron Range Railway Company (DMIR) **owned by CN Railway** has interchanges with all major railroads operating in northern Minnesota and large equipment shipments would generally utilize rail service to the site.

Traffic Volumes and Levels of Service

As discussed in Section 4.15.1.2, historic traffic data was collected and used to forecast future traffic volumes in the vicinity of the East Range Site. Existing ADT volumes were gathered along CR 110 and CR 666 (no ADT data available for Hampshire Drive, see Section 3.15.2.2). In addition, historic traffic volumes along other nearby routes were analyzed to develop historic average annual traffic growth rates for the project area. Average annual traffic growth rates between 1.0 to 3.4 percent were applied to the existing traffic volumes to determine future traffic volumes with and without the project during construction ("Build" and "No Build" volumes, respectively). The historical traffic volumes were projected to the year 2010 as shown in Table 4.15-3.

Table 4.15-3. "No Build" and "Build" ADT Volumes and LOS at East Range Site (year 2010)

Location	Average Daily Traffic Volume	
	"No Build"	"Build"
CR 110 (west of CR 666)	3,170 (B)	4,470 (B)
CR 110 (east of CR 666)	850 (A)	2,150 (B)
CR 666 (north of CR 110)	900 (A)	2,200 (B)
CR 666 (east of Hampshire Road)	570 (A)	3,170 (B)
Hampshire Road (between CR 110 and CR 666)	285(A)	1,585 (A)

Source: SEH, 2006 (b and g)

The two primary roads in the vicinity of the East Range Site are CR 666 and CR 110. The volume of traffic on CR 666 would peak during the Phase I construction period at 3,170 trips per day and would be lower thereafter. The volume on CR 110 would peak at 4,470 trips per day to the west and 2,150 to the east. Though some of the relative traffic increases as a result of the project would be more than a doubling of volume in some instances, these volumes still reflect lower than average ADTs for rural two-lane highways and would not cause a significant degradation in LOS. As shown in Table 4.15-3, the lowest LOS that would result during the construction period is B, which represents free flow traffic and very little congestion. CR 110 and CR 666 would have more than enough capacity to handle the additional traffic volumes resulting from peak construction activities and would therefore have a minimal overall impact to the local roadway system.

The intersection of CR 666 and CR 110 in Hoyt Lakes is predicted to have some congestion at peak hours (e.g., shift changes) during the peak construction periods. However, with the proposed reconstruction of Hampshire Drive, traffic to/from the east would most likely use this road as a shortcut between CR 666 and CR 110, and therefore, minimize the extent of congestion at this intersection.

4.15.4.2 Impacts of Operation

Site Access

Primary access to the East Range Site during operations would be same as that during construction—via the new access road. This primary access would be used by nearly all of the site-generated traffic, including truck hauls, during operation of the power plant.

Traffic patterns (i.e., distribution of vehicle trips) during plant operations are estimated to be similar to that as the construction phase, mainly with the majority of incoming traffic to the power plant coming from the larger communities to the west of the site. **As discussed for the construction phase, access to the East Range Site would still be provided from CR 666 to the east, but with a single access road.**

Traffic Volumes and Levels of Service

Projected traffic volumes during plant operations were estimated in the same manner as calculated for the projected construction traffic volumes. Table 4.15-4 includes ADT traffic estimated during operations for both Phases I and II **in** the year 2028.

Table 4.15-4. "No Build" and "Build" ADT Volumes and LOS at East Range Site (year 2028)

Location	Average Daily Traffic Volume	
	"No Build"	"Build"
CR 110 (west of CR 666)	3,735 (B)	3,925(B)
CR 110 (east of CR 666)	1,335 (A)	1,525 (A)
CR 666 (north of CR 110)	1,435 (A)	1,625 (B)
CR 666 (east of Hampshire Road)	1,020 (A)	1,400 (A)
Hampshire Road (between CR 110 and CR 666)	485 (A)	675 (A)

Source: SEH, 2006 (b, g, and h)

The incremental increase of traffic resulting from the Mesaba Generating Station ranges from minor to significant relative to existing local traffic volumes. CR 110 (west of CR 666) would see approximately 5 percent increase in new traffic as are result of the Mesaba Generating Station. The other locations listed in Table 4.15-4 would see significant increases as a result of the power plant (up to 40 percent). However, because the East Range Site is surrounded by rural county roads that see very little traffic flow, the existing operating capacity of CR 666 and CR 110 would be able to handle the new traffic. Though CR 666 (north of CR 110) would experience a degradation in LOS (from A to B), an LOS of B still represents free flow traffic conditions with very little congestion. The "Build" volumes shown in Table 4.15-5 still reflect relatively low ADT and the roads would continue to operate at LOS B or better, and therefore, very minimal adverse impacts are expected to occur during the operational phase.

Rail Transport

The rail lines near the East Range Site are discussed in Section 3.15.3.3 and shown in Figure 2.3-5. The site does not provide the option of immediate competition between rail providers. Realistically, the CN (the current owner of the DMIR rail line) would be the only feasible near-term rail service provider into the East Range generating station. The nearest competitive railroad is the BNSF Railway near Hibbing, 40 miles from the East Range Site. Longer term, it may be possible to utilize the port at Taconite Harbor and CE's privately-owned railroad to provide feedstock transport to the East Range Site; however, this option is currently considered unlikely.

Existing Rail Routes for Material Transport to the East Range Site

Figure 3.15-1 shows the rail network in northeastern Minnesota. The CN Railway would deliver coal to the site from Eveleth. Empty unit trains would return by the same route. The layouts of the proposed rail alignments are presented in Figure 2.3-6.

Rail Alignment Alternatives

Alternative 1 for the East Range Site is a traditional coal loop that would handle a complete coal train and allow return in the same direction. The track would start near MP's Laskin spur and travel east-northeast to the proposed generating station. The track would be about 17,800 feet long plus additional plant track sidings for miscellaneous chemicals and products. The track would begin at an elevation of approximately 1,455 feet and the coal loop would be at set at about 1,465 to 1,470 feet.

Alternative 2 is an alignment that would handle a complete coal train, but would cross the site (rather than looping within it) and connect with the CN north-south track just north of Wyman Junction. This track would be about 18,500 feet long and have the coal dumper centered in the middle. The train would leave the track at an elevation of 1,455 feet, climb to a dumper elevation of about 1,465 to 1,470 feet and continue to climb to the about 1,485 feet at the north-south CN track. To maintain a workable grade, this track would have to cross under CR 666, requiring construction of a new roadway bridge.

With respect to transportation resources, there are no discernable differences in impacts between either alternative, other than some minor congestion at CR 666 during construction of the new bridge for Alternative 2.

4.15.5 Impacts of the No Action Alternative

For the purposes of this EIS, as explained in Section 2.1.1.2, the DOE No Action Alternative is assumed to be equivalent to a "No Build" Alternative. As a result, the No Action Alternative would maintain the status quo with respect to future transportation conditions near the West Range Site (Itasca County) and East Range Site (St. Louis County).

Traffic demand on the roadway system is composed of existing traffic and estimated future "No Build" traffic (i.e., non-project traffic). As stated in 4.15.2, estimated future traffic growth is generally composed of additional traffic from land development and/or roadway improvement projects and effects of population and business growth.

The historical and projected (without the Proposed Action) traffic volumes for the roadways within the vicinity of the West Range and East Range study intersections are discussed in Sections 4.15.3 and 4.15.4, respectively. The projected volumes were based on assumed traffic growth rates, which closely followed historical traffic trends. The traffic growth rates used accounts for the effects of general population and business growth predicted in the project areas. Assuming that future development and growth trends discussed in this section closely follow actual trends, the ADT volumes and LOSs of the existing and the projected "No Build" conditions for the roads that were analyzed indicate that these roads would continue to operate at LOS D or better under the No Action Alternative.

The No Action Alternative would not alter these baseline conditions and would, therefore, have no adverse impact on transportation resources.

4.15.6 Summary of Impacts

Basis for Impact	No Action	West Range	East Range
Increase in traffic volumes so as to degrade level of service (LOS) conditions to unacceptable levels (e.g., increase traffic delays and cause significant congestion).	There would be no additional vehicular traffic that would occur, and therefore, LOS conditions would remain the same**. [Text in the Draft EIS relating to Access Road 1 has been deleted.]**	During construction: temporary LOS degradation of **CR 7 (south of plant site)** – from an LOS of **A** to **B**. During operation: LOSs would remain the same **and in stable operating conditions** on nearby roadways.	During construction: temporary LOS degradation of most of nearby roads; however, lowest LOS would be B (represents free flow traffic with little congestion). Reconstruction of Hampshire Drive expected to minimize potential congestion at intersection of CR 666 and CR 110. During operation: LOSs would remain the same on nearby roadways, except for CR 666 (north of CR 110), which would degrade from A to B.
Increase in rail traffic compared to existing conditions on railways in the region of influence.	There would be no additional rail traffic that would occur, and therefore, rail operations would remain the same.	Rail use during construction and operations is expected to have minimal adverse impacts to baseline rail traffic conditions.	Rail use during construction and operations is expected to have minimal adverse impacts to baseline rail traffic conditions.
Conflicts with local or regional transportation plans.	There would be no development, thus, no conflicts with transportation plans.	No conflicts with regional transportation plans were identified.	No conflicts with regional transportation plans were identified.

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4.16 MATERIALS AND WASTE MANAGEMENT

4.16.1 Approach to Impacts Analysis

4.16.1.1 Regions of Influence

Two regions of influence were identified for evaluating impacts associated with materials and waste management at both the West Range and East Range Sites and the proposed corridors. The first region of influence was the area within the buffer land boundaries of each proposed site where the Mesaba Generating Station, access roads, and rail spurs would be located, as well as the construction ROWs along the proposed HVTL and gas pipeline corridors. A second, larger region of influence was also considered that included any potential off-site sources that could affect the West Range or East Range Sites, as well as the commercial availability of treatment, storage and disposal facilities located in Minnesota, Itasca County (West Range Site), St. Louis County (East Range Site), or out of state that could receive waste streams from the construction and operation of either site.

4.16.1.2 Method of Analysis

The potential for materials or waste to affect the environment was considered for both the construction phase and the operational phase. The analysis considered the types and quantities of materials expected to be used and stored for construction and operations, the quantity and type of non-hazardous and hazardous waste that would be generated from construction and operation, storage practices and containment, and whether available treatment, storage and disposalfacilities had the capability and the capacity to accept the non-hazardous and hazardous waste generated.

The evaluation of potential impacts from the use of hazardous and non-hazardous materials or the generation of hazardous and non-hazardous waste considered whether the Proposed Action or an alternative would cause any of the following conditions:

- The use of hazardous materials would create reasonably foreseeable conditions that would increase the risk of a hazardous material release;
- The volume of solid waste generated would (directly or indirectly) affect the capacity of solid waste collection services and landfills;
- Wastes would be created for which there are no commercially available disposal or treatment technologies;
- The quantity of hazardous wastes generated would (directly or indirectly) affect the capacity of hazardous waste collection and disposal services; and
- Waste generation would create reasonably foreseeable conditions that would increase the risk of a hazardous waste release to the environment.

4.16.2 Common Impacts of the Proposed Action

Potential impacts associated with the construction and operation of the proposed Mesaba Generating Station, access roads, rail lines, HVTLs, water lines, and gas pipeline corridors would, for the most part, be the same at either the West Range Site or the East Range Site. Therefore, common impacts associated with construction and operations are discussed in this section. Specific impacts from materials and waste management unique to the West Range Site and the East Range Site are discussed in Sections 4.16.3 and 4.16.4, respectively.

4.16.2.1 Impacts of Construction

Construction of Phase I and Phase II of the Mesaba Generating Station would occur over a period of **approximately** six years between **2010 and 2016**. Construction activities would include the construction of the Phase I and Phase II Mesaba Generating Station and associated access roads and rail lines, construction of the HVTL corridors, and construction of natural gas pipelines. Construction of the power plant, rail lines and access roads would occur within the buffer land boundary. Construction of the HVTLs, water lines, and gas pipelines would occur outside of the buffer land boundary as previously described in Chapter 2.

Construction Materials

Construction materials would include water used for hydrotesting, diesel fuel, gasoline, cleaning materials, solvents, concrete, wood, metal, glass, construction equipment, power plant equipment, materials to operate and maintain equipment (oil, batteries, etc.), and other materials commonly used for building construction. Construction water would be supplied **as described in Section 4.14**. Gravel and road base would be used for temporary roads, material storage, and parking areas. General office materials such as paper, packaging, etc., would also be used. In addition to the materials listed, construction of the rail lines would require ballast, subballast, and railroad ties. Materials required for the construction of the HVTLs would include power lines and structures, and gas pipeline construction would require piping and welding materials in addition to the above-listed materials.

Construction materials would be delivered to the construction site (or to the gas pipeline and HVTL corridors) primarily by truck. Completion of the on-site rail spur would also allow rail deliveries to the site. Local, regional, or national suppliers would provide the necessary construction materials. Whenever feasible, supplies would be obtained from local suppliers.

Construction material storage areas would be located within the planned construction **staging and laydown areas described in Sections 2.2.4.1 and 2.3.1.1. The staging and laydown areas for Phase I plant construction would be established on the Phase II plant footprint. For Phase II construction, Excelsior would establish off-site construction staging and laydown areas comprising a total 85 acres of land in one or more locations. In identifying candidate locations, Excelsior considered properties owned by mineral extraction firms or tax forfeiture lands that have been cleared or disturbed during prior activities and, therefore, do not contain surface waters, wetlands, or sensitive natural resources. Candidate sites also have access to local roadways and are within a 10-mile radius of the respective plant footprint. Excelsior would select one or more of the candidate locations for staging and laydown use near the permitted generating station site prior to Phase II construction. Access to construction sites and staging areas** would be controlled for personnel and vehicles by a security fence around the site boundary, and all construction materials would be stored within the secured fence area. Secondary containment would be provided for liquid hazardous material storage. Staging areas up to several acres also would be required along the HVTL and gas pipeline corridors for storing construction materials and equipment. These areas would be fenced to control access, and secondary containment would be provided for liquid hazardous material storage.

Preventative measures such as providing fencing around the construction site, establishing contained storage areas, and controlling the flow of construction equipment and personnel would reduce the potential for a release to occur. In the event that a release should occur, immediate action would be taken to contain and clean up a release in accordance with Federal, state, and local regulations. Construction personnel would be trained in the proper handling and storage practices for construction materials, as well as the response to any leaks or spills during construction. **Among other requirements, the Mesaba Generating Station would be subject to an Emergency Response Program to be developed in compliance with OSHA Standard 1910.120, which would include an Emergency Response Plan (1910.120[q]) as explained in Section 4.13.**

Construction Waste

Non-Hazardous Waste

Non-hazardous waste generated during construction would include trees and debris from site clearing activities, scrap materials, and sanitary waste. Table 4.16-1 lists the non-hazardous wastes and the quantities expected to be generated during construction **for each phase of the Mesaba Generating Station**. To the extent practical, surplus materials and non-hazardous wastes generated during construction would be recycled.

Solid waste and sanitary waste generated during construction would be limited to common construction-related waste streams. In-state or out-of-state landfills or recycling facilities would have the capability and capacity to accept these wastes.

Hazardous Waste

The primary hazardous wastes generated during construction would include spent hydrotest water, used oils, cleaning wastes and solvents, spent welding materials, used oil filters, fluorescent/mercury lamps, oily rags and absorbents, empty hazardous material containers, and used batteries. The quantity of each hazardous waste stream that would be generated during construction **for each phase of the Mesaba Generating Station** is shown in Table 4.16-1.

Based on the estimated quantities of hazardous waste that would be generated during construction, the Mesaba Generating Station could be regulated as a large-quantity generator of hazardous waste. Under RCRA of 1976, a large-quantity generator generates 1,000 kilograms per month or more of hazardous waste, or more than 1 kilogram per month of acutely hazardous waste. RCRA requirements for large-quantity generators include:

- May only accumulate waste on site for 90 days (certain exceptions apply).
- Do not have a limit on the amount of hazardous waste accumulated on site.
- Must always have at least one employee available to respond to an emergency. This employee is the emergency coordinator responsible for coordinating all emergency response measures. Large-quantity generators must have detailed, written contingency plans for handling emergencies.
- Must submit a biennial hazardous waste report that reports to EPA the generation, management, and final disposition of hazardous waste generated by the facility.

Hazardous waste generated during construction would be properly managed and stored on site in accordance with RCRA. Preventative measures such as providing fencing around the construction site, establishing contained storage areas, responding immediately to spills, and controlling the flow of construction equipment and personnel would help reduce the potential for a release to occur.

The quantity and type of hazardous waste that would be generated during construction would be limited to typical construction-related waste streams commonly accepted by treatment, storage and disposal facilities, and commercially available treatment or disposal would be available.

Non-Hazardous and Hazardous Waste Minimization and Storage

To reduce the risk of a release of non-hazardous or hazardous construction wastes to the environment, an Environmental Management System and a Pollution Prevention/Waste Minimization Program would be developed, which would include an evaluation of alternatives to eliminate, reduce, or minimize the amounts of materials used and, subsequently, the amounts of wastes generated. Project planning would include reviews of forecasted hazardous material purchases and use, and the investigation of less-hazardous substitutes. Potential areas for source reduction and recycling would also be identified to reduce the quantity of materials used and waste generated. In accordance with state and county recycling goals, construction wastes would be reused or recycled whenever feasible.

Table 4.16-1. Estimated Construction Waste Streams (Phase I and II)

Waste Description	Approximate Quantity Per Phase	Likely Disposal or Treatment Method
Non-Hazardous Solids		
Site clearing – waste vegetation, salvageable timber, and miscellaneous debris clearing	Cut: 3,100,000 cubic yards (West Range Site) 3,349,000 cubic yards (East Range Site) Fill: 2,350,000 cubic yards (West Range Site) 1,146,000 cubic yards (East Range Site)	Sell salvageable timber for pulp and paper production, sell or donate waste wood for use as fire wood, mulch for recycle, or dispose in non-hazardous landfill. Reuse soils for berms and landscaping, mulch and recycle organic debris, recycle or landfill inorganic debris.
Scrap materials, debris, and trash (wood, metal, plastic, paper, packaging, office wastes, etc.)	40 cubic yards/week	Recycle or non-hazardous waste landfill
Non-Hazardous Liquids		
Sanitary waste from workforce (Portable chemical toilets)	400 gallons/day	Pumped and disposed by contractor
Hazardous Solids		
Spent welding materials	400 pounds/month	Hazardous waste landfill
Used oil filters	100 pounds/month	Hazardous waste landfill
Fluorescent/mercury vapor lamps	30 units/year	Recycle
Misc. oily rags, oil adsorbents	1 drum/month	Recycle or Hazardous waste landfill
Empty hazardous material containers	1 cubic yard/week	Hazardous waste landfill
Used lead/acid and alkaline batteries	1 ton/year	Recycle
Hazardous Liquids		
Used lube oils, flushing oils	10 drums/month	Recycle
Hydrotest water (One time during commissioning, reuse as practical, test for hazardous characteristics)	1.2 million gallons (total Phases I and II)	Hazardous – approved disposal facility Non-hazardous – drain to detention basin and release (need permit)
Steam turbine and HRSG cleaning wastes (Chelates, mild acids, Total suspended particulate matter, and/or EDTA - one time during commissioning)	700,000 gallons (total Phases I and II)	Approved hazardous or non-hazardous disposal facility
Solvents, used oils, paint, adhesives, oily rags	200 gallons/month	Recycle or approved hazardous waste disposal facility

Construction management personnel, contractors, and their employees would be responsible for minimizing the amount of waste produced by construction activities, and would be required to fully cooperate with project procedures and regulatory requirements for waste minimization and proper handling, storage, and disposal of hazardous and non-hazardous wastes. Each construction contractor would be required to include waste management and waste minimization components in their overall project health, safety, and environmental site plans. Typical construction waste management measures would include:

- Dedicated waste management areas and a system for waste management and segregation of incompatible wastes, with waste segregation occurring at time of generation.
- A waste control plan detailing waste collection and removal from the site. The plan would identify where waste of different categories would be collected in separate stockpiles or bins, and appropriate signage provided to clearly identify the category of each collection stockpile.
- Storage of hazardous wastes separate from non-hazardous wastes (and other non-compatible hazardous wastes) in accordance with applicable regulations, project-specific requirements, and good waste management practices.
- Periodic construction supervision inspections to verify that wastes are properly stored and covered to prevent accidental spills and releases.
- Appropriately labeled waste disposal containers.
- Good housekeeping procedures. Work areas would be left in a clean and orderly condition at the end of each working day, and surplus materials and waste would be transferred to the waste management area.
- Appropriate waste management training for the construction workforce.

Consistent with standard construction practices, a Spill Prevention, Control and Countermeasures (SPCC) Plan would be implemented that would include the use of secondary containment in storage and use areas, as well as best management practices and procedures for handling materials. Spill response kits would be available for use in the event of an accidental spill. In the event of a reportable release, notifications would be made to all applicable Federal (e.g., National Response Center), state (e.g., Minnesota Duty Officer), and local (e.g., Fire Department) agencies. Remediation activities, if necessary, would be done in accordance with all applicable Federal, state, and local regulations.

4.16.2.2 Impacts of Operation

Operations Materials

Once operational, the main materials used at the Mesaba Generating Station would include feedstock and natural gas. As described in Chapter 2, the power plant would be fuel flexible, using various fuels or blends of fuels, which would include bituminous coal (e.g., Illinois No. 6); sub-bituminous coal (e.g., Powder River Basin), petroleum coke blended up to 50 percent with coal, or other blends of these fuels. Phase I and II operations would utilize approximately 6 million tons of feedstock annually.

Though the primary fuel source for electric power production would be coal-derived, the Mesaba Generating Station would also be capable of operating on natural gas. Natural gas would be provided **as described in Section 4.14**. The maximum natural gas flow would be approximately 105 million standard cubic feet of gas per day per phase.

Hazardous materials that would be used or stored once the plant is operational include petroleum products, liquid oxygen and nitrogen, molten sulfur, catalysts, flammable and compressed gases, amine replacement and reclamation chemicals, water treatment chemicals, solvents, and paints. Table 2.2**-8** provides a list of potentially hazardous materials that would be used and stored on site.

Operations Material Storage

Material storage requirements for feedstocks are shown in Table 4.16-2. The numbers presented are for each phase, with the total storage requirements for both phases being double those shown.

Table 4.16-2. Feedstock Storage Requirements (Each Phase)

Material	Storage Requirements
Coal Pile	**385,000 tons (20/25 days active/inactive storage based on maximum PRB1 coal usage);** **D**ust control**; W**ater runoff control.
Petroleum Coke Pile	**105,000 tons (20/25 days active/inactive storage)'** **D**ust control**; W**ater runoff control.
Flux Silo	**4,660 tons (20 days active storage).**
Sulfur Tanks	**Max 162 tons/day generated, based on Illinois No.6 coal (7 days on-site storage; 30 rail cars parked on site)**
Slag Pile	**34,800 tons (45 day storage, wet basis, using PRB2:PRB3 coal blend)**

Feedstocks would be delivered by rail cars that would be unloaded using a state-of-the-art rapid discharge rotary dumper with an automatic railcar positioner. Each rail car would be rotated inside the rotary dumper building to unload the coal contained therein. The dumper building would be enclosed and maintained under negative pressure during the unloading process to minimize fugitive emissions.

Natural gas would be piped directly to the site (i.e., not stored on site). The gases that make up the syngas (carbon monoxide, hydrogen, and carbon dioxide) would be stored in pressurized gas tubes on a multi-tube trailer outdoors in accordance with required building and fire codes. Carbon dioxide would be stored and utilized for purging of the generators after normal and emergency shutdowns. Bulk quantities of liquid oxygen and nitrogen would be stored in tanks in the ASU.

Other gases (e.g., acetylene and oxygen) would be stored in approved standard-sized portable cylinders generally located at the point of use. Petroleum-containing materials such as lube oils, steam turbine hydraulic fluid, and transformer oils would be stored indoors in 55-gallon drums or in aboveground storage tanks. These materials would be delivered in approved containers, stored in areas with appropriate secondary containment, and used within curbed areas that only drain to internal drains connected to an oil-water separator system. Oil reservoirs, containment areas, and the separators would be checked regularly for potential leaks and to ensure they are working properly. Bulk chemicals, such as acids and bases for pH control, would be stored in appropriately designed tanks equipped with secondary containment and monitoring systems. Gaseous chlorine (used and stored in compliance with all applicable regulatory requirements) or hypochlorite bleach may be used for biological control of the various circulating water and cooling tower streams. Other water treatment chemicals would be stored in containers ranging from 55-gallon drums to 500-gallon tanks stored indoors or in secondarily contained outdoor storage areas. Smaller containers of miscellaneous oils, chemicals and cleaners would also be used and would be stored indoors in appropriate containers and storage locations.

Diesel fuel would be used for the emergency generator and for the fire-water pumps. The stored quantity would allow for approximately eight hours of operation of the diesel generator at full output (about 3 MW). Appropriate containment and monitoring for spill control would be provided.

An SPCC Plan would be implemented that would include the use of secondary containment in storage and use areas, as well as best management practices and procedures for handling materials. Spill response kits would be available for use in the event of an accidental spill. In the event of a reportable release, notifications would be made to all applicable Federal (e.g., National Response Center), state (e.g., Minnesota Duty Officer), and local (e.g., Fire Department) agencies. Remediation activities, if necessary, would be done in accordance with all applicable Federal, state, and local regulations.

Preventative measures such as providing secondary containment would help reduce the potential for a release to occur. In the event that a release should occur, immediate action would be taken to contain and clean up a release in accordance with Federal, state and local regulations. Facility personnel would be trained in the proper handling and storage practices for materials used, as well as in spill response actions.

Operations Waste

Non-Hazardous Waste

Non-hazardous waste generated during operations would, for the most part, be confined to the operation and maintenance of the Mesaba Generating Station. Only incidental amounts of non-hazardous waste would be generated from the operation of the HVTLs, gas pipelines, and rail lines from routine maintenance activities and clearing of vegetation.

IGCC power plants do not produce the coal combustion ash associated with conventional coal-fired power plants. Slag, a black non-hazardous glass-like material, would be the primary non-hazardous waste generated during operations. **Toxicity Characteristic Leaching Procedure test results for slag from the E-Gas™ process are provided in Table 4.16-3.** Depending upon the fuel being used, Phase I would produce between 500 and 800 tons of slag per day (both phases would produce twice that amount). During operations, 45-day storage would be provided for slag, which equates to a maximum of approximately 32,000 tons of slag being stored on site at any time for Phase I or 64,000 tons of slag for Phase I and II combined. Approximately 292,000 tons of slag would be generated annually per phase.

Minnesota Rules 7035.2860 (Beneficial Use of Solid Waste) addresses standing beneficial use determinations in Subparagraph 4. Item K applies to the use of coal combustion slag as a component in manufactured products such as roofing shingles, ceiling tiles, or asphalt products. Item L applies to the use of coal combustion slag as a sand blast abrasive. The rules permit these uses as specified without contacting the MPCA.

Although no large-scale market exists for slag at this time, successful applications of slag reported by the Wabash River **Project** include concrete cement feedstock, road construction applications (filler for asphalt, blasting grit), roofing material, structural fill, and alternative landfill cover. It has been determined that the blasting grit and roofing granules market provides the best opportunity at this time; however, the single local slag dealer contacted does not have the capacity to accept all of the slag generated from the Mesaba Power Plant. Additional slag dealers or blasting grit/roofing materials manufacturers would need to be identified to maximize marketing of slag (EERC, 2006). If the Mesaba Energy Project generates more slag than the market can accept, then the slag will be land filled. Two existing landfills (in Virginia and Canyon, MN) have roughly 8.7 million cubic yards of permitted capacity (combined), with land available for additional expansion beyond the currently permitted capacities. **If eventually expanded, these landfills would require approval through the state permitting process.**

Elemental sulfur will also be generated as a **non-hazardous** byproduct of power plant operations **and stored in molten form**. It is estimated that approximately 60,000 tons of sulfur would be generated per year per phase of the project. In the United States, production of sulfuric acid is the major use of elemental sulfur, accounting for 90 percent of elemental sulfur consumption. **For comparison, the Wabash River Project reportedly markets its high-purity elemental sulfur in the agricultural chemicals market.** Excelsior is in the process of identifying local markets for elemental sulfur, most likely within the fertilizer manufacturing industry, which utilizes elemental sulfur for manufacture of sulfuric acid (EERC, 2006).

Table 4.16-3 Toxicity Characteristic Leaching Procedure test results for E-Gas™ Slag

Toxicity Characteristic Leaching Procedures	RCRA Regulatory Level, mg/l	Leachate from E-Gas Slag, mg/l
Metals		
Arsenic	5	<0.5
Barium	100	<0.5
Cadmium	1	<0.5
Chromium	5	<0.1
Lead	5	<1
Mercury	0.2	<0.002
Selenium	1	<0.1
Silver	5	<0.1
Organics		
Pyridine	5	<0.5
1,4-Dichlorobenzene	7.5	<0.5
o-Cresol	200	<0.5
m- & p- Cresol	200	<0.5
Hexachloroethane	3	<0.5
Nitrobenzene	2	<0.5
Hexachloro-1,3-butadiene	0.5	<0.5
2,4,6-Trichlorophenol	2	<0.5
2,4,5-Trichlorophenol	400	<0.5
2,4-Dinitrotoluene	0.13	<0.5
Hexachlorobenzene	0.13	<0.5
Pentachlorophenol	100	<0.5
Volatile Organics		
Vinyl Chloride	0.2	<0.005
1,1-Dichloroethylene	0.7	<0.005
Methyl Ethyl Ketone	200	<0.005
Chloroform	6	<0.005
1,2-Dichloroethane	0.5	<0.005
Benzene	0.5	<0.005
Carbon Tetrachloride	0.5	<0.005
Trichloroethylene	0.5	<0.005
Tetrachloroethylene	0.7	<0.005
Chlorobenzene	100	<0.005
1,4-Dichlorobenzene	7.5	<0.005

Source: Excelsior Energy. 2006a

Other non-hazardous solid wastes generated annually during operation of Phase I and Phase II would include refractory brick and insulation from gasifier repairs (360 tons), spent catalyst materials associated with the COS hydrolysis and SRU systems (approximately 70 tons), scrap metal (200 cubic yards), waste paper and cardboard (320 cubic yards), and combined industrial waste (320 cubic yards) as shown in Table 4.16-**4**. Non-hazardous solid wastes would be recycled or reused on site when possible. If recycling or reuse were not feasible, non-hazardous solid waste would be disposed of at an off-site non-hazardous waste landfill.

Sanitary wastewater generated during operation of the Mesaba Generating Station **is addressed in Section 4.14. [Text in the Draft EIS on this subject has been deleted at this point.]**

Hazardous Waste

Table 4.16-**4** summarizes the expected hazardous waste streams that would be generated during Mesaba Generating Station operation. **The wastes generated for the Mesaba Energy Project Phase I would be approximately half the quantities listed for the combined Phases I and II.** Hazardous waste generated during operations would be limited, for the most part, to the operation of the generating station. Any hazardous waste generated from the operation and maintenance of the HVTLs, gas pipelines, and rail lines would likely be limited to small amounts of oils and cleaning solvents generated from the maintenance of equipment.

Operational hazardous wastes would include ZLD filter cake; process waste sludges, residues, and spent cleaning materials (acids and ash); used oils and fluids; and cleaning and maintenance wastes. The predominant hazardous wastes generated annually would include spent sulfuric acid (14,000 gallons) and ZLD filter cake (4,400 tons **per year from treatment of process water and an** additional <24,500 tons per year **from treatment of cooling tower blowdown water)**. Spent sulfuric acid would be disposed of off site at a licensed disposal facility. **[Text addressing sulfur in the Draft EIS has been deleted at this point and relevant information has been added to the preceding subsection]** Filter cake would likely be classified as a hazardous waste due to metals content, and would be disposed in an approved hazardous waste landfill or other licensed facility. Other hazardous wastes generated would be recycled, treated, or disposed of at a permitted hazardous waste landfill.

Due to the quantity of hazardous waste generated, the Mesaba Generating Station would likely be regulated as a large-quantity generator of hazardous waste and would need to adhere to the requirements under RCRA for the handling **of generated hazardous waste**. Hazardous waste generated during operations would be properly managed and stored on site in accordance with RCRA and Minnesota regulations (Minnesota Rules, Chapter 7045).

The quantity and type of hazardous waste that would be generated during operations would be accepted by treatment, storage and disposal facilities, and therefore, commercially available treatment or disposal would be available. Although specific hazardous waste landfills have not been identified, Excelsior is currently negotiating with a waste management company that operates 13 permitted hazardous waste treatment, storage and disposal facilities throughout the U.S., which can accept the types of wastes expected from construction and operation of the Mesaba Generating Station. The nearest permitted facilities operated by this company are located within eastern Wisconsin.

Waste Minimization and Storage

The Mesaba Generating Station would be designed to minimize process-related discharges to the environment compared to other coal-powered plants. For instance, the use of a ZLD process would prevent the discharge of heavy metals and other gasification wastes in wastewater. The advanced features of E-Gas™ technology would also eliminate two solid waste streams (flue gas desulfurization solids and ash) associated with some other types of coal-based power generation. Table 2-2.6 lists the storage, waste minimization, or recycling processes that would be incorporated into the design of the Mesaba Generating

Station to further minimize generation of waste. In accordance with state and county recycling goals, whenever possible, operational wastes would be reused or recycled.

Table 4.16-4. Annual Quantity of Non-Hazardous and Hazardous Waste Generated from Phase I and Phase II Operations

Waste Description	Comments	Annual Quantity[a]	Status[b]	Likely Disposal or Treatment Method
Used Catalysts and Sorbents				
COS hydrolysis catalyst	Proprietary composition	42 tons	NH	Non-hazardous landfill
Hydrolysis catalyst support balls	Alumina silicate	14 tons	NA	Recycle
Claus sulfur recovery catalyst	Activated alumina	28 tons	NH	Non-hazardous landfill
Claus catalyst support balls	Activated alumina	10 tons	NA	Recycle
Hydrogenation catalyst	Cobalt molybdenum	6 tons	NA	Metals reclaim
Hydrogenation. catalyst support balls	Alumina silicate	2 tons	NA	Recycle
Amine regenerator carbon filter	Activated carbon	26 tons	H	Stabilize, hazardous waste landfill
Syngas treatment carbon	Activated carbon	60 tons	H	Stabilize, hazardous waste landfill
Mercury removal carbon	Impregnated carbon	14 tons	H	Stabilize, hazardous waste landfill
Sour water carbon	Activated carbon	48 tons	H	Stabilize, hazardous waste landfill
MDEA reclaim ion exchange	Ion exchange resin	0.4 tons	NH	Non-hazardous waste landfill
Other Process Wastes				
Slag	IGCC by-product	584,000 tons	NH	Market for reuse or landfill
Elemental Sulfur	IGCC by-product	120,000 tons	NH	Market for reuse or off-site treatment
ZLD filter cake (Gasification Island)	Inorganic and organic salts	4,400 tons	H	Stabilize, hazardous waste landfill
ZLD filter cake (**Cooling Tower Blowdown**)	Inorganic and organic salts	<24,500 tons	**NH**[c]	**Characterize, dispose as non-hazardous or hazardous wastes**
Refractory brick and insulation	Gasifier repairs	360 tons	NH	Non-hazardous waste landfill

Table 4.16-4. Annual Quantity of Non-Hazardous and Hazardous Waste Generated from Phase I and Phase II Operations

Waste Description	Comments	Annual Quantity[a]	Status[b]	Likely Disposal or Treatment Method
MDEA sludge	Reclaimer bottoms	10,000 gallons	H	Incinerate or hazardous waste landfill
Sour water sludge	Char carryover in syngas	30 tons	H	Incinerate
Waste char and ash	Maintenance cleaning	160 tons	NH	Non-hazardous waste landfill
Amine absorber residues	Iron and salts	20 cubic yards	NH	Non-hazardous waste landfill
Other Process Wastes				
Metallic filter elements		60 cubic yards	H	Stabilize, hazardous waste landfill
Spent citric acid	Cleaning solution	40 drums	H	Approved disposal facility
Spent soda ash	Cleaning solution	40 drums	H	Approved disposal facility
Spent sulfuric acid	Line cleaning solution	14,000 gallons	H	Approved disposal facility
Off-line combustion turbine wash wastes	Detergent and residues	15,000 gallons	NH[c]	Characterize, dispose as non-hazardous or hazardous wastes
HRSG wash water (infrequent)	Detergent, residues, neutralized acids	100,000 gallons	NH[c]	Characterize, dispose as non-hazardous or hazardous wastes
Raw water treatment sludge and used water filter media	Solids removed from makeup water to plant	TBD	NH[c]	TBD

Table 4.16-4. Annual Quantity of Non-Hazardous and Hazardous Waste Generated from Phase I and Phase II Operations

Waste Description	Comments	Annual Quantity[a]	Status[b]	Likely Disposal or Treatment Method
Miscellaneous Streams				
Used oil	Lube oils, oil from oil/water separator	8,000 gallons	NA	Send to reclaimer
Spent grease		16 drums	NH	Blend to gasifier feed
Miscellaneous solvents, coal tars		2 drums	H	Solvent reclaimer
Flammable lab waste		2 drums	H	Blend to gasifier feed
Scrap metal	Steel, aluminum, etc.	200 cubic yards	NH	Recycle
Waste paper and cardboard	Office, shops, packing, etc.	320 cubic yards	NH	Recycle
Combined industrial waste	Used PPE, materials, small amounts of refractory, slurry debris, etc.	320 cubic yards	NH	Non-hazardous waste landfill

Notes:
[a] **Approximate quantities for Phases I and II combined of the Mesaba Generating Station. A Phase I power plant alone would generate approximately half these amounts.**
[b] NH= non-hazardous, H=hazardous, NA=not applicable **(subject to recycling rules)**
[c] This waste stream would likely be non-hazardous, however, testing would have to be done to determine if it exhibits hazardous waste characteristics

To reduce the risk of a hazardous substance release to the environment, an Environmental Management System and a Pollution Prevention/Waste Minimization Program would be developed during the planning, construction, and operational phases, which would include an evaluation of alternatives to eliminate, reduce, or minimize the amounts of hazardous materials used and hazardous wastes generated. Project planning would include reviews of forecasted hazardous material purchases and use, and the investigation of less-hazardous substitutes. Potential areas for source reduction and recycling could also be identified to reduce the quantity of materials used and waste generated.

In addition, the SPCC Plan would anticipate contingency spill events, thereby protecting environmental media from the effects of accidental releases. All aboveground storage tanks would be lined or paved, curbed/diked, and have sufficient volume to meet all regulatory requirements. The plant would have a drainage plan that would isolate routine, process-related operations from affecting the surrounding environment. Facility design features and management programs would be established to address hazardous materials storage locations, emergency response procedures, employee training requirements, hazard recognition, fire control procedures, hazard communications training, personal protective equipment training, and accidental release reporting requirements. The Mesaba Generating Station would comply with all applicable OSHA hazardous material requirements. **An Emergency Response Plan would be required by OSHA Standard 1910.120[q] as explained in Section 4.13.** Emergency services would be coordinated with local fire departments, police departments, paramedics, and hospitals. A first aid office would be maintained on site for minor first aid incidents. Trained/certified Health Safety and Environmental personnel would be continuously on site to respond to and coordinate emergencies.

Waste minimization and pollution prevention programs would be implemented, and hazardous and non-hazardous wastes would be properly collected, segregated, and recycled or disposed at approved waste management facilities within regulatory time limits and in accordance with requirements. Plant staff would be adequately trained in proper waste handling procedures. Waste manifests and other records and reporting would be maintained as required by regulations and company procedures. A comprehensive secondary containment program would ensure that appropriate tanks, walls, dikes, berms, curbs, etc., would be used to provide adequate secondary containment for liquid storage. Worker training and safety programs would be established to ensure that workers are aware and knowledgeable of spill containment procedures and related health and environmental protection policies.

4.16.3 Impacts on West Range Site and Corridors

4.16.3.1 Impacts of Construction

No additional materials would be used or wastes generated during construction of the West Range Site other than those described in Section 4.16.2.1. The quantity of solid waste generated would be more than for the East Range Site because the HVTL alternatives would be located on more new ROW than for the East Range Site; therefore, more clearing of trees and vegetation would likely be required.

Based on the conclusions of a Phase I assessment performed for the West Range Site (described in Section 3.16.2.1) (SEH, 2005a), several on-site and off-site areas of potential concern were identified that could be affected by the West Range Site. The Phase I Site Assessment identified solid waste (trash, batteries, old equipment) on and adjacent to the site, and stained areas along railroad ties located along the eastern boundary of the West Range Site. During construction, any such materials located within the construction site would be removed and disposed of properly, and would not have an adverse impact on construction of the site. If any evidence of a release from these materials at the site were noted during construction (stained soil or stressed vegetation), the affected soil or vegetation would be removed from the site, necessary remediation or cleanup would be conducted, and removed materials would be disposed of properly. A Phase I assessment was not performed for the HVTLs and gas pipeline corridors that would be associated with the West Range Site.

Based on information available from MPCA, two closed landfills are located in Itasca County: the Iron Range Sanitary Landfill and the Grand Rapids Landfill. The Iron Range Sanitary Landfill is located along the southern border of the West Range Site adjacent to the Itasca County Transfer Station, and the Grand Rapids landfill is located approximately 10 miles southwest of the West Range Site. Exceedances of VOCs and metals were detected in monitoring wells at the Iron Range Landfill during 2002 to 2003 (MPCA, 2004a). Based on the MPCA report, groundwater flow from the landfill is to the south/southeast away from the West Range Site; therefore, West Range Site groundwater conditions would not be expected to be affected by the closed landfill. The closed Grand Rapids Landfill is located approximately 10 miles to the southwest of the West Range Site and would not affect the West Range Site.

4.16.3.2 Impacts of Operation

The West Range Site would not use any materials or generate any additional non-hazardous or hazardous wastes other than those presented in Section 4.16.2.1. No adverse impacts would be expected to occur from the operation of the proposed Mesaba Generation Station at the West Range Site beyond those discussed in Section 4.16.2, Common Impacts of the Proposed Action.

4.16.4 Impacts on East Range Site and Corridors

4.16.4.1 Impacts of Construction

No additional materials would be used or wastes generated during construction of the East Range Site other than those described in Section 4.16.2.1. The quantity of non-hazardous solid waste generated would be less for the East Range Site than for the West Range Site because the HVTLs would be located along existing utility lines and therefore, less clearing of trees and vegetation would likely be required for the East Range Site.

One closed landfill, the Hoyt Lakes Sanitary Landfill, is located approximately 3,000 feet south of the East Range Site along Hoyt Lakes Road. Groundwater monitoring has detected low levels of intermittent VOCs in the groundwater beneath the closed landfill site (MPCA, 2006d). Groundwater in the area flows southward; therefore, East Range Site groundwater conditions would not be expected to be affected by the closed landfill.

4.16.4.2 Impacts of Operation

The East Range Site would not use any materials or generate any additional non-hazardous or hazardous wastes other than those presented in Section 4.16.2.**2**. **[Text in the Draft EIS pertaining to the use of an enhanced ZLD system exclusively at the East Range Site has been deleted at this point]** No adverse impacts would be expected to occur from the operation of the proposed Mesaba Generating Station at the East Range Site beyond those discussed in Section 4.16.2, Common Impacts of the Proposed Action.

4.16.5 Impacts of the No Action Alternative

For the purposes of this EIS, as explained in Section 2.1.1.2, the DOE No Action Alternative is assumed to be equivalent to a "No Build" Alternative. Under the No Action Alternative, materials would not be delivered and stored for the construction or operation of the Mesaba Generating Station, access roads, rail lines, HVTLs, or gas pipelines. Subsequently, no non-hazardous or hazardous waste would be generated from the construction or operation of the Mesaba Generating Station.

4.16.6 Summary of Impacts

Basis for Impact	No Action	West Range	East Range
Create reasonably foreseeable conditions that would increase the risk of a hazardous material release.	No increase in the risk of a hazardous waste release.	Proper handling and storage of wastes in accordance with RCRA would be adhered to minimize potential for a release of a hazardous material to the environment.	Proper handling and storage of wastes in accordance with RCRA would be adhered to minimize potential for a release of a hazardous material to the environment.
Volume of solid waste generated would directly or indirectly affect the capacity of solid waste collection services and landfills.	No solid waste would be generated.	In-state or out-of-state solid waste collection services and landfills would have the capability and capacity to accept solid wastes generated. Additional market analysis would be required to secure a market and avoid disposal of slag (500-800 tons per day generated).	In-state or out-of-state solid waste collection services and landfills would have the capability and capacity to accept solid wastes generated. Additional market analysis would be required to secure a market and avoid disposal of slag (500-800 tons per day generated).
Wastes would be created for which there are no commercially available disposal or treatment technologies.	No wastes would be generated.	Commercially available treatment, stabilization, or disposal for waste streams generated.	Commercially available treatment, stabilization, or disposal for waste streams generated.
Quantity of hazardous waste generated would directly or indirectly affect the capacity of hazardous waste collection and disposal services.	No hazardous wastes would be generated.	In-state or out-of-state hazardous waste collection services and treatment, stabilization or disposal facilities would have the capability and capacity to accept hazardous wastes generated.	In-state or out-of-state hazardous waste collection services and treatment, stabilization or disposal facilities would have the capability and capacity to accept hazardous wastes generated.
Waste generation would create reasonably foreseeable conditions that would increase the risk of a hazardous waste release to the environment.	No hazardous wastes would be generated.	No substantial increase in risk of a hazardous waste release to the environment. Proper handling and storage of wastes in accordance with RCRA would be adhered to.	No substantial increase in risk of a hazardous waste release to the environment. Proper handling and storage of wastes in accordance with RCRA would be adhered to.

4.17 SAFETY AND HEALTH

4.17.1 Approach to Impacts Analysis

4.17.1.1 Region of Influence

The public health and safety region of influence consists of the persons residing within 3 kilometers (1.9 miles) of the proposed IGCC facility footprint (for air emissions); public roads and at-grade crossings near the proposed plant sites (for transportation safety); and residences adjacent to proposed HVTLs and natural gas corridors. Safety of on-site workers (construction and operation) is also evaluated.

4.17.1.2 Method of Analysis

Human health and safety-related impacts were considered from both contaminant exposure and worker safety perspectives. Methods to assess worker safety-related impacts were based on application of accident and incident rate data as described in Section 3.17 for activities that are expected to be associated with the Proposed Action.

Transportation safety issues related to traffic accidents were evaluated by using the average traffic fatality rate for the state of Minnesota. The estimated number of potential vehicular traffic fatalities was based on assuming a total distance traveled from workers commuting during both the construction and operational phases. Based on Mn/DOT traffic accident data over the years 2001 through 2005, an average fatality rate of 1.2 per 100 million vehicle miles traveled was used to predict fatalities as a result of the Proposed Action during construction and operations. Regarding rail transport and at-grade crossings, safety impacts as a result of increased rail activity from the project are discussed in a qualitative manner.

An AERA was conducted on the Mesaba Energy Project (see Appendix C) to identify the sources or groups of sources, chemicals, and associated pathways that may pose a risk to the public as a result of air emissions. The AERA, as prescribed by the MPCA, includes both quantitative and qualitative evaluation of emissions and potential **exposure** pathways.

Since emission source stacks for the plant would be less than 100 meters in height, the AERA evaluation was completed for an area within a 3-kilometer radius of the proposed facility emission points (MPCA, 2004b). Several methods of quantitative analysis were conducted.

The first method was to estimate risk using the Risk Assessment Screening Spreadsheet (RASS) developed by MPCA. The RASS method is used to predict both acute and sub-chronic risks associated with the facility, and as a screening tool it uses very conservative default dispersion assumptions.

The second method, the **Q/CHI** approach, estimates risk from each emission source stack by computing **a Q/CHI** quotient for the chemicals of concern. The **Q/CHI** has several advantages over the RASS, in that it models dispersion specific to each emission unit, automatically calculates hazard indices with respect to time and space, and takes into consideration exhaust parameters (exit velocities and temperatures) and terrain.

In both the RASS and **Q/CHI** methods, risk due to the inhalation pathway is estimated for chemicals causing carcinogenic and non-carcinogenic effects. Risk at any location is additive for all sources. Risk levels for chemicals having cancer endpoints are considered to be within U.S. EPA standards if an individual chemical produces a cancer risk less than one in one million (10^{-6}) and an individual chemical, having non-cancer endpoints, produces a hazard index less than 0.1 (EPA, 2005). Also, if the sum of the individual chemical cancer risks is less than one in 100,000 (10^{-5}) and the sum of the individual non-cancer hazard quotients (hazard index) is less than 1, risk is also considered to be within U.S. EPA standards.

A third method, the Industrial Risk Assessment Program (IRAP) – Health View model, was used to predict chronic risks. IRAP was developed by Lakes Environmental Software, Inc., to comply with the requirements of the U.S. EPA Human Health Risk Assessment Protocol for Hazardous Waste Combustion Facilities guidance document (EPA, 2005). This complex protocol was developed to estimate human health risk at hazardous waste combustion facilities from multi-pathway exposure to chemicals released to the ambient air. With IRAP, risk is predicted via direct (inhalation) and indirect (ingestion of or contact with soil, plants, fruits, vegetables, beef and milk, chicken and eggs, and fish) pathways for each scenario (resident adult, resident child, farmer adult, etc.) specified. Worst-case annual emission rates are used in the IRAP evaluation.

Risk associated with ingestion of fish tissue potentially contaminated with mercury was evaluated using the MPCA's Draft Mercury Risk Estimation Method for the Fish Consumption Pathway (Local Impacts Assessment) (MPCA, 2006f). The method combines current fish tissue mercury concentrations with potential increases in atmospheric deposition to arrive at an estimate of future methylmercury tissue concentrations. Risk from ingestion of fish tissue potentially affected by other contaminants of concern associated with the facility was also evaluated using the IRAP model.

Emission rates for **chemicals of potential concern** were estimated using the following sources (listed in order of preference):

- Results of regulatory test programs at the existing Wabash River **Plant**, Indiana, E-Gas™ IGCC facility - adjusted, if appropriate, for the expected worst-case feeds to the Mesaba Energy Project;
- Equipment supplier information;
- Published emission factors and reports applicable to IGCC facilities;
- Engineering calculations and judgment; and
- U.S. EPA emission factors (AP-42).

The chemicals of potential concern evaluated in the AERA are shown in Table 4.17-1. **Based on comments from MPCA, the emission rates were revised to reflect additional conservatism for the purposes of risk assessment.** Table 4.17-2 shows the exposure pathways evaluated.

Table 4.17-1. Chemicals Evaluated in the AERA (Phases I and II) Reflecting Additional Conservatism for Risk Assessment

Compound	Total Phase I Tons/year	Phase I and Phase II Tons/year
Acetaldehyde	**0.045**	**0.089**
Acetophenone	**0.022**	**0.045**
Acrolein	**0.44**	**0.87**
Antimony	**0.030**	**0.059**
Arsenic	**0.11**	**0.21**
Benz[a]anthracene	**5.7E-05**	**1.1E-04**
Benzene	**0.52**	**1.0**
Benzo(k)fluoranthene	**1.6E-04**	**3.2E-04**
Benzo[a]pyrene	**5.7E-05**	**1.1E-04**
Benzyl chloride	**1.0**	**2.1**
Beryllium	**0.006**	0.013
Biphenyl	0.003	0.005
Bis(2-ethylhexyl)phthalate (DEHP)	**0.11**	**0.22**

Table 4.17-1. Chemicals Evaluated in the AERA (Phases I and II) Reflecting Additional Conservatism for Risk Assessment

Compound	Total Phase I Tons/year	Phase I and Phase II Tons/year
Bromoform	**0.057**	**0.11**
Cadmium	**0.46**	**0.92**
Carbon disulfide	**1.1**	**2.29**
Carbonyl sulfide	**0.000**	**0.000**
Chloroacetophenone, 2-	**0.010**	**0.020**
Chlorobenzene	**0.032**	**0.065**
Chloroform	**0.089**	**0.18**
Chromium, total	**0.018**	**0.036**
Chromium, (trivalent)	**0.013**	**0.027**
Chromium, (hexavalent)	**0.005**	**0.011**
Chrysene (Benzo(a)phenanthrene)	**1.5E-04**	**3.0E-04**
Cobalt	**0.023**	**0.046**
Cumene	**0.008**	**0.016**
Cyanide (Cyanide ion, Inorganic cyanides, Isocyanide)	**0.18**	**0.36**
Dimethyl sulfate	**0.072**	**0.14**
Dinitrotoluene, 2,4-	**4.3E-04**	**8.5E-04**
Ethyl benzene	**0.48**	**0.95**
Ethyl chloride (Chloroethane)	**0.062**	**0.12**
Ethylene dibromide (Dibromoethane)	**0.002**	**0.004**
Ethylene dichloride (1,2-Dichloroethane)	**0.060**	**0.12**
Formaldehyde	**0.43**	**0.85**
Hexane	**0.10**	**0.20**
Hydrochloric acid	**0.097**	**0.19**
Hydrogen fluoride (Hydrofluoric acid)	**1.2**	**2.4**
Indeno(1,2,3-cd)pyrene	**9.2E-05**	**1.8E-04**
Isophorone	**0.87**	**1.7**
Lead	**0.22**	**0.044**
Manganese	**0.046**	**0.092**
Mercury	**0.017**	**0.035**
Methyl bromide (Bromomethane)	**1.3**	**2.6**
Methyl chloride (Chloromethane)	**0.82**	**1.6**
Methyl chloroform (1,1,1 -Trichloroethane)	**0.029**	**0.059**
Methylchrysene, 5-	**3.2E-05**	**6.5E-05**

Table 4.17-1. Chemicals Evaluated in the AERA (Phases I and II) Reflecting Additional Conservatism for Risk Assessment

Compound	Total Phase I Tons/year	Phase I and Phase II Tons/year
Methyl ethyl ketone (2-Butanone)	**0.59**	**1.2**
Methyl hydrazine	**0.25**	**0.51**
Methyl methacrylate	**0.029**	**0.059**
Methyl tert butyl ether	**0.052**	**0.10**
Methylene chloride (Dichloromethane)	**0.059**	**0.12**
Naphthalene	**0.081**	**0.16**
Nickel	**0.057**	**0.11**
Phenol	**1.9**	**3.8**
Proprionaldehyde	**0.57**	**1.1**
Selenium	**0.025**	**0.049**
Styrene	**0.037**	**0.075**
Sulfuric acid and sulfates	**62.8**	**125.6**
2,3,7,8-Tetrachlorodibenzo-pdioxin (as equivalents)	**1.7E-09**	**3.5E-09**
Tetrachloroethylene (Perchloroethylene)	**0.064**	**0.13**
Toluene	**0.098**	**0.20**
Vinyl acetate	**0.011**	**0.022**
Xylenes	**0.17**	**0.33**

HAP – Hazardous Air Pollutant

Table 4.17-2. IRAP Exposure Pathways Evaluated

Exposure Pathways	*Exposure Scenarios (Receptors)*					
	Adult Farmer	Child Farmer	Adult Resident	Child Resident	Adult Fisher	Child Fisher
Inhalation of vapors and particulates	X	X	X	X	X	X
Incidental ingestion of soil	X	X	X	X	X	X
Ingestion of drinking water from surface water sources	X	X	X	X	X	X
Ingestion of homegrown produce	X	X	X	X	X	X
Ingestion of homegrown beef	X	X				
Ingestion of milk from homegrown cows	X	X				
Ingestion of homegrown chicken	X	X				
Ingestion of homegrown pork	X	X				
Ingestion of fish					X	X

In response to comments by MPCA on the Draft EIS, a more conservative basis was established for the AERA emissions inventory and is reflected in the information presented in Table 4.17-1. Specifically, the highest measured value of any chemicals of potential concern quantified in a valid stack test was used instead of the average of several valid tests (chemicals of potential concern emission rates were derived by averaging the results from valid stack tests at the Wabash River Plant).

The AERA determined that chemicals of potential concern emissions at the Mesaba Generating Station would be reduced by the inherently low polluting IGCC technology and many of the same process features that control criteria emissions. A large portion of the heavy metals and other undesirable constituents of the feedstock would be immobilized in the non-hazardous, vitreous slag by-product and prevented from causing adverse environmental effects. Gaseous and particle-bound chemicals of potential concern that may be contained in the raw syngas exiting the gasifiers will be totally or partially removed in the syngas particulate matter removal system, water scrubber, and AGR systems.

4.17.1.3 Evaluation of Impacts

The evaluation of potential impacts on public safety and health considered whether the Proposed Action or an alternative would cause any of the following conditions:

Construction and Operational Safety

- Increase the risk to worker safety and health during facility construction and/or operation.

Transportation Safety

- Increase traffic fatalities.
- Increase safety risks for at-grade rail crossings.

Community Health Risks

- Create a cancer risk to the public exceeding one in one million (10^{-6}) for an individual chemical or a risk exceeding one in 100,000 (10^{-5}) for the sum of individual chemicals (EPA, 2005).
- Create a non-cancer health (morbidity) risk to the public as expressed by a hazard index exceeding 0.1 for an individual chemical or exceeding 1.0 for the sum of individual chemicals (EPA, 2005).
- Create an incremental health risk to subsistence fishers as expressed by a hazard index exceeding 1.0 for mercury via the fish ingestion pathway (MPCA, 2006f).
- Create a risk to public health and safety from EMF exposure.
- Create a risk to public health and safety from exposure to charged particulates.

4.17.2 Common Impacts of the Proposed Action

4.17.2.1 Worker Safety

Construction and Operation Safety Statistics

Worker safety-related impacts associated with the Proposed Action would be associated with facility construction, operation of industrial equipment, and transportation of materials and wastes to and from the sites. For these project-related areas, notable differences are not expected between the two alternative site locations. Therefore, a comparative discussion of worker safety-related impacts is not provided in this section. Based on the incident rates developed by the Bureau of Labor Statistics (see Section 3.17), the potential for work-related incidents and accidents are presented in Table 4.17-3.

Table 4.17-3. Predicted Incidents for the Proposed Action

Industry	Estimated Number of Workers	Potential for Recordable Incidents per Year	Potential Lost Workday Cases per Year	Potential Number of Fatalities (based on rate per 100,000 FTEs)
Construction (peak)	2,985	173	66	<1 (0.4)
Utilities (nominal)	107	3	<1	< 1 (0.01)

Coal Gasification Plant Health and Safety Risk Factors

In 1978, the National Institute for Occupational Safety and Health issued a publication on the occupational exposures in coal gasification plants (NIOSH, 1978). This document does not necessarily reflect the decades of advances in coal gasification technology, including the combined-cycle process that would be included in the Mesaba Energy Project. However, it provides useful information regarding the types of occupational health and safety factors associated with coal gasification plants.

According to **the National Institute for Occupational Safety and Health** , a significant source of worker exposure in all coal gasification plants would be periodic, unpredictable leaks from process lines, vessels, flanges, valves, pumps, and other equipment (NIOSH, 1978). Design and operational measures that can reduce accidents may include performing routine inspections of equipment and process lines, providing adequate general ventilation in closed process areas, designing relief valves piped to emergency vents away from work spaces, isolating hot process equipment or lines to prevent contact, and installing automatic gas leak monitoring systems and alarms. Noise can present significant chronic and acute health hazards to workers unless adequate controls are integrated into plant design, and unless such controls are satisfactorily maintained and strictly enforced (NIOSH, 1978).

The principal occupational hazards associated with coal handling (excluding mining) result from chronic dust inhalation, fire, and explosions. To reduce dust dispersion, coal should be stored in closed bins or silos and kept thoroughly moistened during handling and transport.

4.17.2.2 Transportation Risks

Estimated Fatalities During Construction and Operation

During the construction and operation phases, personnel and material would be moved by personal vehicles and trucks. Such movements of personnel and material could lead to roadway accidents.

It is estimated that there would be a maximum of 1,500 personnel on site during the peak construction period. The accident analysis performed in this section assumes an average of 700 workers per month over a five-year construction period (including Phase I and II construction and material transport). It is assumed that each worker would make two trips per day over six days a week each year. To provide a conservative upper bound estimate of roadway accidents, it was assumed that all workers would individually make daily vehicle trips of 50 miles per day on roadways (same for both West Range and East Range Sites), even though it is likely that many construction workers would reside closer to the project sites and carpool often with other workers. If each trip is assumed to be 50 miles in length, then collectively, over the five-year period, the total number of miles driven by all workers would be approximately 101 million miles.

Based on a fatal accident rate of 1.2 fatalities per 100 million vehicle miles traveled, approximately 1.2 fatalities could occur due to the movement of workers and material via trucks and personal vehicles during construction (estimate is same for both West Range and East Range Sites).

During operations, it is assumed that approximately 107 employees would be required for Phase I and 75 employees for Phase II, for a total of 182. Assuming every employee travels an average of 50 miles per day to work, five days per week for 48 weeks a year, this would collectively total approximately 44 million miles traveled over a 20-year period over operations. Based on a fatal accident rate of 1.2 fatalities per 100 million vehicle mile traveled, approximately 0.53 fatalities could occur due to the travel of workers during operation (estimate is same for both West Range and East Range Sites).

Rail Transport and At-Grade Crossing Safety During Construction and Operation

Concerning safety issues, particular attention is paid to public at-grade rail-highway crossings because of the project's use of the rail transport of material inputs and outputs. It is anticipated that a unit train could include up to 135 cars (approximately 8,000 feet total length) with an average unit train comprising 115 cars. Most of the trains in the region travel at speeds of up to 25 miles per hour. Therefore, 115- and 135-car unit trains could take approximately three and four minutes, respectively, to clear a public at-grade crossing, which would cause delays for local emergency vehicles (see Section 4.11, Community Services).

The examination of at-grade crossing safety typically considers the expected numbers and locations of grade crossings, the volume of both vehicle and rail traffic at crossings, the nature of road traffic (e.g., trucks versus passenger vehicles), the design and safety features of the crossings, and train and vehicle speeds in the vicinity of any crossings.

Because the transport of coal from the PRB to the northeastern Minnesota region is approximately 1,200 miles long, it traverses many public at-grade crossings and any addition of train trips would increase the likelihood of crossing accidents within this existing rail corridor. Up to one roundtrip (i.e., two train trips) a day is anticipated for Phase I, and for Phase II, up to two roundtrips (i.e., four train trips) are anticipated. As discussed in Section 4.15.2.2, the proposed incremental increase to train traffic would not be significantly different in comparison to existing rail conditions given the highly active and well established coal production and rail activities in the region. Therefore, the increase in safety hazards within the existing rail route is expected to be minimal.

The location of at-grade crossings on rail routes near the West Range and East Range Sites were identified in Sections 3.15.3.2 and 3.15.3.3, respectively. Since the frequency of train trips for both Phases I and II is considered a relatively low number and the vehicular traffic volumes are considered low to moderate at these crossings, the increase in safety hazards at the rail crossings would be low. In general, details on the operating characteristics of the trains are unknown at this time; however, it is expected that the proposed rail operations for transport of coal and other potential materials would coordinate with other rail transport movements and rail travel would occur at recommended speeds of up to 25 miles per hour, and therefore, would minimize potential rail accidents at both project sites.

4.17.2.3 Human Health Risks

Carcinogenic and Non-Carcinogenic Morbidity Risks

Human health risks are generally evaluated in comparison to thresholds established by regulatory agencies, including EPA and MPCA, having jurisdiction for standards of exposure. A threshold is determined by the concentration of a chemical or airborne particle below which no appreciable adverse health effects are expected to occur. Examples of thresholds include reference doses, Health Advisories, NAAQS, and American Conference of Governmental Industrial Hygienists Threshold Limit Values for workers. With respect to carcinogens, the product of the chemical-specific exposure and the respective Slope Factor results in a predicted excess lifetime risk. The threshold or "acceptable" excess lifetime cancer risk comprises a range of 10^{-6} (per million) to 10^{-4} (per ten thousand). These values represent excess cancer risks ranging from one additional person per million people exposed to one additional person per ten thousand people exposed. Excess cancer risks to exposed populations lower than one per million people are

considered negligible, and risks greater than one in ten thousand people exposed constitute a significant elevation in excess cancer risk.

Human health-related risks associated with release of potentially harmful contaminants from stack emissions were evaluated under the AERA (**see Appendix C**). Based on analysis in Section 4.3, health-related risks would not be expected from emissions of criteria pollutants from the proposed power plant, because the concentrations are well below EPA's NAAQS, which are set to protect public health and the environment.

Screening-level results using the RASS methodology were calculated in the original AERA (SEH, 2006i) and were above levels of potential concern. As approved by MPCA, subsequent revisions of the AERA did not update or include RASS results because the results were known to exceed screening levels, and compliance relied on the more rigorous Q/CHI and IRAP methodologies instead. [Text in the Draft EIS presenting specific results of the RASS screening test was deleted, because some emission rates have since been revised.]

The **Q/CHI** approach calculated chemical-specific air toxic quotients for chemicals having both carcinogenic and non-carcinogenic endpoints. These quotients were then evaluated at multiple receptors on a grid using AERMOD, a refined dispersion model, with five years of meteorological data. The acute and sub-chronic health risks calculated by the equivalent risk emission rate (ERER) method indicate:

- The maximum-modeled inhalation acute non-cancer hazard index is **0.72**.
- The maximum-modeled **inhalation** sub-chronic non-cancer index is **0.041**.

Both modeled ERER hazard indices are below the MPCA total hazard criterion of 1.0.

Next, the IRAP method of estimating risk was used to evaluate the impacts of the proposed facility for six representative areas of concern that include adult and child residents, farmers and fishers (Table 4.17-2). Eleven receptor locations were evaluated within the 3-kilometer buffer radius from the proposed West Range facility sources.

Total chronic health risks attributable to facility emission sources were calculated by the IRAP method at each receptor location **and the highest cumulative results were reported**. The results indicate that the predicted **cumulative** carcinogenic risk from all combined facility sources is less than 10^{-5} and non-carcinogenic hazard indices are less than 1.0 at all representative locations. Specifically, as can be seen from Table 4.17-4 the highest **cumulative** cancer risks posed by the project to adult and child residents are **1.4×10^{-6}** and **2.3×10^{-7}**, respectively. The highest **cumulative** risks to adult and child farmers are **2.5×10^{-6}** and **4.6×10^{-7}**. The highest **cumulative** risks to adult and child fishers are **1.4×10^{-6}** and **2.5×10^{-7}**. The highest **cumulative** morbidity hazards posed by the project to adult and child residents are **0.080** and **0.081**, respectively. The highest **cumulative** morbidity hazards to adult and child farmers are **0.081** and **0.082**. The highest **cumulative** morbidity hazards to adult and child fishers are **0.080** and **0.081**.

Table 4.17-4. IRAP Summary of Highest Total Risks and Hazard Indices by Exposure Scenarios (1)

Receptors with Highest Risk (2)	Exposure Scenario Evaluated						Comparison to Criteria
	Resident		Farmer		Fisher		
	Adult	Child	Adult	Child	Adult	Child	
Cancer Risk (Criterion = 1×10^{-5})							
RI-3 – **Property Boundary**	**1.4×10^{-6}**	**2.3×10^{-7}**	**2.5×10^{-6}**	**4.6×10^{-7}**	**1.4×10^{-6}**	**2.5×10^{-7}**	Passed
Morbidity Hazard Index (Criterion = 1)							
RI-3 – **Property Boundary**	**0.080**	**0.081**	**0.081**	**0.082**	**0.080**	**0.081**	Passed

(1) Included all chemicals and pathway/route of exposure.
(2) Distance and direction from center of power plant footprint: RI-3 – **0.6** miles to the southeast

Mercury Risks from Fish Consumption

> **Fishable** bodies of water are those that contain water year-round in a year that receives at least 75% of the normal annual precipitation for that area.

Based on AERA guidance for facilities with stack heights less than 100 meters, fishable lakes within a 3-kilometer radius should be considered under the fish consumption pathway. **For the West Range Site, four** fishable bodies of water lie, at least in part, within 3 kilometers of the proposed facility stacks: Dunning Lake, Big Diamond Lake, Little Diamond Lake, and the Canisteo Mine Complex. Since Big Diamond Lake has the most residences surrounding it**,** has the most readily available data (including a fish species survey), and **is in the approximate center of the release plume of potential future facility emissions (based on dispersion modeling for mercury), and therefore, the most impacted lake**, it was chosen to evaluate consumption of potentially contaminated fish tissue.

The methodology used to estimate human health risk for subsistence fish consumption is based on the *Summary of MPCA's Mercury Risk Estimation Method for the Fish Consumption Pathway (Local Impacts Assessment)* (MPCA, 2006f). Estimation of risk associated with fish consumed by adult subsistence fishers on Big Diamond Lake indicated the following:

- Background mercury deposition to the lake (other sources) = 16.5 grams per year
- Mercury deposition to the lake from the proposed plant = 0.08 grams per year
- Incremental increase in mercury in fish tissue from the proposed plant = 0.003 parts per million
- Ambient Subsistence Fisher Hazard Quotient = **11.1**
- Incremental Subsistence Fisher Hazard Quotient from the proposed plant = **0.06**

As noted above, the predicted increment attributable to the proposed facility emission results in **a** hazard quotient **of 0.06**. Thus, **any additional** risk to a subsistence fisher resulting from ingestion of fish tissue after the facility is constructed is negligible. The **incremental hazard** quotient is less than the MPCA risk value of 1.0 via the fish ingestion pathway. **However, the hazard quotient from background mercury sources already exceeds the MPCA risk threshold as indicated above.**

While the ERER, IRAP and mercury impacts to subsistence fishers calculations focused on features of the West Range Site, the results would be similar for the East Range Site. Since the West Range Site is located near more fishable lakes, the mercury impacts to fishermen would potentially be less at the East Range Site.

The 1854 Authority, an inter-tribal natural resource management organization governed by the Bois Forte Band and Grand Portage Band of Lake Superior Chippewa, expressed concerns during the public scoping period of the Mesaba Project about the impacts of the project's air pollutants on fish consumption. The analysis based on the subsistence fishers exposure scenario demonstrates that human health impacts from fish consumption would be negligible even within 3 kilometers of the power plant.

Mercury Risks from Consumption of Other Traditional Food Sources

The 1854 Authority also expressed concern over the effects to water quality, fisheries, and wild rice. The Minnesota Sea Grant College Program sponsored a study between 2001 and 2003 addressing similar concerns regarding the potential health risks associated with consuming aquatic-based Native American traditional foods, such as wild rice, waterfowl, and moose (Renwick, et.al., 2003). The study focused on the bioaccumulation of mercury and lead contaminants within these food sources and analyzed samples of waterfowl tissue, wild rice, and moose muscle and liver from the reservation of the Fond du Lac Band of Ojibwe, located in the Lake Superior Basin of Minnesota. Methylmercury had already been found in high levels in a variety of fish from several of the reservation's lakes, which prompted the further study of other food sources. The study's preliminary results revealed that the potential health risks of consuming wild rice, water fowl, and moose were minimal and that the nutritional, cultural, and economic benefits appeared substantial. Based on the findings of this study and given the very low increment of mercury and other pollutants that would be emitted from the Mesaba Energy Project and its distance from the closest reservation lands (greater than 20 and 50 miles from the West Range and East Range sites, respectively), the health risks associated with the consumption of traditional Native American foods would be negligible.

Risks from Dioxins, Furans, and Chromium

Emissions of one chemicals of potential concern group—chlorinated dioxins and furans—are expected to be negligible from the Mesaba Generating Station. The chlorine concentration in the product syngas is expected to be low, as chlorine is expected to be removed both by the gasification process itself and also during the water wash treatment process before syngas combustion. Data from the Wabash River Plant shows that chlorine concentrations are below test detection limits. The activated carbon bed treatment system at the Mesaba Generating Station is expected to scrub any potential organic compounds to *de minimis* levels, thereby avoiding the potential for formation of dioxins or furans during their subsequent combustion.

The combustion characteristics of syngas (i.e., carbon monoxide and hydrogen precursors in the presence of excess air at high temperatures in the combustion turbine) further support the expectation that dioxin and furan emissions would be insignificant. Those two precursors would quickly be oxidized to carbon dioxide and water, thereby decreasing the probability of an intermediate formation of high molecular weight condensation substances.

Although dioxin and furan emissions are expected to be insignificant, a sensitivity analysis on the risk impact of dioxin (as equivalents) was conducted at the MPCA's request at two receptor locations near the proposed Mesaba Generating Station. In this analysis, annual emissions rates of dioxin from all emission sources were adjusted to result in a carcinogenic risk due to dioxin equivalents alone of 10^{-6} (one in one million). The two scenarios selected for this evaluation were the adult farmers and adult fishers, because these two populations are predicted to be most at risk at these two locations.

The analysis was conducted under two separate operating scenarios. In the first scenario, both Mesaba Phases I and II would operate at full capacity with the emission sources being two CTGs, one flare, and one TVB for each phase. In the second scenario, only Phase I on the eastern-most footprint would be operational at maximum emission rates.

Two receptor locations were selected for the analysis. The Receptor 3 location, southeast of the property boundary, is the area predicted to receive the maximum project impacts outside of the property boundary. Receptor 3 is closest to fishable waters. The Receptor 7 location, northwest of the property boundary, is in an area that is relatively clear of trees and brush and represents the more likely location for a working farm.

The results of this analysis indicated that dioxin emission rates predicted to result in a 10^{-6} dioxin equivalent carcinogenic risk would be lowest at the Receptor 3 location for the farmer scenario. The emission rates that would result in a 10^{-6} dioxin equivalent carcinogenic risk at Receptor 3 location for the fisher scenario would need to be one order of magnitude higher. These emission rates would be the lowest with either both phases or one phase operating. Operation of Phase I alone would result in emission rates that are roughly one-half of those from both phases. Therefore, the emission rate required to produce a risk of 10^{-6} with Phase I operating alone would be approximately double that with both phases running.

The analysis also indicated that the emission rates, which would result in a 10^{-6} dioxin equivalent risk for the fisher scenario at the Receptor 7 location, would be lower than those for the farmer scenario at the same location. All modeling conducted for this analysis resulted in a cumulative risk from all chemicals of potential concern which did not exceed one in 100,000 (10^{-5}).

Emissions for another chemicals of potential concern —total chromium—were based on testing of product (cleaned) syngas at the Wabash River Plant. Chromium exists primarily in two oxidative states, hexavalent chromium (Cr^{+6}) and trivalent chromium (Cr^{+3}). Because Cr^{+6} is significantly more toxic than Cr^{+3}, it is important that the appropriate inhalation health benchmarks and emission rates are used in the calculation of risk. The following information documents the approach for calculating the chromium emission rates used in the IRAP risk model in order to demonstrate that the approach is conservative. Although the test result showed the chromium concentration was below the detection limit, one-half the test's detection limit was used as the basis for the chromium emission rate calculation for the Mesaba Generating Station. Since there were no test data for hexavalent chromium, the ratio of the AP-42 emission factors for hexavalent chromium to total chromium (30 percent) was used as a surrogate.

The method of estimating hexavalent chromium emissions was very conservative. First, the only chromium species stable enough to survive the high temperatures within the gasifier are the metal itself, chromium (III) nitride, chromium (III) sulfide, chromium (II) sulfide, chromium (II) selenide, or chromium (III) oxide. As noted below, these species have melting points at or near the operative temperature in the gasifier (approximately 2,500°F in the first stage and 1,700°F in the second stage). Therefore, whereas those species will not be gases, they will likely be retained on particles and ultimately partitioned within the slag matrix. Second, chromium (VI) oxide melts at 390°F and decomposes above 480°F to chromium (III) oxide. Third, there are several steps in the syngas cleanup process that will remove particles and the chromium bound to them so that the amount of total chromium entering the turbines is very low.

As a point of reference, emission factors for hexavalent and total chromium from turbines burning natural gas/refinery gas, and distillate oil (published by the California Air Resources Board) were compared with the AP-42 ratios used in the AERA. The ratios of hexavalent to total chromium emission factors for turbines burning those fuels are 14 percent, 11 percent, and 2.5 percent, respectively, which are considerably less than the 30 percent assumed in the AERA for Mesaba.

Particulate Matter (2.5 microns or less) Risks

Particulate matter (PM) comprises both solid particles and liquid droplets found in air. PM in the atmosphere is the result of direct emission of natural and manmade sources, or emissions of other pollutants that react in the atmosphere to form PM. These solid and liquid particles come in a wide range of sizes. Specifically, sources of particles with aerodynamic diameters between 2.5 and 10 microns (referred to as "coarse") include crushing or grinding operations and dust from paved or unpaved roads. Particles less than 2.5 microns in aerodynamic diameter ($PM_{2.5}$) (referred to as "fine" particles) can be emitted directly (e.g., smoke from a fire), or they can form from chemical reactions of gases such as sulfur dioxide, nitrogen dioxide, and some organic gases. Sources of $PM_{2.5}$ include power plants, gasoline and diesel engines, wood combustion, high-temperature industrial processes such as smelters and steel mills, and forest fires. However, the source of $PM_{2.5}$ can be difficult to ascertain because half or more of the $PM_{2.5}$ mass is often composed of secondarily formed species, thereby masking the point of origin. Additionally, $PM_{2.5}$ has a lifetime on the order of several days, allowing it to disperse widely and travel long distances.

PM_{10} emissions pose a health concern because they can be inhaled into and accumulate in the respiratory system. Health effects associated with short-term exposure to coarse particles include premature death in people with heart or lung disease, hospital admissions for heart disease, increased hospital admissions and doctors' visits for respiratory disease, increased respiratory symptoms in children and decreased lung function. However, there is no evidence to suggest that there is a link between long-term exposure to coarse particles and health problems.

As with other pollutants, the health risks associated with exposure to elevated levels of $PM_{2.5}$ are greatest with sensitive populations, such as the young, elderly and those with underlying medical issues. The small size of $PM_{2.5}$ (less than one-seventh the average width of a human hair) facilitates particles lodging deeply into the lungs. Health studies have shown a significant association between exposure to fine particles and premature mortality. Other important effects include aggravation of respiratory and cardiovascular disease (as indicated by increased hospital admissions, emergency room visits, absence from school or work, and restricted activity days), lung disease, decreased lung function, asthma attacks, and certain cardiovascular problems, such as heart attacks and cardiac arrhythmia. Individuals particularly sensitive to fine particle exposure include older adults, people with heart and lung disease, and children. Health effects associated with long-term exposure to $PM_{2.5}$ include premature death in people with heart and lung diseases, death from lung cancer, reduced lung function, and development of chronic respiratory disease in children.

In a study of fine particulate air pollution and mortality in nine California counties, Ostro et al. (2006) presented pooled estimates with 95 percent confidence intervals of percent changes in different daily mortality categories per 10 ug/m^3 of $PM_{2.5}$ increment. Their predictions were as follows:

Mortality Category	Percent Change (95% CI)
All-cause	0.6 (0.2 to 1.0)
Cardiovascular	0.6 (0.0 to 1.1)
Respiratory	2.2 (0.6 to 3.9)
Age >65 years	0.7 (0.2 to 1.1)
Ischemic heart disease	0.3 (–0.5 to 1.0)
Diabetes	2.4 (0.6 to 4.2)

CI – confidence interval

$PM_{2.5}$ was included in the AERA analysis because of the potential health effects associated with this pollutant. To demonstrate that the risks associated with $PM_{2.5}$ emissions from the Mesaba Generating Station would be within acceptable limits, the results of the NAAQS Dispersion Modeling effort, showing the impacts of PM_{10} emissions from the plant, were considered. As explained in Section 4.3, $PM_{2.5}$ emissions were scaled from PM_{10} emissions based on research reported by EPA (USEPA, 2005) and using a conservative multiplier of 0.11 for relative $PM_{2.5}$ from PM_{10} values. As reported in Tables 4.3-9 and 4.3-10, the impacts from both PM_{10} and $PM_{2.5}$ emissions would meet Minnesota and Federal ambient standards. The combined particulate emissions from the Mesaba Generating Station, nearby sources, and background concentrations would be less than Minnesota and Federal $PM_{2.5}$ ambient standards. In addition, although MPCA does not publish a $PM_{2.5}$ background concentration, the $PM_{2.5}$ background concentration is expected to be less than the PM_{10} background concentration.

As indicated in Section 4.3.2.5, all point sources associated with Phase I and Phase II were included in the source input for PSD increment modeling. Additionally, to account for distant and regional sources, data on nearby major increment-consuming (or -expanding) sources were also included as source input. This data was accumulated from MPCA and recent permit applications. For the Final EIS, a more refined regional source inventory, applicable to modeling for the Mesaba Generating Station at both the West Range and East Range sites, was developed and used in all PSD increment and NAAQS modeling analyses. For NAAQS modeling, total allowable emissions from significant nearby sources were included in the input file (see Appendix B for a list of regional sources and the modeled emissions).

Although the Mesaba Generating Station is expected to release particulates during operation, the newest technologies will be used to ensure minimization of releases. The anticipated health impacts from the incremental increase in $PM_{2.5}$ emissions by the facility are expected to be negligible. The current elevated air impacts to the region are primarily attributable to transboundary input from sources outside of Minnesota.

4.17.3 Corridor-Specific Impacts

The primary public safety aspects of utility corridors are associated with EMF from HVTLs and accidents related to natural gas lines.

4.17.3.1 HVTL Lines

As stated in Section 3.17, only four states have edge of ROW electric field standards and only two states have edge of ROW magnetic field standards (NIEHS, 2002). **Minnesota has a standard for the electric field within the ROW of 8-kV per meter but no standard applicable to the edge of the ROW.** For the purposes of this EIS, the standard for assessing human health impacts **is 8-kV per meter within the ROW. In addition, a target of less than 2-kV per meter** at the edge of the ROW for electric fields and **a target of** 150 mG for 69-kV to 230-kV lines or 200 mG for lines up to 500-kV for magnetic fields **are considered protective of human health**.

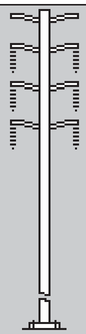
The EMF values presented in this section are based on calculations performed with the ENVIRO computer program (ENVIRO is a program originally designed for the Electric Power Research Institute as part of the EPRI EMF Workstation under project RP2472-3, which is now licensed for use through ENERTECH Consultants; see http://www.enertech.net/emfw/products/emfw_products.html#ENVIRO). It provides calculations for conductor surface gradients, electric field, magnetic field and audible noise.

West Range

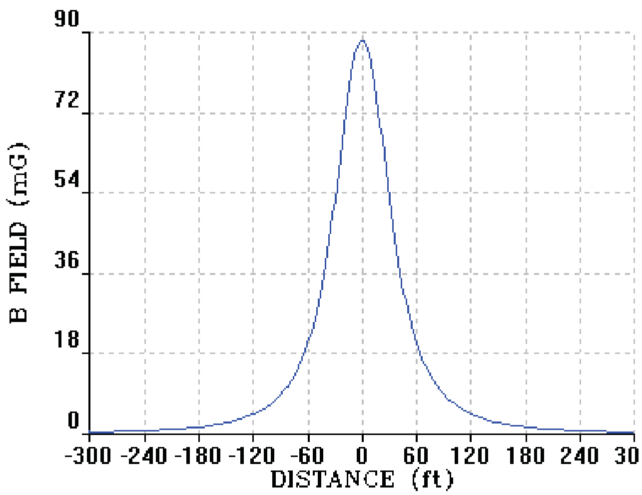
The current 28L ROW is 145 feet in width and the 62L ROW varies from 160 to 340 feet. The proposed new ROWs between the former Greenway Substation and the Blackberry Substation would be 100 to 150 feet under all alternatives. Though different configurations of the lines and support structures can greatly influence the electric and magnetic fields, the most conservative configurations (showing the greatest field strength at 50 feet from the centerline [CL]) are provided here. Based on the minimum width of proposed and existing ROWs, 50 feet from centerline (100 feet total) is considered the point of compliance (edge of ROW) with the human health standards **for these lines**.

Figure 4.17-1 **(revised for the Final EIS)** shows the electric and magnetic field levels for the 230-kV double circuit without the 115-kV underbuild. Figure 4.17-2 **(revised for the Final EIS)** shows the electric and magnetic field levels for the 345-kV single circuit with a delta configuration without a 115-kV underbuild on the new ROW route.

The magnetic fields at 50 feet from centerline are below both the 150 mG and 200 mG **targets** for 230-kV and 345-kV lines, respectively. The **electric fields for the 230-kV and 345-kV lines would be within the 8-kV per meter Minnesota standard inside the ROW, and the electric field for the 230-kV line would be within the 2-kV per meter target at the edge of the ROW. The** electric field for the 345-kV **single-circuit delta** configuration **would be slightly above the** 2-kV per meter **target at the edge of the ROW (this configuration would be used off-site in one very short segment inWRB-2A on the West Range site and for the new ROW segment linking the 37L and 39L HVTLs that would serve the East Range site)**. Since the nearest residence to any of the HVTL routes for the West Range Site would be greater than 100 feet from the centerline, there would be no permanent receptors within an electric field greater than 2-kV per meter.



	Magnetic Field (mG)		Electric Field (kV/m)	
	At CL	88.30	At CL + 18	1.71
	At CL + 50 ft	28.06	At CL + 50 ft	0.47
	At CL + 100 ft	7.02	At CL + 100 ft	0.02
	At CL + 300 ft	0.44	At CL + 300 ft	0.009



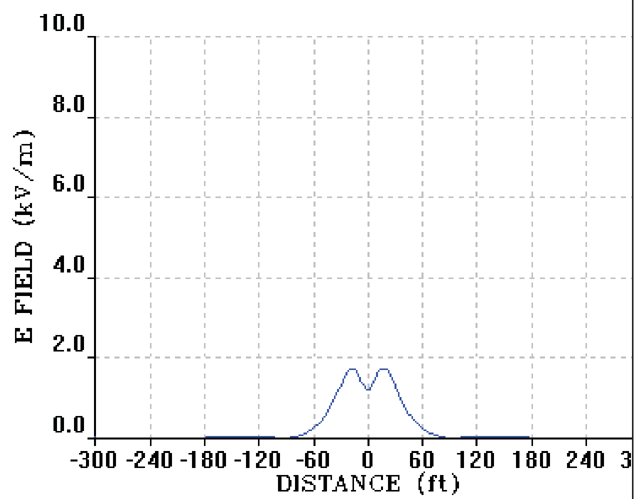
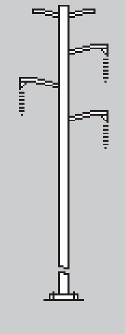


Figure 4.17-1. West Range, EMF for 230-kV – 2 Circuit Vertical Configuration



Magnetic Field (mG)		Electric Field (kV/m)	
At CL+10	140.0	At CL + 20	4.52
At CL + 50 ft	76.57	At CL + 50 ft	2.17
At CL + 100 ft	27.04	At CL - 100 ft	0.55
At CL + 300 ft	3.03	At CL - 300 ft	0.05

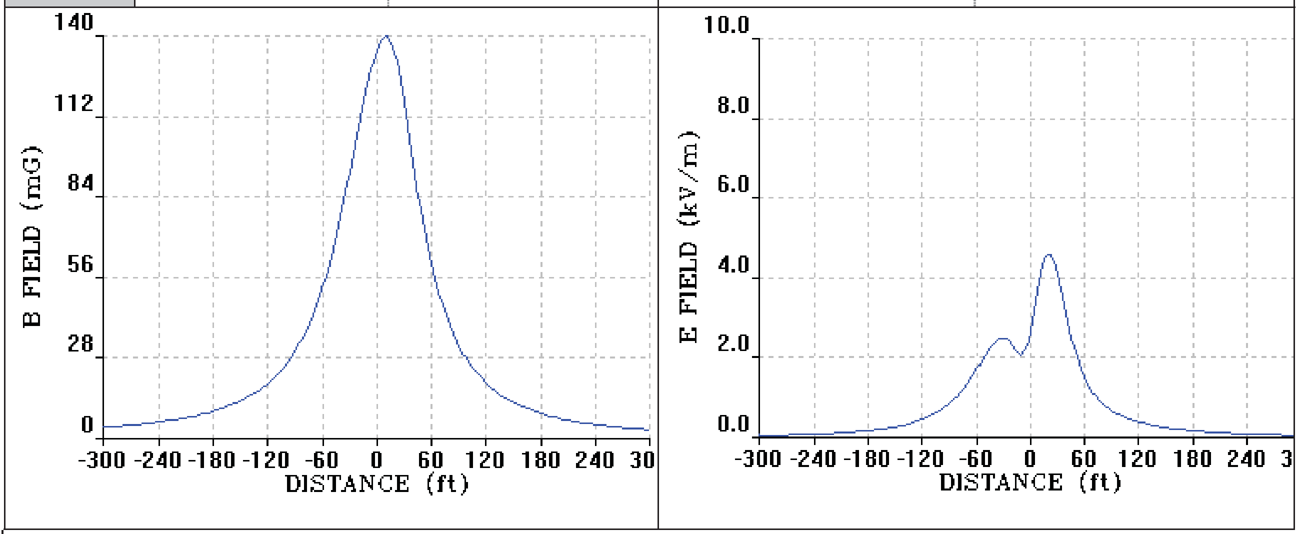
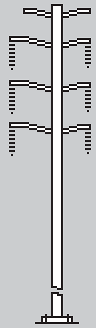


Figure 4.17-2. West Range, EMF for 345-kV – 1 Circuit Delta Configuration

East Range

The 37L, 38L, and 39L ROWs are currently 100 feet in width. The proposed new ROW to parallel the 43L corridor would be 100 feet in width. Under the two alternatives for routing, existing ROWs would be widened by 30 feet.

Figure 4.17-3 shows the electric and magnetic field levels for the 345-kV vertical configuration and 115-kV vertical configuration on a single steel pole (worst case fields under the Proposed Action). The magnetic field at 50 feet from centerline is well below the 200 mG **target** for the 345-kV lines. The electric field is below the **8-kV per meter Minnesota standard within the ROW and below the** 2-kV per meter **target** at 50 feet from the centerline. There is one residence within 50 to 100 feet of the centerline of the current 38L route, and 2 residences are within 50 to 100 feet of the centerline of the current 39L/37L route. These residences **would not be exposed to EMF above the 8-kV per meter standard for Minnesota, but they could** fall **within** areas where the electric fields exceed 2-kV per meter under the Proposed Action.



Magnetic Field (mG)		Electric Field (kV/m)	
At CL - 16	158.97	At CL - 16	2.741
At CL - 50 ft	130.47	At CL - 50 ft	1.67
At CL - 100 ft	72.16	At CL - 100 ft	0.257
At CL - 300 ft	12.83	At CL - 300 ft	0.066

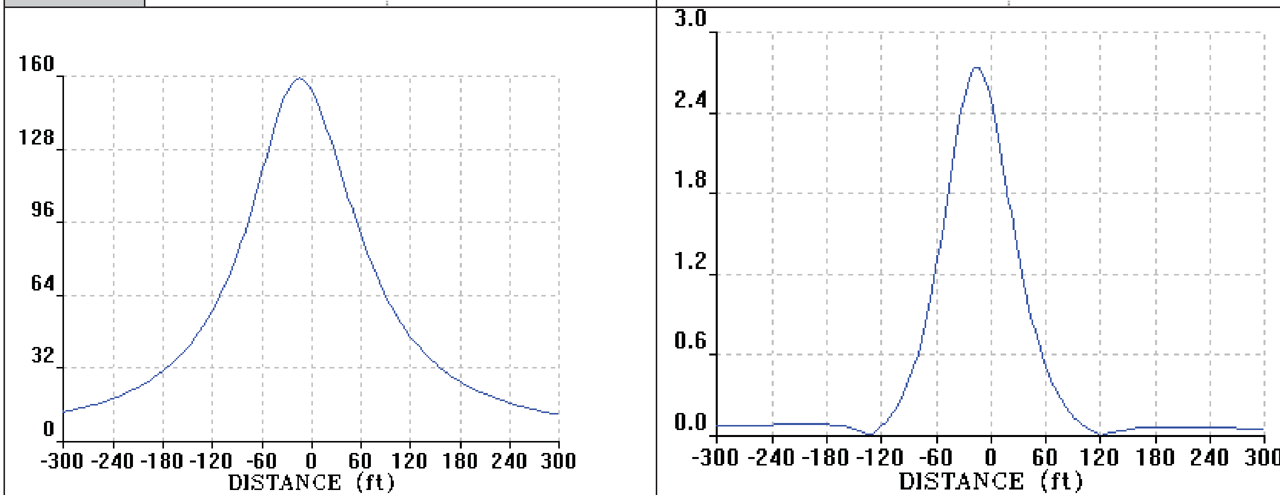


Figure 4.17-3. East Range, EMF for 345-kV – Vertical Configuration Bundle with 115-kV - Vertical Configuration Rail

Henshaw Effect

As discussed in Section 3.17.5.3, Professor Denis L. Henshaw of England hypothesized that electric fields at the surface of power line conductors cause increased charges on particles, thereby increasing the likelihood of inhaled particles being deposited on surfaces inside the lungs and airways, even at considerable distances from the line. In theory, these events could lead to increases in respiratory ailments and other diseases. Similarly, a British study **(Draper, 2005)** found elevated rates of childhood leukemia at distances up to 600 meters (2,000 feet) from electric lines, where magnetic fields are similar to background levels. **However, the author of the study found no causal link between childhood leukemia and EMF. Moreover, a recent study (Jeffers, 2007) could not support the hypothesis that ion exposure from HVTL charges increases lung deposition of airborne particles.**

As stated previously, all the electric fields at the edge of the ROWs would be below 2-kV per meter (a standard based on other state guidelines). The medical basis for some of the state standards relating to electric fields from HVTLs is unknown, though there is research that indicates that some older models of active implantable medical devices, such as pacemakers, begin to show inappropriate behavior at fields as low as 1.5 to 2-kV per meter (although newer models may be unaffected at fields as high as 20-kV per meter) (National Grid, 2006). Consequently, it is not known whether the 2-kV per meter electric field standard at the edge of the ROW would be protective with respect to reducing or eliminating potential Henshaw Effects.

It also is not possible to accurately calculate the levels of charge that pollutant particles acquire near HVTLs. The nature of pollutant particles depends on location; although for the purposes of calculation, a typical pollutant population may be specified together with an assumed particle size distribution. How such particles may charge near a power line also depends on their initial charge. Nevertheless, it seems likely that the pollutant particles downwind of a power line in corona do have somewhat larger average charges on them as a result of corona discharge. The distribution and deposition of such charged particles is another variable which is greatly influenced by atmospheric charges, humidity, wind speed and direction, terrain, vegetation, and other weather conditions (NRPB, 2004).

The potential impact of corona ions on health would depend on the extent to which they increase the dose of relevant pollutants to target tissues in the body. It is not possible to estimate the impact precisely, because of uncertainties about the:

- Extent to which corona effects increase the charge on particles of different sizes, particularly within buildings;
- Exact impact of this charging on the deposition of particles in the lungs and other parts of the respiratory tract; and
- Dose-response relation for adverse health outcomes in relation to different size fractions of particle.

However, it seems unlikely that corona ions would have more than a small effect on the long-term health risks associated with particulate air pollutants, even in the individuals who are most affected. In public health terms, the proportionate impact will be even lower because only a small fraction of the general population live or work close to sources of corona ions (NRPB, 2004).

Since the research regarding the Henshaw Effect and its potential health implications in real-world conditions is inconclusive at this time, any potential health effects from charged particles resulting from HVTLs introduced by the Proposed Action cannot be quantitatively ascertained in this EIS. **As described in Section 3.17.5.3, substantial research has been, and continues to be, conducted by academic laboratories, as well as the most qualified health research organizations in the world, including NIEHS and the WHO, into the potential health risks from EMF exposure. In spite of these efforts, there are no established health criteria or quantifiable impact assessment methods currently accepted for determining adverse effects to human health with respect to EMF exposure or the Henshaw Effect.**

4.17.3.2 Natural Gas Pipelines

The Pipeline and Hazardous Materials Safety Administration, Office of Pipeline Safety governs natural gas pipeline safety. Natural gas pipelines and their operators are subject to numerous safety requirements and regulations. Operator requirements include routine maintenance and inspection, integrity testing, installation and monitoring of automatic leak detection systems and alarms, establishing written emergency preparedness and response plans, and ensuring that their employees are fully trained and qualified (OPS, 2006a).

Within Minnesota, there are approximately 27,800 miles of gas transmission and distribution lines. Between 2003 and 2005, there was an average of 5.6 accidents associated with these lines (OPS, 2006b). This translates to approximately one accident per every 5,000 miles of gas transmission or distribution lines. The project would require the installation of between 13 and 33 miles of new natural gas transmission lines depending on the site and route selected. Statistically, the accident rate associated with these lengths of new natural gas line would be negligible.

4.17.4 Intentional Destructive Acts

Although concerns have been raised about the vulnerability of nuclear power plants to terrorist attack (Behrens and Holt, 2005), the potential for such attacks on coal-based power plants has not been identified as a threat of comparable magnitude. However, as with any U.S. energy infrastructure, the proposed power plant could potentially be the target of terrorist attacks or sabotage. In light of two recent decisions by the U.S. Ninth District Court of Appeals (*San Luis Obispo Mothers v. NRC, Ninth District Court of Appeals, June 2, 2006; Tri Valley Cares v. DOE, No. 04-17232, D.C. No. CV-03-03926-SBA, October 16, 2006*), DOE has examined the potential environmental impacts from acts of terrorism or sabotage against the facilities proposed for the Mesaba Energy Project.

Although risks of sabotage or terrorism cannot be quantified, because the probability of an attack is not known, the potential environmental effects of an attack can be estimated. Such effects may include localized impacts from releases of toxic substances at the proposed power plant and associated facilities, which may be similar to what would occur under an accident or natural disaster. To evaluate the potential impacts of sabotage or terrorism, DOE considered failure scenarios without specifically identifying the cause of failure. For example, potentially harmful chemicals could be released as a result of component failure or human error (or a combination of both), or from such external events as aircraft crashes, seismic events, or other natural events as high winds, tornadoes, floods, ice storms, other severe weather, and fires (both natural and human-caused). Likewise, for truck and rail tanks, releases can occur from accidents or component failure during transport or from human error during transfer to the storage tanks at the facility.

Hazardous events considered for the proposed power plant caused by intentional destructive acts included: gas releases and exposure to toxic gas clouds, fires, and vapor cloud explosions. A particular concern associated with the release of a gas is exposure to a toxic component within the dispersing gas cloud. Evaluations of these hazards indicate:

- Toxic hazards would be dominated by the potential releases of H_2S and SO_2 from the Sulfur Recovery Unit (Claus process). The potential releases may pose a health hazard to plant workers and residents in the immediate vicinity of the proposed power plant. Based on information in Section 3.17.4.2, there are no schools, daycare centers, recreation centers, playgrounds, nursing homes, or hospitals located within 0.5 miles of the West Range Site or East Range Site. The nearest residences are approximately 0.6 to 0.8 miles from the West Range Site and about 1 mile from the East Range Site.
- Potential releases of carbon monoxide from the syngas process stream of the gasifiers could result in the longest downwind toxic impact distance. The potential releases may pose a health hazard to plant workers and closest residents to the proposed power plant.
- Fire hazards at the plant site would not extend beyond the West Range Site or East Range Site.
- Under all worst-case scenarios, plant workers would be the most at-risk of injury or death.

4.17.5 Impacts of the No Action Alternative

For the purposes of this EIS, as explained in Section 2.1.1.2, the DOE No Action Alternative is assumed to be equivalent to a “No Build” Alternative. Under the No Action Alternative, worker accidents associated with other regional industrial sites and construction projects would still occur. Incremental health risks associated with the operation of the power plant and its associated air emissions would not occur. Furthermore, the electric and magnetic fields introduced by new or reconfigured HVTLs would not occur under the No Action Alternative.

4.17.6 Summary of Impacts

Basis for Impact	No Action	West Range	East Range
Increase the risk to worker safety and health during facilities construction and/or operation.	If the power plant were not constructed, there would be no increase in the probability of construction or operational health and safety risks.	Construction workers would follow a safety plan and standard construction safety practices. Therefore, construction-related health and safety impacts would be comparable to those of similar industrial projects. The storage and handling of coal can release inhalable dust, although this too would be minimized through engineering controls and plant safety practices	Impacts would be **comparable to** those for the West Range Site **based on comparable project conditions at both sites**.
Increase traffic fatalities	There would be no increase in vehicular traffic, and therefore, no increase in traffic-related fatalities on public roads would occur.	During the 5-year construction period, statistically less than 2 traffic-related worker fatalities would occur. During the operational timeframe of the plant, statistically no more than 1 traffic-related worker fatality would occur.	Impacts would be **comparable to** those for the West Range Site **based on comparable project conditions at both sites**.
Create safety risks for at-grade rail crossings	There would be no increase in rail traffic, and therefore, there would be no increase in safety hazards at at-grade crossings.	Because of relatively low incremental addition of daily train trips, it is expected that increases to safety hazards at at-grade crossings would be low.	Impacts would be **comparable to** those for the West Range Site **based on comparable project conditions at both sites**.
Create a cancer risk to the public, including particular receptor categories, exceeding the EPA standard ($1x10^{-5}$).	No change in cancer risk beyond existing conditions, although other projects planned for the region could emit pollutants of concern that may pose additional cancer risk.	Based on **AERA** results, cancer risks posed by the project would be small. As presented in Table 4.17-4, the highest cumulative cancer risks posed by the project to adult and child residents are **$1.4x10^{-6}$** and **$2.3x10^{-7}$**, respectively. The highest risks to adult and child farmers are **$2.5x10^{-6}$** and **$4.6x10^{-7}$**. The highest risks to adult and child fishers are **$1.4x10^{-6}$** and **$2.5x10^{-7}$**.	**The risks would be comparable to, or less than, those for the West Range Site as explained in Appendix C, Section 2.1 (Volume 2).**
Create a morbidity hazard to the public, including particular receptor categories, exceeding the EPA standard (1.0).	No change in morbidity rate beyond existing conditions, although other projects planned for the region could emit pollutants of concern that may pose additional morbidity risk.	Based on **AERA** results, the morbidity hazards to the public would be small. As presented in Table 4.17-4, the highest cumulative morbidity hazards posed by the project to adult and child residents are **0.080** and **0.081**, respectively. The highest morbidity hazards to adult and child farmers are **0.081** and **0.082**. The highest morbidity hazards to adult and child fishers are **0.080** and **0.081**.	**The hazards would be comparable to, or less than, those for the West Range Site as explained in Appendix C, Section 2.1 (Volume 2).**
Create a risk to public health and safety from EMF exposure.	No change in existing EMF exposure from current power lines in the region.	EMF exposure from utility lines would be within the 2-kV/m limit at the edge of the ROW. There would be no permanent residential receptors located in areas exceeding 2-kV/m.	Impacts would be **comparable to** those for the West Range Site **based on comparable project conditions at both sites**.

Basis for Impact	No Action	West Range	East Range
Create a risk to public health and safety from exposure to charged particulates.	No change in the risk of health hazards associated with existing power lines and any current exposure to charged particulates.	Because the Henshaw Effect is largely unverified in terms of human health impacts, there is no conclusive means to determine whether charged particulates from new HVTLs would cause public health risks.	Impacts would be **comparable to** those for the West Range Site **based on comparable project conditions at both sites**.

4.18 NOISE

4.18.1 Approach to Impacts Analysis

4.18.1.1 Region of Influence

The region of influence for noise impacts encompasses areas that include receptors potentially sensitive to noise during construction and operation of the Mesaba Generating Station. The region of influence is dependent on the magnitude of new noise emissions that would be generated and existing ambient noise levels, which would affect the extent of the noise impact. Noise receptor locations were chosen based on their land use category (e.g., residential and church) and proximity to the proposed plant site and associated transportation corridors (e.g., rail alignments and public roadways).

Recent aerial photographs of the proposed plant sites were reviewed to identify the locations of receptors that may be affected by noise resulting from the Proposed Action. Ambient noise levels were measured at receptor locations as discussed in Sections 3.18.2.1 and 3.18.2.2 for the West Range and East Range Sites, respectively. These baseline noise levels were then used as a basis to predict noise levels as a result of proposed construction, plant operations, rail, and traffic activities. The locations of the receptors are dependent on the type of noise analysis being performed (e.g., plant noise vs. traffic noise) and are identified in the respective analysis in this section.

4.18.1.2 Method of Analysis

The evaluation of potential impacts from noise or vibration considered whether the Proposed Action or an alternative would cause any of the following conditions:

- Conflict with a jurisdictional noise ordinance or Minnesota regulations (i.e., MPCA) during construction.
- Conflict with a jurisdictional noise ordinance or Minnesota regulations (i.e., MPCA) during operations.
- Permanently increase ambient noise levels at nearest residential neighborhoods in the region of influence.

To determine whether the Proposed Action would result in any of the above listed conditions for noise, a noise evaluation study for both sites was performed for noise generated from Mesaba Generating Station (i.e., Phases I and II) activities, including plant construction, operations, rail facilities, and traffic. Estimating techniques used to conduct these analyses, and key considerations with respect to these models, are described below. The full noise reports for both proposed sites are included in Appendix 5 of the Mesaba Energy Project Environmental Supplement (Excelsior, 2006b).

After publication of the Draft EIS, changes were made to various components at the West Range Site, including: plant footprint adjustment, the new Rail Alignment Alternative 3B, and new Access Road Alignment 3. Based on these new adjustments, revised noise analyses were conducted for construction activities, rail line operations, rail yard operations, rail line vibration effects, and plant operations at the West Range Site. Additionally, some errata in the Draft EIS were also corrected. In general, the revisions reflect minor differences from initial analyses discussed in the Draft EIS, either in A-weighted sound levels or in VdB vibration levels (AAC, 2009 and HDR, 2009). New text was added throughout this section to reflect the most recent noise analyses.

Construction Noise

Construction equipment typically utilized for this type of project were used to predict the noise levels during various construction phases as identified in Table 4.18-1. The noise levels presented in Table 4.18-1 reflect levels at a distance of 50 feet from the equipment source. Noise levels at the receptor locations as a result of the construction equipment were estimated by simply examining the rate of attenuation and distance between the noise source (assumed to be at the construction boundary) and the receptor.

Table 4.18-1. Noise Levels of Typical Construction Equipment at 50 feet from Source

Equipment	Noise Level at 50 feet from Source (dBA)
Trucks	91
Crane	83
Roller	89
Bulldozers	80
Pickup Trucks	60
Backhoes	85
Jack Hammers	88
Rock Drills	98
Pneumatic Tools	86
Air Compressors	81
Compactor	82
Grader	85
Loader	85

Source: Excelsior, 2006b

No specific local standards govern construction noise at either site locations. Therefore, the MPCA limits for residential receptor properties were used for comparison. As discussed in Section 3.18.1.2, the MPCA standards are grouped according to land activities by the noise area classification system. Thresholds for NAC-1 **and NAC-3** are shown in Table 4.18-2 **(updated for the Final EIS)**. **All of the receptors that were analyzed for this project are represented by NAC-1, except for R1, which is represented by thresholds under NAC-3.**

Table 4.18-2. Noise Area Classification (NAC) Thresholds

	NAC-1		NAC-3	
	L_{10}	L_{50}	L_{10}	L_{50}
Daytime (7:00 a.m. to 10:00 p.m.)	65 dBA	60 dBA	**80 dBA**	**75 dBA**
Nighttime (10:00 p.m. to 7:00 a.m.)	55 dBA	50 dBA	**80 dBA**	**75 dBA**

Source: MPCA, 1999**; Bold typeface indicates inclusion of new data for the Final EIS.**

Facility Operation Noise

The noise evaluation study was conducted to simulate the operation of the Mesaba Generating Station and predict the noise emissions by using a proprietary computerized noise prediction program. The modeling program uses industry-accepted propagation algorithms based on American National Standards Institute and International Standards Organization standards. The modeling program was used to predict future noise conditions during the combined operation of both Phase I and Phase II and to recommend mitigation methods, as needed. Noise acceptability was judged in terms of the MPCA standards for residential receiving properties as shown in Table 4.18-2.

Proposed project equipment noise level emissions were determined using vendor-supplied noise level information, reference data for similar equipment, and/or industry-accepted estimation techniques. These predicted equipment levels were modeled to synthesize the expected future noise conditions for the plant site and adjacent land uses (residential and church receptors). The project site plan drawings were used to establish the location of the noise sources and other relevant physical characteristics of the site. For conservatism, the modeling assumed stable atmospheric conditions suitable for reproducible measurements (i.e., under "standard-day" conditions of 59°F and 70 percent relative humidity), that are favorable for propagation. These inherent conservative factors and assumptions resulted in a noise model that tended to be biased to higher predicted values than would be expected in the actual environment around the proposed project. The modeling results were compared to the project criteria to assess potential impacts. Noise mitigation treatments were then applied to the individual noise contributors that were estimated to have the greatest influence on receptor locations.

The noise model was run for the base plant configuration. All currently planned, continuous-operation equipment items that were deemed to be significant noise sources at the Mesaba Generating Station (Phases I and II) were included in the noise model. The major process areas of the project include the ASU, the Feed Handling Unit, the Gasification Island, the Gas Treating Unit, the Sulfur Recovery and Tail Gas Recycling systems, the Power Block, and General Facilities (such as cooling, utilities, and auxiliary/support systems). The major process units would be used at either the West Range Site or East Range Site with only minor modifications to the equipment design and plant layout. Therefore, for the purposes of the noise impact assessment, both potential sites would be the same from an aggregate noise emissions standpoint.

The Mesaba Generating Station was assumed to operate 24 hours per day at its design capacity; consequently, its noise output would be constant, regardless of time of day and the statistical sound levels would all be the same (i.e., $L_{100}=L_{90}=L_{50}=L_{10}$). As a secondary information source, model inputs derived from generic industry reference information for construction equipment were used.

No special noise control options were initially assumed. The standard-design levels from the significant noise sources were converted into octave band sound power levels (abbreviated PWL or L_w) to serve as the initial inputs for the noise-modeling program. Major buildings, as well as stepped terracing, were included as barriers to account for propagation losses due to shielding between a given noise source and a receptor location. However, for a conservative worst-case analysis, low-lying buildings, such as power distribution centers and water treatment buildings, and the coal piles were not included in the model for shielding benefits.

Rail Noise and Vibration Levels

Noise from rail operations was estimated for the surrounding sensitive receptors using FRA and Federal Transit Administration methodologies. Additionally, the American Public Transportation Association provides guidelines that are based on maximum train pass-by noise (L_{max}). The noise levels generated by freight train operations were compared to the American Public Transportation Association threshold of 70 dBA for residential areas.

A maximum noise level guideline was used to evaluate the noise from freight train operations given the limited amount of daily rail operations. An L_{max} of 75 for single family residences was used as the maximum allowable single event noise level for this analysis.

There are no local standards for ground-borne vibration. However, the FRA and Federal Transit Administration provide ground-borne vibration impact criteria for various types of building uses. The residential category of vibration criteria was applied for assessing ground-borne vibration from rail operations. Table 4.18-3 lists the FRA criteria for residential land uses for both frequent and infrequent vibration events. The residences in proximity to the project sites fall under this residential land use classification. The maximum vibration of 80 VdB was used as vibration assessment criteria for this project. Adjustments were made to the vibration calculations to conservatively account for stiff rail car suspension systems, welded rail, train speed, and efficient soil propagation conditions.

Table 4.18-3. Ground-Borne Vibration Guideline for Residential Land Use

Land Use Category	Equivalent Ground-Borne Vibration Impact Velocity, inch/second
Residences and buildings where people normally sleep	80 VdB (infrequent events[a]) 72 VdB (frequent events[b])

Notes: [a]less than 70 vibration events per day, [b]greater than 70 vibration events per day; Source: SEH et al., 2005

The train and yard noise were estimated based on the operational data contained in Table 4.18-4. During operating hours, there would be one train either entering or leaving the project site and any instance.

Table 4.18-4. Proposed Train Operating Conditions

Train Data	Future Operations
Number of trains per week	6
Estimated Number of trains per day	1
Locomotives per train	3
Number of Cars per train	115 – 135
Train Speed	10 mph

Federal Highway Administration Noise Analysis

The FHWA does not have actual noise standards, but implements guidelines, which are used to trip a federal funding mechanism for noise abatement on highway projects; FHWA procedures for highway traffic noise analysis and abatement are contained in 23 CFR 772, "Procedures for Abatement of Highway Traffic Noise and Construction Noise." These procedures specify the requirements that state highway agencies must meet when using Federal-aid funds for highway projects. Thus, for a FHWA noise analysis to be required, a proposed roadway would have to include substantial realignment and additional lanes. Therefore, because the West Range Site includes a substantial realignment of CR 7 and the East Range Site does not require any new roadway project, the FHWA noise analysis was performed only for the West Range Site. The noise related to increased traffic in and around proposed neighborhoods affected by the proposed road improvements at the West Range Site was performed in accordance with the FHWA, Mn/DOT, and MPCA guidelines.

Specifically, the augmented FHWA noise prediction software MINNOISE was used to predict noise levels and identify potential noise impacts at 20 virtual receptor sites along the study corridor. Ten of the virtual receptors were placed in and around Big Diamond and Dunning Lakes to represent residences in close proximity to the proposed roadway. The MINNOISE model was used in conjunction with on-site measurement of traffic noise during peak hours. Additionally, MINNOISE calculates the amount of potential noise directly related to traffic speeds, traffic mix (percent of cars, trucks, heavy trucks), and peak hour percentages of predicted future traffic. On-site ambient measurement at the receptor locations discussed in Section 3.18 were used as a basis for modeled results and included into the virtual receptor sites. The measurement sites include areas of existing residential housing and common use areas regarded by the Federal standards as Federal Activity Category B, which includes residential, recreational, and church land uses. The FHWA NAC for Category B land uses is an hourly A-weighted sound level of L_{10} = 70 dBA.

In accordance with FHWA requirements, Mn/DOT has adopted a statewide noise policy that clarifies the FHWA terminologies of noise impacts. "Mn/DOT Noise Policy for Type I and Type II Federal-aid Projects as per 23 CFR 772" includes the following descriptions:

- *Noise Level Approaching the NAC* – Mn/DOT defines a level as "approaching" the criterion level when it is 1dB, or less, below the criterion level. For example, 69 dBA is considered "approaching" the FHWA NAC category B level of 70 dBA.
- *Substantial Increase in Noise* – Mn/DOT defines a substantial increase in noise as those future predicted noise levels that exceed the FHWA NAC category B level of 70 by 5dB or greater, or 75dBA.
- *Substantial Noise Reduction* – Mn/DOT identifies feasibility requirements for the use of abatement procedures such as noise walls and their associated costs. These requirements dictate that every reasonable effort be made to obtain a substantial noise reduction. Mn/DOT defines a substantial noise reduction as 5dBA or more from a noise impact.

Finally, all modeled results were judged using the L_{10} metric as both Federal and state guidelines specify only one metric used when determining impacts; L_{10} is common among both the Federal and state guidelines.

Receptor Locations

As discussed in Sections 3.18.2.1 and 3.18.2.2, receptor locations were chosen for ambient noise monitoring to provide baseline noise conditions and to use as base data for various noise analyses described above. In addition to these ambient noise receptor locations, some of the analyses required additional receptor locations to further supplement the noise impact analysis. The full set of receptor locations at the West Range and East Range Sites and the type of noise analysis performed at each receptor are identified in Tables 4.18-5 and 4.18-6, respectively **(see Figures 3.18-1 and 3.18-2 for graphical depiction of receptor locations listed in these tables; tables updated for the Final EIS)**.

Table 4.18-5. Receptor Locations for Noise Analyses at the West Range Site

Receptor Location	Approximate Distance from the nearest edge of West Range Site	Used for Analyses Type(s)
R1. County Landfill, south of proposed Plant	**1,870** ft south	Ambient Monitoring; Plant Operations Modeling; Construction Impacts; FHWA traffic modeling; Rail Operations Impacts
R2. Residence, North Big Diamond Lake	**4,025** ft southeast	Ambient Monitoring; Plant Operations Modeling; Construction Impacts; FHWA traffic modeling; Rail Operations Impacts
R3. Residence, along CR 7	**4,110** ft west	Ambient Monitoring; Plant Operations Modeling; Construction Impacts; FHWA traffic modeling; Rail Operations Impacts
R4. 32423 CR 7	**4,650** ft west	Ambient Monitoring; Plant Operations Modeling; Construction Impacts; FHWA traffic modeling; Rail Operations Impacts
R5. Dunning Lake Site	**4,300** ft southeast	Ambient Monitoring; Plant Operations Modeling; Construction Impacts; FHWA traffic modeling; Rail Operations Impacts
R6. Lutheran Church	**18,060** ft southeast	Plant Operations Modeling
R7. Catholic Church	**9,940** ft northwest	Plant Operations Modeling
AAC-6. Near Beasley Ave., City of Taconite	**9,100** ft southwest	Construction Impacts; Rail Operations Impacts
AAC-7. North side of Twin Lakes; near City of Marble	**15,000** ft southeast	Construction Impacts; Rail Operations Impacts
AAC-8. Between O'Reilly Lake & Island Lake (off Reilly Beach Rd.)	**11,050** ft northwest	Construction Impacts; Rail Operations Impacts

Table reflects changes due to readjustment of plant footprint (bold typeface denotes updated values for the Final EIS). See Figure 3.18-1 for graphical depiction of the receptor locations. Source: SEH et al, 2005; AAC, 2009

Table 4.18-6. Receptor Locations for Noise Analyses at the East Range Site

Location	Approximate Distance from the nearest edge of East Range Site	Used for Analyses Type(s)
R1. Access Road Southeast of Plant	800 ft northwest	Ambient Monitoring; Plant Operations Modeling; Construction Impacts; Rail Operations Impacts
R2. Boat Landing and Park	9,200 ft southwest	Ambient Monitoring; Plant Operations Modeling; Construction Impacts; Rail Operations Impacts
R3. Colby Ridge Development	8,300 ft southwest	Ambient Monitoring; Plant Operations Modeling; Construction Impacts; Rail Operations Impacts
R4. 321 Kent St, Hoyt Lakes	11,500 ft south	Ambient Monitoring; Plant Operations Modeling; Construction Impacts; Rail Operations Impacts
R5. Faith Lutheran Church	**8,400 ft south**	Plant Operations Modeling; Construction Impacts; Rail Operations Impacts
R6. Queen of Peace Catholic Church	**8,800 ft south**	Plant Operations Modeling; Construction Impacts; Rail Operations Impacts
R7. Trinity Methodist Church	**8,800 ft south**	Plant Operations Modeling; Construction Impacts; Rail Operations Impacts

See Figure 3.18-2 for graphical depiction of receptor locations (bold typeface indicates updated values for the Final EIS). Source: SEH et al, 2005; AAC, 2009

Note that the FHWA noise analysis was only required for the West Range Site because of the proposed realignment of CR 7. The virtual receptor locations for this analysis are discussed in the subsequent traffic noise impacts discussion for the West Range Site. **Following publication of the Draft EIS, Itasca County deferred its planned realignment of CR 7 due to changes in funding priorities at the state level. The proposed realignment of CR 7, as it was presented in the Draft EIS, is no longer anticipated to be available for the Mesaba Energy Project. Access Road 3, now Excelsior's preferred alternative, would directly connect the existing alignment of CR 7 to the southwestern corner of the property boundary as shown in Figure 2.3-2. A new traffic-related noise analysis was conducted for the new Access Road 3 at the West Range Site and is discussed in Section 4.18.2.2.**

4.18.2 Impacts of the Proposed Action

4.18.2.1 Impacts of Construction

The construction process for the Mesaba Generating Station and associated facilities would be expected to generate noise during the following construction phases:

- Site Preparation
- Excavation
- Foundation Placement
- Plant and Building Construction
- Exterior Finish and Cleanup

Equipment used during the construction process would differ from phase to phase. In general, heavy equipment (e.g., bulldozers, scrapers, dump trucks, and concrete mixers) would be used during excavation and concrete pouring activities. Most other phases would involve the delivery and erection of the building and equipment components. It is assumed that there would be no driven piles during the construction process; however, the necessity for such construction activity and applicable requirements would be fully determined after detailed engineering and design is completed.

Noise associated with the construction would be attenuated in a variety of ways. The most significant is the divergence of the sound waves with distance (attenuation by divergence). In general, this mechanism results in a 6-dBA decrease in the sound level with every doubling of distance from the source. For example, the 84-dBA average sound level at 50 feet associated with clearing and grading would be attenuated to 78 dBA at 100 feet, 72 dBA at 200 feet, and to 66 dBA at 400 feet. For a conservative worst-case analysis, noise attenuation from dampening due to ground effects was not included in the construction noise modeling.

During final construction, a method used for testing and cleaning steam piping called “steam blows” would create substantial noise, which would occur on a short-term, temporary basis. A steam blow results when high-pressure steam is allowed to escape into the atmosphere when cleaning the steam piping. A series of short steam blows, lasting 2 or 3 minutes each, would be performed several times daily over a period of 2 or 3 weeks during the final weeks of construction. Steam blows are necessary after erection and assembly of the feed water and steam systems because the piping and tubing that comprise the steam path accumulate dirt, rust, scale, and construction debris. The steam blows prevent debris from entering the steam turbine. Steam blows can produce noise as loud as 130 dBA at a distance of 100 feet. Subsequently, the resultant sound level at the nearby receptors would range from 86 to 103 dBA. To minimize the short-term temporary noise impacts from the steam blows, the steam piping would be equipped with silencers that would reduce noise levels by 20 dBA to 30 dBA at each receptor location.

Due to the nature of construction noise and common fluctuations in the background noise level, construction activity would be occasionally discernable at the nearest receptors. Given ideal atmospheric conditions with cold temperatures, winds, and variable humidity, construction noise could be discernable at the receptors located furthest from the project site because of inversion effects. Under certain circumstances, the construction noise could be a source of annoyance to noise sensitive individuals. In addition to implementing silencers on steam piping, Excelsior would develop a notification plan to alert nearby residents of impending activities that would result in abnormally loud noises. Furthermore, after the final site has been determined, Excelsior would notify nearby residences of the construction schedule and operating plan.

In general, short-term noise levels during construction would not be significant for the following reasons:

- The distance separating the residential areas from the site would result in substantial attenuation of construction noise.
- The construction equipment would not normally be operating simultaneously.
- During construction there would be periods of time when no equipment would be operating, and when noise would be at or near ambient levels.
- Construction activities are scheduled to occur during daytime hours, when many people are at work and away from home.
- To reduce construction noise to the greatest extent possible and practical, functional mufflers would be maintained on construction equipment.

Impacts During Construction at West Range Site

After publication of the Draft EIS, the footprint for the proposed Mesaba Generating Station was shifted approximately 280 feet to the northwest on the property along the same axis as the originally proposed footprint. Based on the new noise analysis, estimated construction-related noise levels at the receptors remained the same or decreased from values as stated in the Draft EIS. This section was revised to reflect the latest noise analysis based on the footprint adjustment. The modeled receptor locations for the West Range site are listed in Table 4.18-5. Note that R6 and R7 represent church receptors and were not used in the construction noise analysis. The predicted aggregate noise levels at the West Range Site during construction are shown in Table 4.18-7 **(revised in Final EIS)**.

The results shown in Table 4.18-7 indicate that noise from construction activities is not expected to exceed the MPCA residential daytime noise limits of 60 dBA (L_{50}) at any of the nearby receptor locations.

For the most part, rail line construction would be located further away from noise sensitive receptors, when compared to the construction of the power plant. However, rail line construction would encroach within 500 feet of receptors R2 and R5. Construction noise would be expected to range from 57 to 69 dBA during the short period that the railroad construction operation is nearest to the homes represented by each of these receptors. Due to the short-term nature of the linear construction operation, rail construction noise could potentially result in a short-term, temporary noise impact, which would be diminished as the construction operation moves away from receptors R2 and R5.

Table 4.18-7. Aggregate Estimated Noise Levels Generated by Construction Activities at the West Range Site

Construction Activity	Estimated Construction Operation Noise Level at Each Receptor Location, dBA							
	R1	**R2**	**R3**	**R4**	**R5**	**Receptor AAC-6**	**Receptor AAC-7**	**Receptor AAC-8**
Site Clearing	51	**44**	**45**	44	**43**	38	34	36
Excavation	56	**49**	**50**	49	**48**	43	39	41
Foundation	44	**37**	**38**	37	**36**	31	27	29
Building Construction	51	**44**	**45**	44	**43**	38	34	36
Finishing	56	**49**	**50**	49	**48**	43	39	41

This table reflects latest noise analysis based on plant footprint readjustment (bold typeface denotes updated values for the Final EIS). (Source: SEH et al., 2005**; AAC, 2009**)

Table 4.18-8 **(revised in Final EIS)** summarizes the estimated noise levels at the receptor locations resulting from steam blow at the West Range Site.

Table 4.18-8. Estimated Steam Blow Noise Levels at West Range Site

Receptor	Estimated Distance to Nearest Future Plant Steam Blow	Steam Blow Noise Level, dBA
R1	**2,990**	**100**
R2	**5,590**	**95**
R3	**5,375**	**95**
R4	**5,910**	**95**
R5	**6,130**	**94**
AAC-6	**10,250**	90
AAC-7	**16,480**	86
AAC-8	**12,525**	88

This table reflects latest noise analysis based on plant footprint readjustment. (Source: SEH et al., 2005**; AAC, 2009**)

To minimize the short-term temporary noise impacts from the steam blows, the steam piping would be equipped with silencers that would reduce noise levels by 20 dBA to 30 dBA at each receptor location.

The FHWA noise analysis that is required at the West Range site because of the proposed realignment of CR 7 also includes construction-related traffic noise and is discussed in Section 4.18.4.3. **Following publication of the Draft EIS, Itasca County deferred its planned realignment of CR 7 due to changes in funding priorities at the state level. A new traffic-related noise analysis was conducted for the new Access Road 3 at the West Range Site and is discussed in Section 4.18.2.2.**

As described in Sections 2.2.4.1 and 2.3.1.1, Excelsior would establish off-site construction staging and laydown areas on 85 acres of land selected from among four potential sites for Phase II construction. Figures 2.3-1 and 2.3-3 show the candidate locations for the West Range Site. All of the sites are located on lands that have been disturbed or cleared during prior uses by mineral extraction companies and all have access to local roadways. Additional traffic volumes (up to eight vehicle trips for each peak a.m. and p.m. hour) from construction truck deliveries would result in intermittent, increased noise levels on routes between the potential laydown areas and the construction site. However, these impacts are expected to be minor as this traffic increase would be short-term and intermittent and the routes between the laydown areas and the construction site do not traverse large towns. The 30-acre laydown area adjacent to CR 7 would present the least amount of noise impacts as the area is located in a fairly remote area near the project site and the route to the proposed site includes one residential property. A few residential areas located on US 169 in the community of Holman would experience minor noise impacts from the other three potential laydown areas as trucks travel between these areas and the project site. Residential properties located in the southwest corner of Taconite would experience minor noise impacts from the 30-acre laydown area located west of Taconite.

Impacts During Construction at East Range Site

The modeled receptor locations for the East Range Site are listed in Table 4.18-6. The predicted aggregate noise levels at the East Range site during construction are shown in Table 4.18-9.

The results shown in Table 4.18-9 indicate that noise from construction operations would not be expected to exceed the MPCA residential daytime noise limits of 60 dBA (L_{50}) at any of the nearby receptor locations.

Table 4.18-9. Aggregate Estimated Noise Levels during Construction at East Range Site

Construction Activity	Estimated Construction Operation Noise Level at Each Receptor Location, dBA						
	R1[1]	R2	R3	R4	R5[2]	R6[2]	R7[2]
Site Clearing	60	41	42	38	40	40	40
Excavation	65	46	47	43	45	45	45
Foundation	53	34	35	31	33	33	33
Building Construction	60	41	42	38	40	40	40
Finishing	65	46	47	43	45	45	45

[1] Receptor 1 is located at the boundary of the Buffer Land and is isolated from residential receptors.
[2] These 3 Receptors represent churches within the Hoyt Lakes Area
Source: SEH, 2005b

Table 4.18-10 **(revised for Final EIS)** summarizes the estimated noise levels at the receptor locations resulting from steam blow at the East Range Site.

Table 4.18-10. Estimated Steam Blow Noise Levels at East Range Site

Receptor	Estimated Distance to Nearest Steam Blow	Steam Blow Noise Level
R1*	1,900 ft	**104** dBA
R2	10,000 ft	**90** dBA
R3	9,200 ft	91 dBA
R4	12,800 ft	88 dBA
R5	10,700 ft	**89** dBA
R6	11,000 ft	**89** dBA
R7	11,000 ft	**89** dBA

* Receptor 1 is located at the boundary of the Buffer Land and is isolated from residential receptors.
Bold typeface denotes updated values for the Final EIS.
Source: SEH, 2005b

To minimize the short-term temporary noise impacts from the steam blows, the steam piping would be equipped with silencers that would reduce noise levels by 20 dBA to 30 dBA at each receptor location.

As described in Sections 2.2.4.1 and 2.3.2.1, Excelsior would establish off-site construction staging and laydown areas on 85 acres of land from two potential sites for Phase II construction. Figure 2.3-5 shows the candidate locations for the East Range Site. Both the sites are located on lands that have been disturbed during prior uses by mineral extraction companies and are accessible by mining roads or abandoned rail grades. The laydown areas are located about 2 to 3 miles from the project site and outside of any residential areas. Additional traffic volumes (up to eight vehicle trips for each peak a.m. and p.m. hour) from construction truck deliveries would result in intermittent noise level increases on routes between the potential laydown areas and the construction site. However, these impacts are expected to be minor as potential routes between the laydown areas and the construction site are located in fairly remote mining areas and no known sensitive receptors are located in the region.

4.18.2.2 Impacts of Facility Operation

<u>Plant Noise</u>

The dominant noise sources for the base plant configuration included the HRSG and ASU stack exits, large buildings with major process equipment inside (including the CTGs and STG) buildings, the ASU buildings, Rod Mill buildings, and Slurry Feed buildings), Acid and Tail Gas burners, the Power Block and ASU cooling towers, and several large water-handling pumps.

Once Phase I begins commercial operations, Excelsior would perform a noise survey to ensure that such operations are in compliance with applicable noise standards. The mechanism for conducting such measurements would depend upon the construction schedule for Phase II. Presuming that construction of Phase II would be concomitant with operation of Phase I, testing would be conducted in a manner to confirm that the combination of activities (i.e., simultaneous Phase I operation and Phase II construction) comply with state requirements. The measurements would be taken during evening and daytime hours to include routine and special operating circumstances, including facility start-ups and shut downs, full load operation, maintenance and testing activities (e.g., steam blows), and rail deliveries and associated unloading activities.

During the start-up process, either the initial commissioning start-up phase or during on-going operations, controlled venting of steam directly to the atmosphere during steam-cycle start-up can occur from vent valves. Also during start-ups, steam can be vented to blowdown tanks. These start-up steam venting/discharging operations are generally not referred to as ‘steam blows’ and typically generate lower noise emissions than steam blows that occur during construction (discussed in Section 4.18.2.1). Beyond the start-up process and during regular operations, the only potential ventings or discharges of steam would be associated with an unusual or emergency event wherein one or more plant systems would ‘trip’ off-line and necessitate a steam discharge to protect personnel and plant equipment; however, these ‘tripping’ discharges are expected to occur infrequently because of the sophisticated control systems at the proposed facility.

Plant Noise at the West Range Site

After publication of the Draft EIS, the footprint for the proposed Mesaba Generating Station was shifted approximately 280 feet to the northwest on the property along the same axis as the originally proposed footprint. In general, new noise analysis findings show that levels of impact at the receptors were reduced compared to the analysis presented in the Draft EIS. None of the receptor locations exhibited changes in noise levels that would be perceptible (all decibel increases were less than ±3 dB). This section was revised to reflect the latest noise analysis for plant-related noise at the West Range Site.

The noise modeling results **for combined Phases I and II** (without any assumed noise control treatments) at the seven nearest receptors are shown below in Table 4.18-11. **Predicted noise levels are well within the daytime limits for all locations.** For the community receptors **R3 and R4**, the predicted aggregate noise emissions from the proposed complete power plant project (Phases I and II) were above the indicated Minnesota L_{10} /L_{50} community limits during the nighttime. At R3 and R4, these noise levels exceeded the L_{10} threshold by 3.**2** and 1.**2** dBA, respectively. The nighttime noise levels exceedances above the L_{50} threshold **were predicted as 3.5** dBA (R**3**) **and** 3.**4** dBA (R4). Note**, however,** that although R3 and R4 are above the **nighttime** noise limits, existing ambient conditions at both residences already exceed the Minnesota regulations, because of their proximity to CR7**. Additionally**, these locations are expected to incrementally receive less than 1 dB from the combined plant **noise levels**, which is well below the commonly held threshold of a perceptible change in community noise levels (which is ±3 dB).

Table 4.18-11. Estimated Plant Noise Levels (without mitigation) at Receptors for West Range Site for Phases I and II

Receptor	Existing L_{10}/L_{50} Day (dBA)	Existing L_{10}/L_{50} Night (dBA)	Projected Plant Noise L_{10}/L_{50} (dBA)	Decibel Increase L_{10}/L_{50} Day (dBA)	Decibel Increase L_{10}/L_{50} Night (dBA)	Resultant L_{10}/L_{50} Day (dBA)	Resultant L_{10}/L_{50} Night (dBA)
R1	53/52	51/49	**45/45**	**0.6/0.8**	**1.0/1.5**	**53.6/52.8**	**52.0/50.5**
R2	54/53	50/49	**42/45**	**0.3/0.3**	**0.6/0.8**	**54.3/53.3**	**50.6/49.8**
R3	59/55	***58/53***	**44/44**	**0.1/0.3**	**0.2/0.5**	**59.1/55.3**	***58.2/53.5***
R4	59/52	***56/53***	**43/43**	**0.1/0.5**	**0.2/0.4**	**59.1/52.5**	***56.2/53.4***
R5	51/**50**	50/49*	**42/42**	**0.5/0.6**	**0.6/0.8**	**51.5/50.6**	**50.6/49.8**
R6	52/50*	50/49*	**27/27**	0/0	0/0	**52.0/50.0**	**50.0/49.0**
R7	52/50*	50/49*	**35/35**	**0.1/0.1**	**0.1/0.2**	**52.1/50.1**	**50.1/49.2**

Note: **Table reflects new noise analysis based on adjusted footprint of proposed plant (bold typeface denotes updated values for the Final EIS).** Additionally, italicized and underlined typeface indicate levels exceeding state standards: 65/60 dBA (L_{10}/L_{50}) for daytime and 55/50 for nighttime at residential and church land uses (Source: SEH et al., 2005**; AAC, 2009**);
***Existing ambient conditions and levels were estimated based on information at locations with similar characteristics.**

The following techniques were evaluated to further reduce noise from plant operations, if needed:

- Using a mix of low-noise designs for some equipment items;
- Using available noise control technologies (such as stack silencers); and
- Applying external treatments such as enclosures or noise control panels on selected building walls.

The specific mitigation methods needed to reduce the noise levels of equipment to the desirable design criteria would depend on final design and selection of specific equipment. During the final design review process, Excelsior would evaluate noise reduction features and determine the best suite of mitigation measures that would be incorporated into the final plant design. A host of conceptual plant noise mitigation alternatives and the expected noise reduction potential associated with each feature is identified later in this section in Table 4.18-16.

Even without mitigation, it is expected that the facility would meet state noise standards (both L_{50} and L_{10}) at all sites, with the exception of the nighttime L_{10} noise standard for R3 and R4. Currently, the L_{10} noise levels at R3 and R4 are already above the MPCA nighttime limits due to roadway traffic on CR 7; however, the increased noise levels resulting from plant operations would not be detectable at these sites (less than 1 dBA for both sites). **Noise levels at receptors during the Phase I-only operation are not included in Table 4.18-11. Although, noise levels would not be halved during Phase I-only operation (in comparison to levels during the combined Phases I and II), the amount of decibel increase would be less than what is predicted in Table 4.18-11 and would be below perceptible changes.**

Plant Noise at East Range Site

The modeling results at the seven nearest receptors are shown below in Table 4.18-12. **Changes shown in this table are corrections based on Excelsior's latest supplemental filing (January 2008) for the project's Joint Application to the State of Minnesota (Excelsior, 2008).**

Table 4.18-12. Estimated Operational Noise Levels (without mitigation) at Receptors at East Range Site for Phases I and II

Receptor	Existing L_{10} /L_{50} Day (dBA)	Existing L_{10} /L_{50} Night (dBA)	Projected Plant Noise L_{10} /L_{50} (dBA)	Decibel Increase L_{10} /L_{50} Day (dBA)	Decibel Increase L_{10} /L_{50} Night (dBA)	Resultant L_{10} /L_{50} Day (dBA)	Resultant L_{10} /L_{50} Night (dBA)
R1[1]	50/50	49/49	58/58	**8.6/8.6**	**0.8/0.8**	**58.6/58.6**	**58.5/58.5**
R2	52/**51**	50/49	40/40	**0.3/0.3**	0.4/0.5	**52.3/52.3**	50.4/49.5
R3	53/**51**	50/49	**40/40**	**0.2/0.3**	**0.4/0.5**	**53.2/53.3**	**50.4/49.5**
R4	52/50	49/48	35/35	**0.1/0.1**	0.**2**/0.2	52.**1**/50.**1**	49.**2**/48.2
R5	53/50*	50/49*	**38/38**	0.**1**/0.3	0.3/**0.3**	53.**1**/50.3	50.3/**49.3**
R6	53/50*	50/49*	**38/38**	0.**1**/0. 3	0.3/**0.3**	53.**1**/50.3	50.3/**49.3**
R7	53/50*	50/49*	**38/38**	0.**1**/0. 3	0.3/**0.3**	53.**1**/50.3	50.3/**49.3**

Note: No receptor levels are predicted to exceed state standards: 65/60 dBA (L_{10} /L_{50}) for daytime and 55/50 for nighttime at residential and church land uses;
[1]**State threshold for R1, is 80/75 dBA (L_{10} /L_{50}) for daytime and nighttime at industrial land uses**.
***Existing ambient conditions and levels were estimated based on information at locations with similar characteristics.**
(Source: SEH, 2005b**; Excelsior, 2008; AAC, 2009**);
Bold typeface denotes updated values for the Final EIS - corrections in this table are based on Excelsior's latest supplemental filing (January 2008) for the project's Joint Application to the State of Minnesota (Excelsior, 2008)

During operation of the plant **during the combined Phases I and II** at the East Range Site, it is not anticipated that any of the receptors would receive levels above MPCA guidelines during either daytime or nighttime operation, as predicted in Table 4.18-12. This is attributable to the distances involved between the East Range Site and the nearest sensitive receptors. R1 exhibited the greatest predicted decibel increase for the daytime (**8.6** dBA for both L_{10} and L_{50}) **and for the** nighttime (0.8 for **both L_{10} and** L_{50}). **The 8.6-dBA increase at R1 exceeds ±3 dB, and thus, signifies a detectable change**; however, **R1 is located in a remote area at the boundary of the undeveloped East Range buffer land and isolated from any residential receptor. Also, R1 remains below the state threshold of 80/75 dBA (L_{10} /L_{50}) for daytime and nighttime at industrial land uses. All other** increases are well below the commonly-held threshold of a perceptible change in community noise levels (which is ±3 dB). **Noise levels at receptors during the Phase I-only operation are not included in Table 4.18-12. Although, noise levels would not be halved during Phase I-only operation (in comparison to levels during the combined Phases I and II), the amount of decibel increase would be less than what is predicted in Table 4.18-11, remain below perceptible changes with respect to any residential area, and remain within state thresholds.**

Rail Noise and Vibration

The Mesaba Energy Project would transport coal and related materials to and from the proposed project sites by way of a new rail line. Noise and vibration generated by the rail operations have the potential to impact nearby sensitive receptors. The rail noise analysis assumes the rail operating parameters as shown in Table 4.18-4.

The use of train horns is governed by the FRA per Federal requirements as found in 49 USC 20153 and 49 CFR, Parts 222 and 229 "Use of Locomotive Horns at Highway-Rail Grade Crossings, Final Rule (August 17, 2206). Train horns are must be sounded at public at-grade rail crossings. Further, these documents establish that locomotive horns should produce a minimum sound level of 96 dBA and a maximum sound level of 110 dBA, both measured at 100 feet forward of the locomotive in its direction of travel. Cumulative impacts as a result of train horns are discussed in Section 5.2.7.3.

Both rail yard noise levels and rail line noise levels were calculated for the Mesaba noise impact analysis using the methodologies, calculation procedures, and emissions ratings found in the industry-standard document "Transit Noise and Vibration Impact Assessment" (FTA, 1995). The methodologies of this assessment take into account the number of locomotives, the number of rail cars, the train speed, the type of tracks and wheels, and the number of trains per hour or day and use is made of standardized reference emissions factors for the various sources.

Rail Noise and Vibration at West Range Site

In response to concerns raised by USACE and other agencies about the need to avoid and minimize wetland impacts identified in the Draft EIS, Excelsior identified a new preferred rail alignment, Alternative 3B. The alignment would follow the same route as Alternative 1A from the point of interconnection with the CN and BNSF main line to the Mesaba plant site. However, Alternative 3B would begin its rail loop approximately at a point in between the footprints for Phases I and II (see Figure 2.3-2). The rail car unloading station was adjusted about 2,000 feet to the southeast and unit trains would extend beyond the West Range Site boundary at the start of unloading. Thus, under Alternative 3B, the train would be within about 1,000 feet of residential properties on the north end of Big Diamond Lake for approximately 1 hour longer than for Alternative 1A. However, because the train would not be under power during unloading and would be passively pulled through the unloading process, nearby residents would not be subject to additional rail noise during unloading under Alternative 3B. This section was revised to reflect the latest noise analysis for rail-related noise impacts at the West Range Site.

Table 4.18-13 lists the estimated future noise and vibration levels generated by train operations associated with the project in the West Range Site. Freight train noise levels would range from **36 to 56** dBA at the receptor locations during a train pass-by. Typical daytime background noise levels were measured to be in the low 50's dBA (L_{50}). Based on these levels, noise from freight train operations could be noticeable to residences represented by receptors R2, R5, and **AAC-**7 and may be considered an impact based on the FRA noise criteria (see Section 4.18.2.1). However, given the relatively small amount of future train operations **(up to two daily rail trips during Phase I and up to four daily rail trips during Phase II)** and the fact that very few train operations would occur on a daily basis, the incremental L_{dn} increase generated by freight train operations would not be considered significant when compared to background noise levels. Some instances of train pass-bys would be noticeable at receptors with quieter background noise levels, but the noise levels would not be expected to contribute appreciably to the ambient background on an hourly or 24-hour basis. The maximum noise levels generated by freight train operations would be below the ATPA guideline of 70 dBA at each residential receptor location.

Table 4.18-13. Estimated Freight Train and Yard Activity Noise Levels at West Range Site

Receptor	Estimated Distance to Nearest Track Segment (ft)	Estimated Train Noise (dBA)	Estimated RMS Vibration Velocity (dBV)	Estimated Distance to Rail Yard (Loading & Unloading) (ft)	Estimated Yard Noise (dBA)
R1	4,110	44	56	**3,835**	**25**
R2	**1,125**	**52**	**67**	**4,585**	**23**
R3	**6,895**	**40**	**51**	**7,490**	**19**
R4	**7,300**	**40**	**51**	**8,070**	**18**
R5	**630**	**56**	**72**	**4,800**	**23**
AAC-6	**2,130**	**48**	**61**	**10,950**	**15**
AAC-7	**1,480**	**51**	**65**	**15,575**	**12**
R8	**13,020**	**36**	**46**	**14,565**	**12**

Table reflects new noise analysis based on new rail alignment Alternative 3B (bold typeface denotes updated values for the Final EIS). (Source: SEH et al., 2005**; AAC, 2009**)

Noise generated by rail yard operations have also been estimated and summarized in Table 4.18-13. The noise from yard activities, involving loading and unloading of freight trains, would be greatly attenuated due to the distance between the nearby receptors and the yard. Rail yard noise is estimated to be between **12 to 25** dBA at the nearby residences. Noise generated by yard operations would not exceed the FRA and ATPA noise guidelines, and therefore, is not expected to be significant.

Horn soundings would be expected to be clearly audible to the nearest residential receptors. Because train horns are a requirement of the FRA, the noise impact would be considered an unavoidable adverse noise impact.

Since vibration effects from rail operations would be classified as "infrequent events" (per Table 4.18-4), the FRA guideline for vibration impacts would be 80 VdB. As all the receptors at the West Range Site are predicted to have train-related vibration levels of at least 8 VdB below this guideline level, it is expected that rail vibration impacts would not be significant at the West Range Site.

Rail Noise and Vibration at East Range Site

Table 4.18-14 lists the estimated future noise levels generated by train operations associated with the project at the East Range Site. **Changes shown in this table are corrections based on Excelsior's latest supplemental filing (January 2008) for the project's Joint Application to the State of Minnesota (Excelsior, 2008).**

Freight train noise levels would range from **39 to 50** dB at the receptor locations during a train pass-by. Typical daytime background noise levels were measured to be in the low 50s. Based on these levels, noise from freight train operations could be noticeable to R1. However, given the relatively small amount of future train operations and the fact that very few train operations would occur on a daily basis, the L_{dn} generated by freight train operations would not be considered significant when compared to background noise levels. Some instances of train pass-bys would be noticeable at receptors with quieter background noise levels, but the noise would not be expected to contribute appreciably to the ambient background on an hourly or 24-hour basis. Furthermore, the maximum noise levels generated by freight train operations would be below the ATPA guideline of 70 dBA at each receptor location and would not be considered significant.

Table 4.18-14. Estimated Freight Train and Yard Activity Noise Levels at East Range Site

Receptor	Estimated Distance to Nearest Track Segment (ft)	Estimated Train Noise (dBA)	Estimated RMS Vibration Velocity (dBV)	Estimated Distance to Rail Yard (Loading & Unloading) (ft)	Estimated Yard Noise (dBA)
R1	1,700	**50**	**63**	1,700	**32**
R2	5,800	**42**	**53**	9,500	**17**
R3	5,200	**43**	**53**	8,700	**18**
R4	9,300	**39**	**49**	12,000	15
R5	7,300	**40**	**51**	10,000	**17**
R6	8,000	**40**	**50**	10,200	**16**
R7	8,100	**40**	**50**	10,200	**16**

* Receptor 1 is located at the boundary of the Buffer Land and is isolated from residential receptors. (Source: SEH, 2005b; AAC, 2009); **Corrections in this table are based on Excelsior's latest supplemental filing (January 2008) for the project's Joint Application to the State of Minnesota (Excelsior, 2008)**

Noise generated by rail yard operations have also been estimated and summarized in Table 4.18-14. The noise from yard activities, involving loading and unloading of freight trains, would be greatly attenuated due to the distance between the nearby receptors and the yard. Rail yard noise is estimated to be between 15 to **32** dB at the **receptors**. When compared to the FRA and ATPA noise guidelines, noise generated by yard operations would not expected to be significant.

Horn soundings would be expected to be clearly audible to the nearest residential receptors. Because train horns are a requirement of the FRA, such noise impacts are an unavoidable adverse impact.

Since vibration effects from rail operations would be classified as "infrequent events" (per Table 4.18-4), the FRA guideline for vibration impacts would be 80 VdB. As all the receptors at the East Range Site are predicted to have train-related vibration levels of at least 17 VdB below this guideline level, it is expected that rail vibration impacts would not be significant at the East Range Site.

Federal Highway Administration Noise Analysis (West Range)

As previously mentioned, an FHWA noise analysis was conducted (using the augmented FHWA noise prediction software MINNOISE) for the West Range Site because this site initially consisted of a proposed roadway that would have included substantial realignment and additional lanes (realignment of CR7). Following publication of the Draft EIS, Itasca County deferred its planned realignment of CR 7 due to changes in funding priorities at the state level. The proposed realignment of CR 7 as it was presented in the Draft EIS is no longer anticipated to be available for the Mesaba Energy Project. Access Road 3, now Excelsior's preferred alternative, would directly connect the existing alignment of CR 7 to the southwestern corner of the property boundary as shown in Figure 2.3-2. An additional noise assessment was completed for Access Road 3. This section was revised to reflect the latest traffic-related noise levels at the West Range Site.

The noise levels at the virtual receptors at the West Range Site during the construction and operational phase are shown in Table 4.18-15 **(revised for Final EIS)**. **For the new analysis, two**

receptor points, MR 19 and MR 20, were removed due to their greater distance from Access Road 3. New receptors, MR 21 and MR 22, were added: MR 21 is a new location which was not affected by the original alignment and MR 22 has been identified as a new residential receptor. See Figure 4.18-1 (added in Final EIS) for location of receptors used for the traffic-related noise analysis. [Text regarding exceedances predicted for Draft EIS was deleted.]

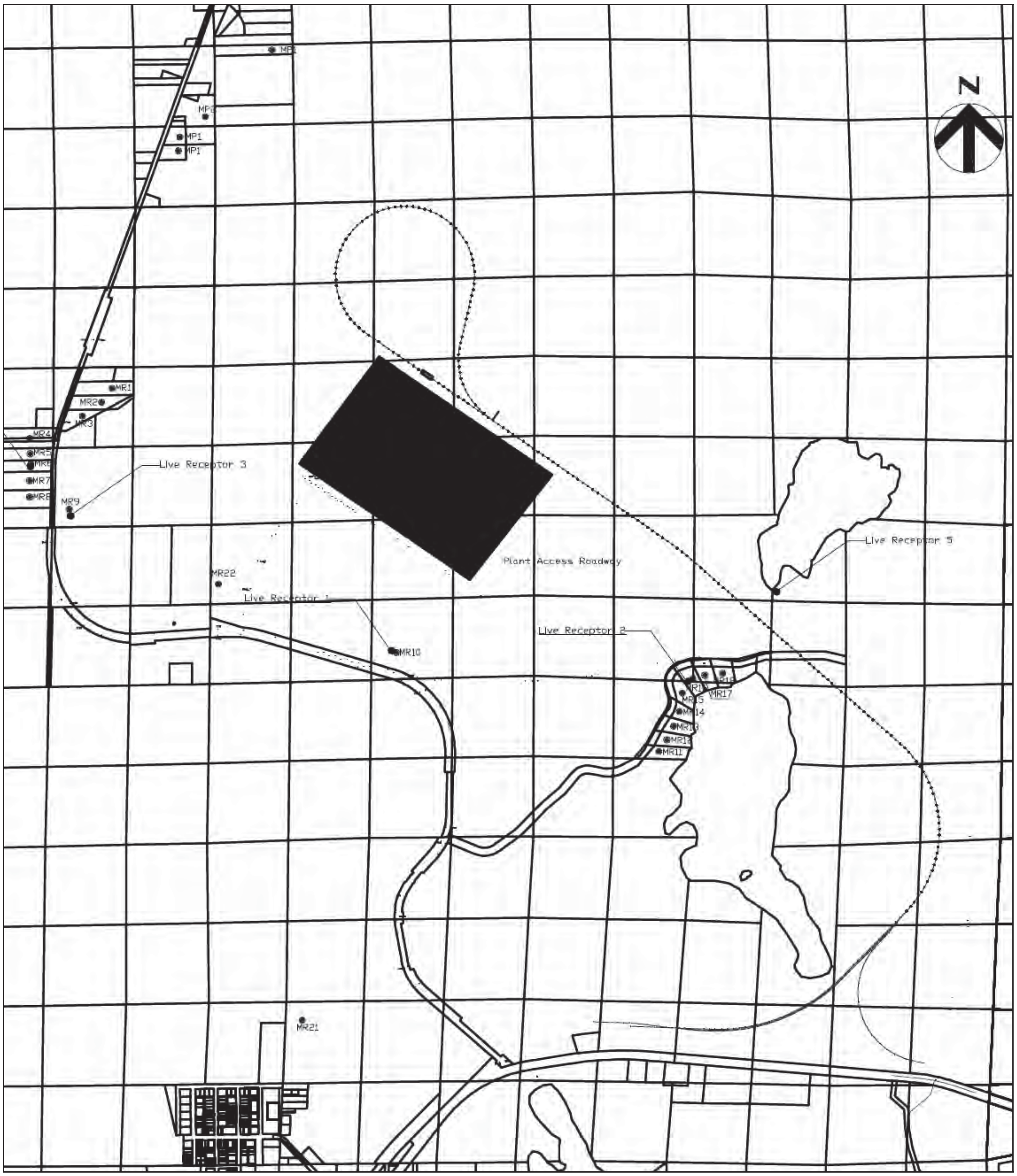


Figure 4.18-1. MINNOISE L_{10} Virtual Receptor Locations for West Range Site (HDR, 2009)

Table 4.18-15. MINNOISE L_{10} Noise Levels at Virtual Receptor Locations for West Range Site

Receptors/Distance to Roadway	"Nightime"[1] Construction L_{10}	"Daytime"[1] Construction L_{10}	"Nightime"[1] 2028 Plant Service L_{10}	"Daytime"[1] 2028 Plant Service L_{10}
MR1/5500'	**45** dBA	**48.8** dBA	**40.4** dBA	**40.4** dBA
MR2/5400'	**46.3** dBA	**50.2** dBA	**41.7** dBA	**41.7** dBA
MR3/5500'	**49.7** dBA	**53.9** dBA	**45.2** dBA	**45.2** dBA
MR4/5800'	**49.8** dBA	**52.9** dBA	**44.3** dBA	**45.6** dBA
MR5/5600'	**50.8** dBA	**53.8** dBA	**45.2** dBA	**45.7** dBA
MR6/5600' **(near R4)**	**51.3** dBA	**54.2** dBA	**45.6** dBA	**45.8** dBA
MR7/5450'	**51.3** dBA	**54.2** dBA	**45.6** dBA	**48.4** dBA
MR8/5300'	**51.5** dBA	**54.4** dBA	**45.8** dBA	**53.9** dBA
MR9/4600' **(near R3)**	**55.1** dBA	**57.2** dBA	**48.4** dBA	**35.8** dBA
MR10/320' **(near R1)**	**62.3** dBA	**60.8** dBA	**55.1** dBA	**35.3** dBA
MR11/1400'*	**41.9** dBA	**41.8** dBA	**36** dBA	**34.9** dBA
MR12/1250'*	**41.5** dBA	**41.3** dBA	**35.5** dBA	**34.6** dBA
MR13/1050'*	**41.1** dBA	**40.9** dBA	**35.1** dBA	**34.3** dBA
MR14/850'*	**40.7** dBA	**40.5** dBA	**34.7** dBA	**33.7** dBA
MR15/550'*	**40.4** dBA	**40.2** dBA	**34.4** dBA	**33.1** dBA
MR16/350'*	**39.8** dBA	**39.6** dBA	**33.8** dBA	**32.4** dBA
MR17/300'* **(near R2)**	**39.2** dBA	**39.1** dBA	**33.3** dBA	**40.9** dBA
MR18/300'*	**38.5** dBA	**38.4** dBA	**32.6** dBA	**32.4** dBA
MR21/1,880'	**46.8** dBA	**47,** dBA	**40.7** dBA	**40.9** dBA
MR22/520'	**58.4** dBA	**58.8** dBA	**51.8** dBA	**52.1** dBA

Notes: Shaded values represent L_{10} values above state standards **65/60 dBA (L_{10} /L_{50}) for daytime and 55/50 for nighttime at residential and church land uses**. * Represents residences at Big Diamond Lake. **[Note, MR 19 and 20 were deleted for the Final EIS.];**

[1] "Daytime" is defined by the MPCA as between 7:00 am – 10:00 pm; "nighttime" is defined as between 10:00 pm – 7:00 am

Source: SEH et al., 2005**; HDR, 2009**

The new analysis indicates that MPCA noise thresholds are potentially exceeded at three receptor points – MR 9, MR 10, and MR 22 – for the nighttime construction condition. However, these exceedances are only for construction-related traffic and only between the nighttime hours. Since no nighttime construction activities are currently planned, the nighttime noise standards would not be exceeded and, therefore, noise mitigation for increased traffic-related noise would not be required. In defining the impacted receptors, the FHWA, Mn/DOT, and MPCA regulations were examined and the following conclusions were made: **[Text regarding exceedances predicted for the Draft EIS was deleted.]**

- No receptors met the criteria for *Noise Level Approaching the NAC*. As stated, FHWA and Mn/DOT apply this classification when the predicted level is 1 dB below the criterion level.
- No receptors met the FHWA definition of *Substantial Increase in Noise* as defined by a 5-dB increase over the Federal NAC category B criteria of 70 dB, or a 75 dB prediction.

- "Nighttime" construction times (10:00 pm – 7:00 am) yielded **three** impacted receptors per MPCA definition. **However, construction is unlikely to occur during nighttime hours and these three receptors would not experience these projected noise levels.**
- "Nighttime" 20-year project plant service traffic levels revealed **no** impacted receptors **per FHWA or MPCA and Mn/DOT guidelines**.
- "Daytime" 20-year projected plant service traffic levels reveal no impacted receptors per FHWA or MPCA and Mn/DOT guidelines.

In general, results of the new noise study show that Access Road 3 would not generate any new noise impacts above MPCA guidance and, in fact, traffic-related noise impacts as discussed in the Draft EIS, primarily for receptors near Big Diamond Lake, are reduced. Based on the level of reduced impacts, a noise wall analysis is not required.

4.18.3 Impacts of No Action Alternative

For the purposes of this EIS, as explained in Section 2.1.1.2, the DOE No Action Alternative is assumed to be equivalent to a "No Build" Alternative. Since this alternative would most likely not involve introducing new noise sources, the No Action Alternative is projected to have no impact on the nearby noise sensitive receptors. Therefore, the noise levels would be substantially similar to existing conditions.

4.18.4 Summary of Impacts

Basis for Impact	No Action	West Range	East Range
Conflicts with a jurisdictional noise ordinance or Minnesota regulations (i.e., Minnesota Pollution Control Agency [MPCA]) or results in a permanent perceptible increase in ambient noise levels at residential areas during construction.	There would be no additional noise emissions and therefore, there would be no new conflicts with noise standards; however R3 and R4 at the West Range are currently above the MPCA noise thresholds.	Short-term adverse noise impacts would result from construction activities, including steam blows. Noise levels at nearby receptors from steam blows would range from **86 to 100** dBA; however, steam piping would be equipped with silencers that would reduce noise levels by 20 dBA to 30 dBA at each receptor location. **Predicted aggregate noise levels from construction activities range from 27 to 56 dBA -** MPCA residential daytime noise limits of 60 dBA (L_{50}) would not be exceeded at any of the residential receptors during construction. **Increased noise levels would occur at potential off-site staging areas, especially along construction vehicle routes; however, minor impacts are expected as increases would be short-term, intermittent, and transportation routes would not traverse large towns.** FHWA noise analysis: Nighttime L_{10} threshold would be exceeded at **three receptors locations (MR9, MR10, and MR22)** during construction**; however, construction not expected to take place during nighttime hours and, thus, no impacts would occur**.	Short-term adverse noise impacts would result from construction activities, including steam blows. Noise levels at nearby receptors from steam blows would range from 88 to **104** dBA; however, steam piping would be equipped with silencers that would reduce noise levels by 20 dBA to 30 dBA at each receptor location. **Predicted aggregate noise levels from construction activities range from 31 to 65 dBA -** MPCA residential daytime noise limits of 60 dBA (L_{50}) would not be exceeded at any of the residential receptors during construction **(65 dBA is predicted to occur at R1, which is located at the boundary of the Buffer Land and is isolated from residential areas)**. **Increased noise levels would occur at potential off-site staging areas, especially along construction vehicle routes; however, minor impacts are expected as increases would be short-term, intermittent, and staging areas and transportation routes are located in remote areas.**

Basis for Impact	No Action	West Range	East Range
Conflicts with a jurisdictional noise ordinance or Minnesota regulations (i.e., Minnesota Pollution Control Agency [MPCA]) during operations or results in a permanent perceptible increase in ambient noise levels at residential areas.	There would be no additional noise emissions and therefore, there would be no new conflicts with noise standards and no change in ambient noise conditions; note, however, that R3 and R4 at the West Range are currently above the MPCA noise thresholds.	Unmitigated plant noise (daytime): Without mitigation, MPCA noise thresholds would not be exceeded. Unmitigated plant noise (nighttime): Without mitigation, the nighttime noise levels would exceed the L_{50} threshold at R3 and R4 by **3.5** and **3.4** dBA, respectively. Note, however, that existing noise levels at R3 and R4 currently exceed state limits because of proximity to CR 7. **Additionally, note that no perceptible noise increases would occur at any receptor locations for the single and combined plant phases under an unmitigated scenario (i.e., predicted change in existing ambient noise levels would be less than 3 dB)**.	Unmitigated plant noise (daytime and nighttime): MPCA noise thresholds would not be exceeded. Predicted daytime and nighttime noise level increases were **greatest at R1 (8.6-dBA increase); however, R1 is an isolated area (not a residential area); no other perceptible changes in noise levels would occur at the other receptor locations**.
Conflicts with transportation-related noise guidelines (Federal Highway Administration, Federal Railroad Administration, and American Public Transportation Association).		Rail Noise: Freight train noise levels would range from **36 to 56** dBA at the modeled receptor locations during a train pass-by - noise from freight train operations could be noticeable to residences represented by receptors R2, R5, **and AAC-7** and may be considered an impact based on the FRA noise criteria, but would be short-term and relatively infrequent. Maximum noise levels generated by freight train operations would be below the ATPA guideline of 70 dBA at each receptor location and would not be considered significant. **All receptors are predicted to have train-related vibration levels of at least 8 VdB below the FRA guideline level of 80 VdB.** Train horns, as required under FRA regulations would be adverse unavoidable impacts for receptors near at-grade crossings. FHWA noise analysis: **All receptor locations were below state thresholds during plant operations (no receptors met the FHWA definition of *Substantial Increase in Noise*)**.	Rail Noise: Freight train noise levels would range from **39 to 50** dBA at the modeled receptor locations during a train pass-by - noise from freight train operations could be noticeable to residences represented by receptor R1. Maximum noise levels generated by freight train operations would be below the ATPA guideline of 70 dBA at each receptor location and would not be considered significant. **All receptors are predicted to have train-related vibration levels of at least 17 VdB below the FRA guideline level of 80 VdB.** Train horns, as required under FRA regulations would be adverse unavoidable impacts for receptors near at-grade crossings.

4.18.5 Plant Noise and Mitigation Issues

To ensure that appropriate noise attenuation features are included in the final facility design and layout, acceptable ambient noise levels for the proposed land use could be specified in contractor bid specifications. An acoustical analysis of the final design could be completed to ensure it is consistent with the MPCA guidelines.

Noise mitigation design features were identified in the noise evaluation reports. The reports recommended a prudent plant layout configuration, appropriate building acoustical features, low-noise specifications for selected item vendors, and silencing equipment on certain systems. With these proposed noise control designs, it is believed that compliance with the MPCA standards would be achieved at all nearby receptor locations and beyond in the adjacent land uses; both during full-load operations at any time of the day and night.

To ensure noise compliance, the amounts of equipment noise controls could be refined during the course of the project engineering, such that the as-built installation maintains the expected noise emissions and achieves the desired noise compliance. Following commissioning, the plant could be tested using a formalized acoustical survey procedure to demonstrate noise acceptability with the project requirements.

Table 4.18-16 lists the conceptual noise mitigation measures, identified in the noise evaluation studies included in Appendix 5 of the Mesaba Energy Project – Environmental Supplement (SEH et al., 2005), that could be incorporated into the final design of the power plant.

Table 4.18-16. Summary of Noise Mitigation Project Design Features

Noise Source (Original Noise Emissions Rating)	Conceptual Noise Mitigation Feature(s)
Power Block Cooling Tower (60 dBA at 400' from tower edge)	Reduced 6 dB to 54 dBA at 400' from tower edge. Tower vendors can use a combination of slower-speed fans with special blade design, low-noise drive systems, splash control features, and/or tower baffling materials.
Combustion Turbine, Steam Turbine, & HRSG 2-on-1 Power Island (70 dBA at 400' from island envelope)	(a) Include acoustical panel specifications for CTG and STG buildings walls in the detailed design such that interior space noise levels are adequately absorbed and encased within these building shells. (b) Specify CTG components that are outside buildings to be less than 90 dBA at 3 feet from the equipment surface envelope, as an aggregate.
HRSG Stack Exit (alone)(60 dBA at 400')	Reduced 10 dB to 50 dBA at 400' from stack base. Power Island vendor should use a stack silencer (either before or after the up-turn bend) to reduce HRSG stack noise.
Power Block Cooling Tower Pumps(94 dBA at 1')	Reduced 6 dB to ≤88 dBA at 1'. Can be accomplished via noise limit specification to equipment vendor (for a quiet design). As an alternative, install an acoustical enclosure around the pump and drive mechanics.
ASU System(varies)	(a) Include acoustical panel specifications for ASU building walls in the detailed design such that interior space noise levels are adequately absorbed and encased within the building shell. (b) Specify ASU components that are outside buildings to be less than 90 dBA at 3 feet from the equipment surface envelope, as an aggregate.
ASU Stack Exit (alone) (50 dBA at 400')	Reduced 10 dB to 40 dBA at 400' from stack base. ASU System vendor should use a stack silencer to reduce stack noise.
Rail Dumping Building(73 dBA at 50')	Assumes acoustical panel specifications for building walls in the detailed design such that interior space noise levels are adequately absorbed and encased within the building shell to meet the assumed emissions levels.
Slurry Feed and Slurry Prep Building(60 dBA at 50')	Same as immediately above.
Slag Handling Building(65 dBA at 50')	Same as immediately above.
Rod Mill Building(75 dBA at 50')	Reduced 10 dB to 65 dBA at 50' from any building facade. Specify acoustical panel specifications for Rod Mill building walls in the detailed design such that interior space noise levels are adequately absorbed and encased within the building shell to meet the reduced emissions levels.

Table 4.18-16. Summary of Noise Mitigation Project Design Features

Noise Source (Original Noise Emissions Rating)	Conceptual Noise Mitigation Feature(s)
SynGas and TailGas Burners(96 dBA at 3')	Reduced 10 dB to 86 dBA at 3' from the burner box. Specify low-noise burners to equipment vendors or use noise control enclosures/ plenums around burner systems.
Raw Water Pump Sets(91 dBA at 3')	Reduced 10 dB to 81 dBA at 3' from the pump set envelope. Noise limit specification to equipment vendor to supply either quiet-design pump sets or to utilize equipment enclosure.
All other Mechanical Equipment not specified above (various)	Noise limit specification to equipment vendor; no more than 85 dBA at 3'.
All building HVAC units and fans (various)	Noise limit specification to equipment vendor; no more than 85 dBA at 3'.

Source: SEH et al., 2005**; AAC, 2009**

The available mitigation methods needed to reduce the noise levels from specific equipment to the desirable design criteria would depend on final design and selection of specific equipment. Therefore, no commitment to specific noise mitigation methods has been made at this phase of the project. However, to ensure that noise levels would be below state-required thresholds, Excelsior would evaluate and select the best suite of noise reduction alternatives to be incorporated as part of the design basis.

With respect to noise resulting from activities other than plant equipment, additional noise reduction activities could include restricting the number and timing of coal train deliveries across a specific time period and restricting certain construction/maintenance activities to daytime hours.

5. SUMMARY OF ENVIRONMENTAL CONSEQUENCES

5.1 COMPARATIVE IMPACTS OF ALTERNATIVES

5.1.1 Summary Comparison of Alternatives and Impacts

Table 2.4-1 (Chapter 2) compares the potential impacts for the No Action Alternative with the Proposed Action as located at the West and East Range Sites. The impacts for each environmental resource are based on the analyses found in Chapter 4.

5.1.2 Impacts of Commercial Operation

The demonstration of the Mesaba Energy Project for the CCPI Program would be considered successful if the results indicate that the continued operation of the gasifier would fully meet the fuel needs of the combined-cycle unit and would be economically and environmentally feasible (i.e., the project would achieve commercially competitive performance in terms of availability, thermal efficiency, emissions, and cost of electricity). However, if the fuel needs of the combined-cycle unit would need to be met or supplemented by using natural gas for continued commercial operation, then the demonstration of synthesis gas (syngas) production by coal gasification would be considered unsuccessful.

Following completion of the one-year demonstration in late **2015**, three scenarios would be reasonably foreseeable: (1) a successful demonstration of the Mesaba Energy Project followed immediately by commercial operation of the facilities at approximately the same production level; (2) an unsuccessful demonstration followed by continued commercial operation of the combined cycle power-generating unit using the gasifier to the extent possible, while using natural gas to serve the balance of the combined-cycle unit's requirements not met by the gasifier; and (3) an unsuccessful demonstration followed by continued commercial operation of the combined-cycle unit using natural gas exclusively.

Under all three scenarios, the expected operating life of the facilities would be at least 20 years, including the one-year demonstration period. An extension beyond 20 years would be based on the continued economic feasibility of the facility. Under the first scenario (successful demonstration followed by commercial operation), the level of short-term impacts for environmental resource areas during commercial operation would not differ from those described in Section 4 because the proposed facilities would continue operating 24 hours per day with the same operating characteristics.

For long-term effects, the impacts would be identical to those discussed in Chapter 4, except for impacts that accumulate with time (i.e., solid waste disposal and CO_2 emissions). As described in Sections 2.2.3.3 and 2.2.3.4, solid wastes would be minimized through the removal of elemental sulfur from the IGCC syngas in relatively concentrated form resulting in a marketable product. The other principal solid waste from the syngas process would be an inert, glass-like slag that may be marketable for asphalt aggregate, landfill cover, or other applications depending on carbon content and gasification fuel source. Unmarketable sulfur and/or slag would be disposed of at an appropriate commercial landfill. Disposal of these wastes would increase the waste volume in the landfill, but would not change other potential impacts associated with the landfill. Solid wastes from the ZLD system in the form of a crystallized filter cake would be disposed of at a licensed hazardous waste landfill. The impacts of solid waste management are described in Section 4.16.

Maximum CO_2 emissions over the 20-year commercial life of the generating station would be approximately 214 million tons without mitigation. However, as described in Section 2.2.1.3, the plant would be designed to be adaptable for retrofit of carbon capture technology. Excelsior has presented a plan to remove up to 85 percent of the CO_2 in the syngas fuel, which would result in an overall CO_2 capture rate of 30 percent for the plant (Appendix A1). Furthermore, Excelsior is working in coordination with the Energy and Environmental Research Center, as part of the Plains CO_2 Reduction Partnership, to develop CO_2 management options for the Mesaba Energy Project based on evaluations of sequestration opportunities associated with regional geologic formations and nearby terrestrial features.

Under the second scenario (an unsuccessful demonstration followed by commercial operation of the combined-cycle unit using the gasifier to the extent possible), the types of impacts resulting from the proposed facilities would be similar to those in the first scenario. However, the level of impacts would be reduced because less coal would be used and less elemental sulfur, slag, and carbon dioxide would be produced. Fewer trains would be needed to deliver coal to the Mesaba Generating Station than for the first scenario operating at full load. Disposal requirements and/or transportation off the site for commercial sale of elemental sulfur and slag would be reduced correspondingly. During periods when the gasifier would not be operating, cooling water demand for project facilities also would be reduced in comparison to the first scenario.

Under the third scenario (an unsuccessful demonstration followed by commercial operation of the combined-cycle unit using natural gas exclusively), the gasifier and associated equipment would no longer be required and most likely would be dismantled and removed from the site for reuse or salvage. Potential short-term impacts would result from fugitive dust and emissions by engines during dismantlement and off-site transport of unneeded equipment, from additional traffic associated with hauling the equipment off site, and from temporary socioeconomic impacts related to the additional workers needed to dismantle and remove the equipment. Also, the likely operational downtime that would occur for the generating station during the dismantling of the gasifer would result in reduced operational impacts.

5.1.2.1 Carbon Dioxide Capture and Geologic Storage

The Carbon Capture and Sequestration plan presented in Appendix A1 was prepared by Excelsior and submitted to the PUC to provide a starting point from which the State of Minnesota could consider meeting its obligations under future CO_2 regulations. Although this option is not feasible during the period of the project demonstration phase, Excelsior may install CO_2 capture technology and sequester the power plant's CO_2 in a deep underground geologic formation at some point during the commercial life of the project. The analysis presented here describes the potential environmental impacts associated with the scenarios and possible pipeline routes presented in Appendix A1, based on the best available information.

Excelsior has not established a specific, detailed design for carbon capture, transport, or sequestration. Hence, this analysis is based primarily on publicly available information compiled by DOE that is considered most representative of the potential future design of these features appropriately scaled for the Mesaba Energy Project. It is expected that if CO_2 capture and storage were implemented at some time in the future, a more detailed analysis would be conducted, including detailed design and engineering, environmental and geotechnical studies, and permitting necessary to comply with appropriate laws and regulations.

For conceptual purposes, two possible CO_2 capture scenarios are examined in this section: Scenario 1, in which approximately 20-30 percent of the CO_2 is captured (depending on the feedstock used), and Scenario 2, in which approximately 85-90 percent of the CO_2 is captured. The captured CO_2 would be stored in an oil-bearing formation for enhanced oil recovery (EOR) or in a deep saline formation. These scenarios help present a valid range of impacts that could occur if CO_2 capture and sequestration were implemented during the power plant's commercial operation phase.

Geologic sequestration (or storage) is the injection and storage of CO_2 in a suitable subsurface formation with the capability to contain it permanently. The injection of gases underground is not a new concept and has been performed successfully for decades, including natural gas storage projects around the world and acid gas injection at EOR projects.

Geologic storage of anthropogenic (man-made) CO_2 as a greenhouse gas mitigation option was first proposed in the 1970s, but little research was done until the early 1990s. In a little over a decade, geologic storage of CO_2 has grown from a concept of limited interest to one that is quite widely regarded as a potentially important mitigation option. Technologies that have been developed for and applied by the oil and gas industry can be used for the injection of CO_2 in deep geologic formations. Well-drilling technology, injection technology, computer simulation of reservoir dynamics, and monitoring methods can potentially be adapted from existing applications to meet the needs of geologic storage (IPCC, 2005).

Types of geologic formations capable of storing CO_2 include oil and gas bearing formations, saline formations, basalts, deep coal seams, and oil- or gas-rich shales. Not all geologic formations are suitable for CO_2 storage; some are too shallow and others have low permeability (the ability of rock to transmit fluids through pore spaces) or poor confining characteristics. Formations suitable for CO_2 storage have specific characteristics such as thick accumulations of sediments or rock layers, extensive covers of low permeability sediments or rocks acting as seals (caprock), permeable layers saturated with saline water (saline formations), structural simplicity, and lack of transmissive faults (IPCC, 2005).

Impacts of CO_2 Capture

Table 5.1-1 lists the potential CO_2 capture rates and expected material requirements, wastes, and water use associated with Scenarios 1 and 2. These estimates are based on information for representative carbon capture and storage systems that would most likely be included in the detailed design for the Mesaba Energy Project.

Under Scenario 1, approximately 20-30 percent of the CO_2 would be captured using amine scrubbing, in which a solution of amine and water contacts the syngas. Higher capture rates would be possible with Powder River Basin coal as a feedstock, while other feedstock blends would result in a lower capture rate. Under Scenario 2, a gas reheater and water-gas shift reactors would be placed upstream of the CO_2 amine scrubber, enabling approximately 85-90 percent of the CO_2 to be captured. Current turbine designs cannot accommodate the higher percentages of hydrogen in syngas produced by this process; however, the advancement of **turbine** technology is **an objective of the CCPI Program**.

The amine and CO_2 in the syngas undergo a chemical reaction forming a CO_2-rich amine that is soluble in water. This solution would then be pumped to a desorber where it is heated or de-pressured, which reverses the reaction and releases pure CO_2 gas. A portion of the recovered amine would be sent to a reclaimer where it would be heated to a higher temperature to distill and reclaim usable solvent that is recycled to the process. There would be some degradation of the amine solvent through irreversible side reactions with SO_2 and other syngas components, resulting in solvent loss.

Amine solutions, such as N-Methyldiethanolamine (MDEA), are stable and not particularly hazardous but require safe chemical handling (such as skin, eye, and respiratory protection) and proper hazardous material storage procedures (DOW, 2004). Soda ash could be added to aid in the precipitation of higher boiling point waste material, which includes heat stable amine salts and other degradation products. The waste would be transferred to the plant's wastewater tank for off-site disposal.

In addition to the reclaimer waste and spent carbon, the process would generate used filter elements from the solvent filters at the carbon bed (Chapel, Ernest, and Mariz, 1999). While waste quantities are estimated in Table 5.1-1 based on the best available information, the actual amount of waste generated would be function of the syngas composition and power plant operating conditions. Because Scenario 2 would result in nearly 3 times greater CO_2 capture than Scenario 1, it would require nearly 3 times the amount of solvent, soda ash, water, and energy. It would also generate nearly 3 times the amount of reclaimer waste and spent carbon filter material. The reclaimer waste would be disposed of by incineration and the spent carbon filter material would most likely be regenerated (recycled) by the vendor (Chapel, Ernest, and Mariz, 1999).

Table 5.1-1. Expected Characteristics of CO2 Capture Scenarios

Parameter	Scenario 1	Scenario 2
Power Plant Rating (MW gross)	1,200	1,200
Total CO_2 generated (tons/year) without capture and sequestration	10,600,000	10,600,000
Capture rate (nominal)	30 percent	90 percent
CO_2 captured (pounds/hour)	726,000	2,178,000
CO_2 captured (tons/year)	3,180,000	9,540,000
CO_2 emitted (million tons/year) after capture and sequestration	7,420,000	1,060,000
Solvent, MEA		
Solvent recirculation rate (gallons per minute) [based on 2.18 gallons MEA/pound of CO_2 removed] [1]	26,400	79,100
Solvent make-up rate (gallons per minute) [based on 0.05 percent loss] [2]	13.2	39.6
Solvent delivery (gals/day) [based on losses]	19,000	57,000
Rail car deliveries of solvent (cars/week) [based on 30,000-gallon capacity tank cars] [3]	4	13
Soda Ash		
Soda ash consumed (pounds/hour) [based on 370 lbs/hr for 4,800 gpm solvent recirculation rate] [2]	2,000	6,000
Soda Ash requirement (tons/year)	8,900	27,000
Spent Carbon Filter		
Spent carbon (pounds/day) [based on 0.165 pounds per metric ton of CO_2] [4]	1,300	3,900
Spent carbon disposal/regeneration (tons/year)	240	720
Energy Use		
Energy penalty (% decrease in efficiency) [5, 6]	1-3	8
Reduction in Capacity (MW)	33-100	267
Reclaimer Waste		
Reclaimer waste (cubic meters/day) [based on 0.003 cubic meters per metric ton of CO_2 captured] [4]	24	70
Reclaimer waste, cubic meters/year	8,700	26,000
Water Use		
Water (gallons per minute) [based on 180 gpm required for 2,800 MT per day CO_2 recovery]	<500	1,500
Process water (gallons/day)	731,600	2,195,000

Note: Quantities of materials, waste, water and energy are estimated based on the best available data; however, the actual amounts would be a function of the flue gas composition and power plant operating characteristics. Many of the estimates for the 30% capture scenario are conservative as they represent a third of the 90% case and do not account for the fact that the proposed 30% capture case would not require the water gas shift reactor.

[1] EPRI, 2000
[2] Chinn, et al., 2004.
[3] ARI, 2005
[4] Chapel, Ernest, and Mariz, 1999
[5] Ciferno, et al., 2007 (Energy penalty shown is based on Selexol. Use of amine would have a higher energy penalty)
[6] Southern California Edison, 2006

Impacts of CO_2 Compression and Transport

Background on CO_2 Compression and Pipelines

To deliver the captured CO_2 to the injection site, the gas would be compressed into a supercritical state (i.e., exhibiting properties of both a liquid and a gas) to make it more efficient to transport. CO_2 compression uses the same equipment as natural gas compression, with some modifications to suit the properties of CO_2. Once compressed, the CO_2 would be conveyed by pipeline to the sequestration site.

Approximately 3,000 miles (4,800 kilometers) of CO_2 pipelines exist in the United States. CO_2 pipelines are regulated as hazardous liquids pipelines. The U.S. Department of Transportation's CO_2 Pipeline and Hazardous Materials Safety Administration has responsibility for safe and secure movement of hazardous materials to industry and consumers by all transportation modes, including the Nation's pipelines. Ordinarily, Federal approval is not required for development of a new hazardous liquids pipeline unless it would cross Federal lands. Generally, state and local laws regulate construction of new hazardous liquids pipelines. However, under Federal and state regulations, pipeline operators are responsible for ensuring the safe operation of their pipelines. Operators must use qualified materials and sound construction practices; thoroughly inspect, test, maintain, and repair their pipelines; ensure their workers are trained and qualified; implement best management practices (BMPs) to prevent damage to pipelines; and develop adequate risk management and emergency response plans. A Computational Pipeline Monitoring System is required by Federal regulation (49 CFR Section 195.444) for leak detection in CO_2 pipelines. This type of leak detection system automatically alerts the operator when a leak occurs so that appropriate actions can be taken to minimize the release. The proposed routes to EOR sites cross international boundaries and would require bilateral coordination between the U.S. Department of Transportation and the Canadian National Energy Board.

> **Supercritical CO_2** - CO_2 usually behaves as a gas in air or as a solid in dry ice. If the temperature and pressure are both increased (above its supercritical temperature of 88ºF [31.1ºC] and 73 atmospheres [1,073 psi]), it can adopt properties midway between a gas and a liquid, such that it expands to fill its container like a gas, but has a density like that of a liquid.

Most pipelines for hazardous liquids are located or buried within existing rights-of-way (ROWs). A ROW consists of consecutive property easements acquired by, or granted to, the pipeline company. The ROW provides sufficient space to perform pipeline maintenance and inspections, as well as a clear zone where encroachments can be monitored and prevented. If an existing utility ROW is not available or suitable for the proposed CO_2 pipeline, new ROW would be obtained where necessary.

The diameter of the pipeline would depend on many factors, particularly the length of the pipeline and transport pressure. It is likely that the pipeline would be buried at least 3 feet (0.9 meter) below the surface except where it is necessary to come to the surface for valves and metering. A typical distance between metering stations is 5 miles (8 kilometers). These features may be aboveground or could be located below ground in concrete vaults. The pipeline would require protection from above ground loading at road crossings, either by increased wall thickness or by casing the pipe. In cold climates, transporting warm CO_2 could increase the ground temperature, which may affect ground frost and freeze in the winter. To avoid problems with icing at road crossings, the pipeline depth or pipe insulation thickness may be increased.

The use of existing ROWs is preferable, because developing ROWs for new CO_2 pipelines could cause changes in land use and ownership, including land clearing and soil disturbances, utility and road crossings, wetland and habitat disturbances, and potential surface leaks of CO_2.

Storage Option 1- Transport to Oil Fields for Enhanced Oil Recovery

As explained in Appendix A1, CO_2 has been proven very effective for oil recovery by both displacing and decreasing the viscosity of otherwise unrecoverable oil. This process provides an economic benefit that can offset all or some of the costs of CO_2 capture, transport, and sequestration. For Option 1, pipelines could be constructed between the Mesaba Energy Project and a cluster of oil fields in north central North Dakota, the southwestern corner of Manitoba and the southeastern corner of Saskatchewan. For the main trunk pipeline connecting the power plant and the oil field, two route options were examined. These routes would follow existing ROWs to minimize potential impacts to environmental resources and land uses. While these routes are good candidates for such a pipeline, other potential corridors may exist and could be selected if CO_2 capture and storage were pursued. Both of the examined routes could service either the West Range or East Range sites (with slight differences). Routes 1 and 2 are presented in Figure 5-1.2-1. If CO_2 regulations are instated, a comprehensive network of CO_2 pipelines may develop to meet regional sequestration needs and link sources with potential sinks; The Mesaba Energy Project may be able to efficiently connect to that pipeline network.

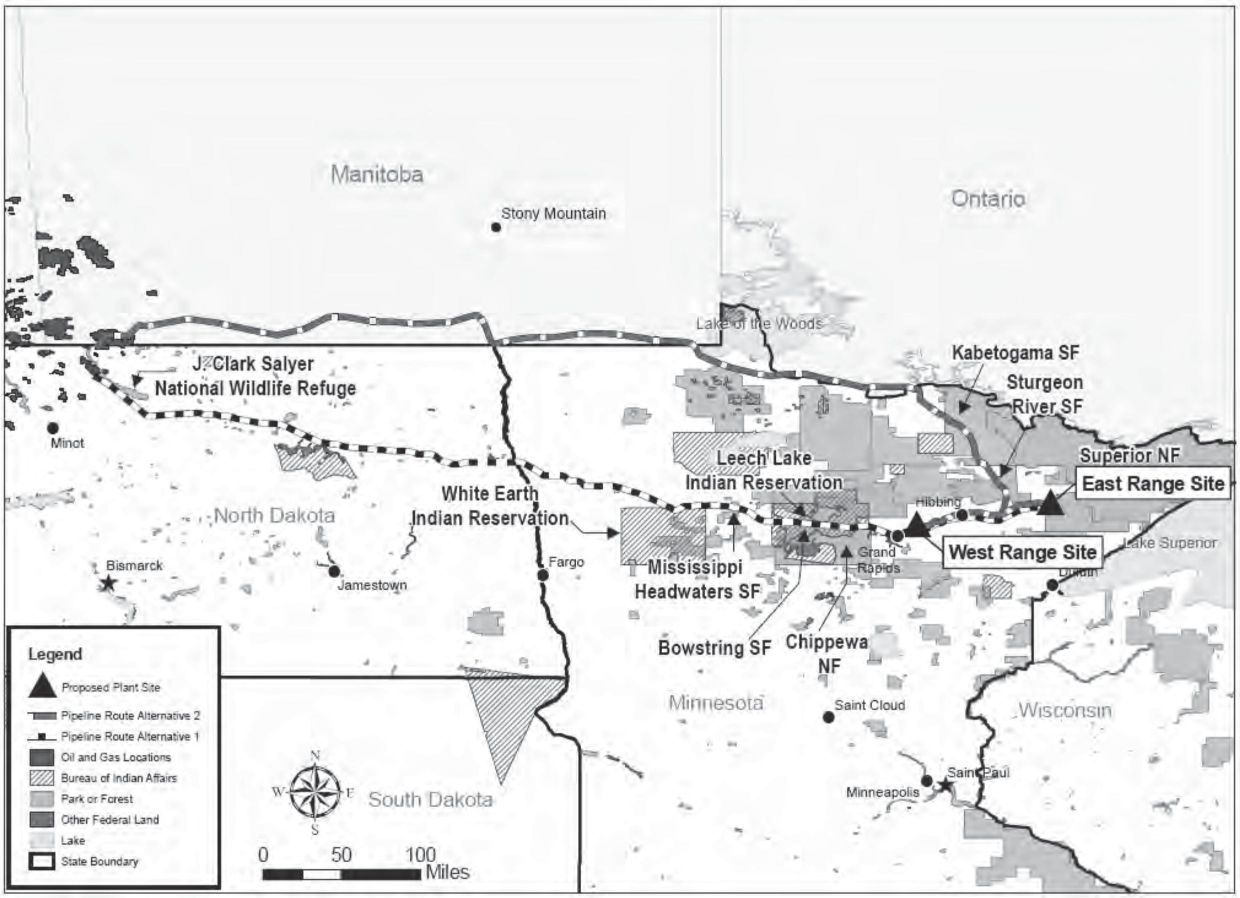


Figure 5-1.2-1. Potential Pipeline Routes from the Mesaba Energy Project to EOR Fields

Route 1

Route 1 would originate at either the East Range Site or West Range site, following an existing ROW to the west. From the West Range site, the route would be about 400 miles long and from the East Range site, the route would be about 450 miles; depending on which capture scenario is employed, the pipeline may be expanded to reach additional oil fields.

For either site, pipeline route 1 would travel through the Chippewa National Forest near Grand Rapids, as well as the Mississippi Headwaters and Bowstring State Forests within existing railroad ROW. For the East Range Site, route 1 between Hibbing and the East Range Site would also pass through a portion of Superior National Forest within existing railroad ROW.

Route 1 for either power plant site would pass through two Indian reservations in Minnesota, including 3 areas that are part of the Leech Lake Indian Reservation and the northern portion of the White Earth Indian Reservation. If this route were chosen, the railroad ROW agreement would need to be examined for each reservation to determine if utility lines (like CO_2 pipelines) would be allowed under the current agreement. If not, Excelsior would seek to obtain a separate right-of-way agreement across each reservation in accordance with 25 CFR 169 (Bureau of Indian Affairs, Department of Interior, Part 169, Right of Way Over Indian Lands). If written consent is obtained from the tribe, a written application for a right-of-way would then be filed with the Secretary of Interior.

Route 1 would travel through 41 towns and communities, ranging from populations of less than 100 to 49,000. The largest towns along the route would be Hibbing (East Range only), Grand Rapids, Bemidji, Crookson, Grand Forks, and Devils Lake.

Route 2

Pipeline Route 2 would originate at either the East Range Site or West Range site, following existing railroad ROW ultimately to the north towards Canada, where it would then turn west toward the oil fields. From the West Range site, the route would be about 525 miles long and from the East Range site, the route would be about 500 miles; depending on which capture scenario is employed, the pipeline may be expanded to reach additional oil fields.

For either site, route 2 would also travel through the Superior National Forest north of Hibbing and the Sturgeon River and Kabetogama State Forests within existing railroad ROW. For the East Range site, route 2 between Hibbing and the East Range Site would also pass through a portion of Superior National Forest within existing railroad ROW. Route 2 would not pass through any Native American tribal lands.

Route 2 would travel through 18 towns and communities, ranging from populations of less than 100 to 17,000. The largest towns along the route would be Hibbing (East Range only), International Falls, Virginia, Eveleth, and Mountain Iron.

Storage Option 2 – Transport to Saline Formation

Deep saline formations are also good candidates for CO_2 storage if they have adequate seals or caprock above them to prevent upward migration. While there is currently no economic benefit of sequestration in saline formation when compared to EOR, saline formation generally have much greater capacities to store CO_2 than oil-bearing formations. If future CO_2 regulations generate value for reducing emissions, an economic benefit for saline storage could emerge.

Under this option, the pipeline route would most likely follow route 1 described above for the EOR option. However, the route would be approximately 200 miles shorter for each power plant site alternative, terminating somewhere between Grand Forks Air Force Base and the Town of Devils Lake in eastern North Dakota. There is also the potential for saline storage in the Mid-continent Rift formation in Minnesota, which could be reached with a <100 mile pipeline. **However its potential for CO_2 sequestration is still theoretical.**

Impacts of Geologic Sequestration

Background

Injection of CO_2 in its supercritical state into a deep geologic formation would be achieved by pumping the CO_2 down an injection well. To increase the storage potential, CO_2 would be injected into very deep formations where it could maintain its dense supercritical state. The fate and transport of CO_2 in the formation would be influenced by the injection pressure, dissolution in the formation water, and upward migration due to CO_2's buoyancy.

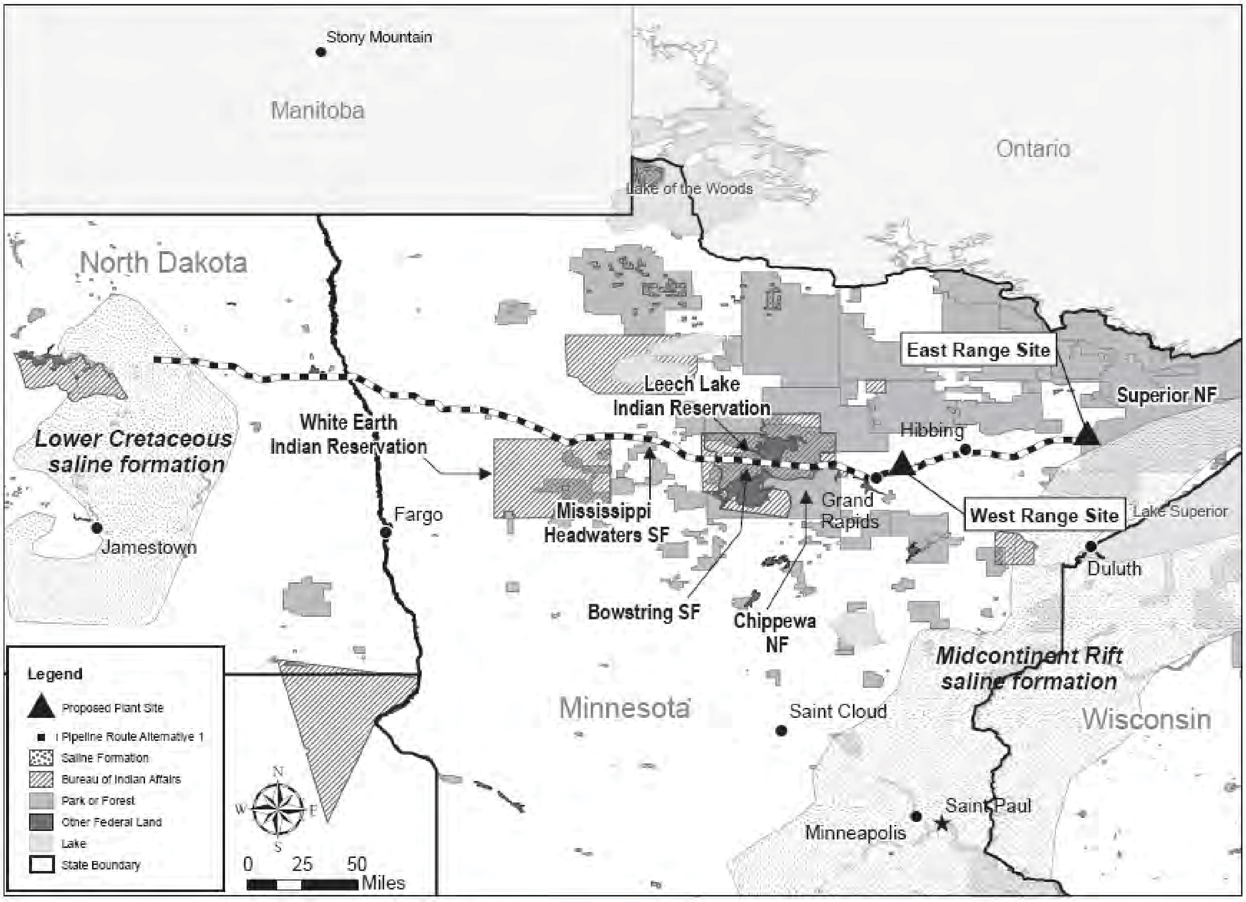


Figure 5-1.2-2. Potential Pipeline Route to the Lower Cretaceous Saline Formation

When CO_2 is injected for EOR, it mixes with the oil and decreases the viscosity, enabling recovery of oil that was previously considered unrecoverable. During standard EOR practices, a small fraction of the CO_2 injected remains in underground storage, but most is recycled as the oil is produced. The CO_2 that remains in the structure is stored over the long term by the same trapping mechanisms observed in saline formations and described below. **For example, the Weyburn CO_2 Monitoring and Storage Project in Saskatchewan, Canada, yielded a 93 percent storage rate for CO_2 supplied by the Dakota Gasification Company plant. Although 100 percent of the CO_2 supplied by the Dakota Gasification Company was determined to remain in geologic storage, the CO_2 emissions resulting from the electricity consumption by the compressors needed to re-inject CO_2 removed with the extracted oil would be equivalent to 7 percent of the stored CO_2. Conservatively, assuming a net 90 percent storage rate and use of 100 percent subbituminous coal, the Mesaba scenarios could achieve sequestration rates of 2,862,000 to 8,586,000 tons per year of CO_2, respectively, for the 30 percent and 90 percent capture rates**.

When CO_2 is injected into a deep saline formation in a liquid or liquid-like supercritical dense phase, it is only somewhat miscible in water. Because supercritical CO_2 is much less viscous than water (by an order of magnitude or more), it would be more mobile and could migrate at a faster rate than the saline groundwater. In saline formations, the comparatively large density difference (30 to 50 percent) creates strong buoyancy forces that could drive CO_2 upwards.

To provide secure storage (e.g., structural trapping), a low permeability layer (caprock) would act as a barrier and cause the buoyant CO_2 to spread laterally, filling any stratigraphic or structural trap it encounters. As CO_2 migrates through the formation, it would slowly dissolve in the formation water. In systems with slowly flowing water, reservoir-scale numerical simulations show that, over tens of years, up to 30 percent of the injected CO_2 would dissolve in formation water. Larger basin-scale simulations suggest that, over centuries, the entire CO_2 plume would dissolve in formation water. Once CO_2 is dissolved in the formation water, it would no longer exist as a separate phase (thereby eliminating the buoyant forces that drive it upwards), and it would be expected to migrate along with the regional groundwater flow.

As migration through a formation occurs, some of the CO_2 would likely be retained in the pore space, commonly referred to as "residual CO_2 trapping." Residual trapping could immobilize large amounts of the CO_2. While this effect is formation-specific, researchers estimate that 15 to 25 percent of injected CO_2 could be trapped in pore spaces, although over time much of the trapped CO_2 dissolves in the formation water (referred to as "dissolution trapping"). The dissolved CO_2 would make the formation water more acidic, with pH dropping as low as 3.5, which would be expected to dissolve some mineral grains and mineral cements in the rock, accompanied by a rise in the pH of the formation water. At that point, some fraction of the CO_2 may be converted to stable carbonate minerals (mineral trapping), which is the most permanent form of geologic storage. Mineral trapping is believed to be comparatively slow, taking hundreds or thousands of years to occur (IPCC, 2005).

To ensure the safe storage of sequestered CO_2, a monitoring, mitigation and verification strategy would be implemented. The purposes of monitoring include assessing the integrity of plugged or abandoned wells in the region; calibrating and confirming performance assessment models; establishing baseline parameters for the storage site to ensure that CO_2-induced changes are recognized; detecting microseismicity associated with the storage project; measuring surface fluxes of CO_2; and designing and monitoring remediation activities.

Regulations Governing Underground Injection of CO_2

The underground injection of CO_2 is regulated under the U.S. Environmental Protection Agency's (EPA's) Underground Injection Control (UIC) Program. The UIC Program works with state and local governments to oversee underground injection of waste in an effort to prevent contamination of drinking water resources. All injection wells require authorization under general rules or specific permits.

The EPA groups underground injection into five classes for regulatory control purposes. Each class includes wells with similar functions, and construction and operating features so that technical requirements can be applied consistently to the class. Although the classification of UIC wells would be determined at the time of permitting, there is an overall standard of protection under the UIC Program that prohibits the movement of fluids into underground sources of drinking water. The citation below (from 40 CFR Part 144) provides the standard that all injection wells must be measured, including Class V (shallow and other) wells. This standard is currently in effect:

§ 144.12 Prohibition of movement of fluid into underground sources of drinking water.

(a) No owner or operator shall construct, operate, maintain, convert, plug, abandon, or conduct any other injection activity in a manner that allows the movement of fluid containing any contaminant into underground sources of drinking water, if the presence of that contaminant may cause a violation of any primary drinking water regulation under 40 CFR Part 142 or may otherwise adversely affect the health of persons. The applicant for a permit shall have the burden of showing that the requirements of this paragraph are met.

Furthermore, if any water quality monitoring of underground sources of drinking water indicates the movement of any contaminant into the water source, the state or EPA would require corrective action, operation, monitoring, or reporting as necessary to prevent such movement. The injection permit would be modified to reflect these additional requirements or the permit may be terminated. Appropriate enforcement action can be taken if a permit is violated.

In July 2008, EPA released a new rule that would create a new category for CO_2 injection wells under the UIC Program. The rule would govern the siting, operation, monitoring and closure procedures for the injection wells. EPA solicited comments from the public through December, 2008, and has hosted several stakeholder workshops in an effort to get public input in the process. In 2008, EPA promulgated UIC guidance allowing the use of Class V wells for CO_2 sequestration research initiatives. However, until the CO_2 injection rule has been finalized by EPA, standard primacy and UIC well categories still apply to CO_2 injection wells. In North Dakota, Class II UIC wells cover the injection of brines and other fluids associated with oil and gas production and are regulated by the North Dakota Industrial Commission, Department of Mineral Resources, Oil and Gas Division (North Dakota Department of Health, 2007). **For EOR,** Class II is the most likely class of UIC well that would be used**.**

In Canada, underground injection and groundwater protection are regulated at the provincial level, except where provincial or international boundaries are crossed. In this case, because the CO_2 would be piped from Minnesota, the Canadian Federal government would have jurisdiction. Both Saskatchewan and Manitoba have a provincial Environmental Assessment Act, under which CO_2 injection would be classified as a development requiring ministerial approval (PCOR, 2005).

Impacts of EOR Storage

The target formation for injection for EOR storage would be various hydrocarbon formations within the Williston Basin in eastern North Dakota, southeastern Saskatchewan, and southwestern Manitoba. Possible fields for CO_2 EOR development with CO_2 from the Mesaba Energy Project include the Nesson anticline, Saskatchewan, and Northwestern Flank. Oil production in the Williston basin is from Paleozoic-age rocks where oil is contained in stratigraphic traps.

The economic benefits and incentives for CO_2 EOR are described in Appendix A1. Preliminary estimates indicate that under either capture scenario, there are fields suitable to accept the CO_2 from the Mesaba Energy Plant for the planned 22-year operations cycle. The use of CO_2 from the Mesaba Energy Project at existing oil fields could extend the operating life of those fields, allowing for greater volumes of oil to be extracted. A small fraction of the CO_2 would mix with the recovered oil that would be removed in the processing stage. However, because of the economic value of the CO_2, it would probably be recovered and re-injected at the EOR site. Extending the life of nearly-depleted oil fields could create or prolong existing jobs at these fields and provide additional oil and gasoline for consumers. Impacts associated with using the CO_2 for EOR could potentially include, but would not be limited to:

- Constructing new CO_2 injection sites that require the permitting and drilling of new UIC wells
- land clearing and soil disturbance for installing wells, pumps, distribution piping, access roads, and utility lines
- sealing or mitigation of abandoned wells
- potential surface leaks of sequestered CO_2
- potential vertical or lateral migration of CO_2 in the subsurface that could cause changes in soil gas concentrations, cause chemical changes or mineralization, impact groundwater supplies, or mobilize heavy metals
- prolong oil recovery operations at the site
- providing the economic benefits of additional oil recovery

The amount of oil recovered would vary based on site-specific conditions. However, a nominal estimate would be three barrels of incremental oil produced per metric ton of CO_2 injected (EU DG JRC, 2005). Under the 30 percent capture scenario, up to 3.2 million tons (2.9 million metric tons) per year of CO_2 could be used for EOR. This could result in the additional recovery of up to 8.7 million barrels of oil per year. For the 90 percent capture scenario, up to 9.5 million tons (8.6 million metric tons) per year of CO_2 could aid the recovery of an additional 25.3 million barrels of oil per year.

Impacts of Saline Formation Sequestration

The target formations for storage in saline formations would be the Lower Cretaceous saline formation within the Williston Basin in eastern North Dakota or the Mid-continent Rift formation in Minnesota. The formations that make up the Lower Cretaceous portion of the northern Great Plains aquifer system are, in descending order, the Newcastle, Skull Creek, and Inyan Kara in North Dakota (Bluemle et al., 1986). Overlying the Lower Cretaceous aquifer system in North Dakota are impermeable rocks of the TK4 aquitard system. Marine shale is the primary lithology of the TK4. Other lithologies include sandstone, siltstone, and chalk; there are also numerous beds of bentonite throughout parts of the section. With respect to CO_2 sequestration, the thick shales and occasional bentonite formations of the TK4 would serve as competent seals in areas where it is present (PCOR, 2005). The Mid-continent Rift formation has not been characterized at this point, but preliminary studies indicate it warrants further study as a potential CO_2 storage reservoir.

Potential impacts of injection into a saline formation include induced seismic responses if proper injection pressures are maintained. State and Federal agencies regulate the injection pressures that can be utilized during the sequestration process, and monitoring of the formation pressure would help detect potential over-pressurization. Some saline formations are located in geologic traps that also serve as petroleum reservoirs. Therefore, prior to the sequestration of CO_2 in a saline formation, the surrounding area would be studied to determine if the sequestration would affect any oil and gas resources. As with the other geologic sequestration technologies, surface and underground mining in the area of the injected CO_2 could affect the integrity of the hydrogeologic features that cap and isolate the reservoir, thus may allow undesirable migration of the CO_2.

It is essential to protect the water supply aquifers that are stratigraphically above the injection zone. The addition of CO_2 to the saline water-bearing formation can decrease the water pH and alter the pH of the water causing the mobilization of trace elements (e.g., arsenic, selenium, lead). However, selecting sites with competent, extremely tight caprock above the injection zone and other favorable geologic features that restrict both vertical and lateral flow would isolate the sequestered CO_2 from any aquifer that could be used as a potable water supply source. Utilizing BMPs for design, construction, operation, and monitoring can control the subsurface leakage of formation fluids. Injection pressures would be carefully monitored and controlled to avoid hydrofracturing of the formation or caprock that could allow formation fluids to migrate to shallower aquifers. Impacts associated with the construction of the pipeline and injection wells would be the same as for storage via EOR.

Summary of Impacts of CO_2 Capture and Sequestration

Potential impacts of CO_2 capture and storage are provided in Table 5.1-2. Because the addition of CO_2capture and storage technologies at the Mesaba Energy Plant is not part of the Proposed Action, impacts are described in general terms. Additional site-specific analysis would be needed should the commercial operations include CO_2 capture and storage.

Table 5.1-2. Summary of Impacts and Mitigation Measures for CO_2 Capture and Storage

Resource Area	Summary of Impacts	Possible Mitigation Measures
Aesthetics	Capture: • No additional impact on aesthetics would be anticipated with the addition of capture technologies. Storage: • If existing ROWs are not used, land clearing would result in potential moderate adverse impacts (long-term and localized) on aesthetic and scenic resources. Such impacts may range from negligible to moderate depending upon the characteristics of the proposed corridor. Pipeline route 1 would pass through 2 national forests, 1 wildlife refuge, and 2 state forests. Pipeline route 2 would pass through 1 national forest and 2 state forests.	Capture: • No mitigation measures warranted. Storage: • Final pipeline routes should use existing ROWs to the extent possible and avoid scenic resources.
Air Quality	Capture: • Beneficial impact from reduced CO_2 emissions would occur. • Criteria emission rates would increase proportionately to the reduced heat rate of the plant. Storage: • Equipment used to compress, transport and inject the CO_2 (which could be fossil-fueled) may emit additional air pollutants; overall impact would be negligible. • Possibility exists for leakage of CO_2 from storage site to the atmosphere. Risk of leakage is greatest during injection. Once injection ceases, wells would be properly sealed and abandoned to minimize this leakage pathway. Once within the formation, mineralization reactions would slowly decrease the risk of leakage. Impact is expected to be negligible, provided monitoring, mitigation and verification measures are followed.	Capture: • No mitigation measures warranted. Storage: • Determine the air impacts associated with operation of CO_2 compression and injection equipment as applicable. Consult state air permitting officials to determine if the project would meet emission standards as designed. • Mitigate possibility for leakage of CO_2 to the atmosphere through careful site selection, acquiring applicable permits, review of all wells or other surface conduits in the area, and employing appropriate monitoring, mitigation and verification technologies to measure releases of CO_2 from the surface above geologic formations. • Locate pipelines and injection areas away from populated areas.
Climate	Capture: • Beneficial impact from reduced CO_2 emissions would occur. Storage: • EOR or saline storage would not cause any unavoidable adverse impacts relevant to climate and meteorology.	• No mitigation measures warranted.

Table 5.1-2. Summary of Impacts and Mitigation Measures for CO_2 Capture and Storage

Resource Area	Summary of Impacts	Possible Mitigation Measures
Geology	Capture: • Capture technologies would have no impact on geological resources. Storage: • No unavoidable adverse impacts would occur to geological resources, provided mitigation measures are followed. Reservoir space would be used to store the injected CO_2.	Capture: • No mitigation measures warranted. Storage: • Following appropriate regulatory requirements and maintaining appropriate injection pressures is critical to preserving the integrity of the storage reservoir. • Impacts to sub-surface microbial communities may be unavoidable.
Soils	Capture: • Capture technologies would have no impact on soils Storage: • Temporary disturbances to soil would occur along proposed pipeline corridors. BMPs would minimize adverse impacts. Overall, impacts would be moderate but temporary.	Capture: • No mitigation measures warranted. Storage: • BMPs for pipeline corridors should be implemented to decrease soil erosion.
Groundwater	Capture: • Increased need for water for CO_2 capture represents a minor impact to regional groundwater resources. Storage: • No unavoidable adverse impacts would occur to groundwater resources. BMPs would be used to minimize impacts.	Capture: • No mitigation measures warranted. Storage: • Careful site selection and risk assessment prior to injection as well as following appropriate regulatory requirements would ensure protection of groundwater resources. The monitoring, mitigation and verification plan may include groundwater monitoring.
Surface Water	Capture: • Compression of CO_2 would result in condensate water with trace chemicals and increased salinity; no impacts are expected, provided appropriate permits are received and BMPs followed. Storage: • Water may be produced, or withdrawn, from the underground formation prior to injection at both EOR and saline storage sites; appropriate permits for disposal would be needed to avoid adverse impacts. Disposal to surface waters may not be possible and the wastewater may be reinjected through a UIC-permitted saltwater disposal well. • Direct impacts of CO_2 on surface water are extremely unlikely.	Capture: • Appropriate permits for any pollutant discharge should be obtained (NPDES). Storage: • UIC or National Pollution Discharge Elimination System (NPDES) permits may be required for disposal of produced water.

Table 5.1-2. Summary of Impacts and Mitigation Measures for CO_2 Capture and Storage

Resource Area	Summary of Impacts	Possible Mitigation Measures
Wetlands and Floodplains	Capture: • Capture technologies would have no impact on wetland and floodplain resources. Storage: • Construction of pipeline infrastructure could result in unavoidable temporary impacts to wetlands along the pipeline corridors. BMPs would minimize adverse impacts, and no long-term operational impacts are anticipated.	Capture: • No mitigation measures warranted. Storage: • Pipeline corridors could be located to avoid wetlands where possible. • Section 404 permits would be obtained for jurisdictional water-body and wetland alternations needed for pipeline construction. As a permit condition, mitigation of wetland impacts would be in the form of direct replacement or other approved U.S. Army Corps of Engineers (USACE) and state mitigation requirements.
Biological Resources	Capture: • Capture technologies would have no impact on biological resources. Storage: • Temporary disturbances to additional aquatic and terrestrial habitats would occur along proposed pipeline corridors. • Surveys for endangered and threatened species before pipeline construction and injection would determine if they occur in the area. BMPs and coordination with state and Federal agencies would minimize adverse impacts. • Seismic imaging (a key monitoring, mitigation and verification technique) has potential temporary adverse impacts on wildlife and potential localized destruction or harm to plant populations.	Capture: • No mitigation measures warranted Storage: • Mitigation for Federal endangered species, if necessary, would be defined during consultation with the U.S. Fish and Wildlife Service and could include passive measures such as construction timing outside of critical breeding periods, or more aggressive measures such as complete avoidance of impacts. • Seismic survey plans should undergo environmental review before testing is authorized and conducted
Cultural Resources	Capture: • No additional cultural resource impact is anticipated beyond what is described elsewhere in this document. Storage: • Consultation with Native American tribes would be needed along either proposed pipeline route. Any potential of unavoidable adverse impacts would be resolved once consultation is complete. • Although there are no known areas of cultural significance, the potential exists for an adverse impact to cultural resources along the pipeline corridor and at proposed injection sites. Archaeological surveys would determine location of any cultural resources and the possible extent of impact.	Capture: • No mitigation measures warranted. Storage: • Required management and mitigation measures regarding traditional cultural properties are unknown until consultation with Native American tribes is complete. • Consultation with the State Historic Preservation Officer (SHPO) for any new unforeseen areas of construction or ground disturbance not included within the EIS would be completed before construction to determine the need for cultural resource investigations and any appropriate mitigation measures.

Table 5.1-2. Summary of Impacts and Mitigation Measures for CO_2 Capture and Storage

Resource Area	Summary of Impacts	Possible Mitigation Measures
Land Use	Capture: • No additional impact, although the Mesaba Energy Project with capture may have a slightly larger construction footprint within the existing plant site. Storage: • Potential impact due to displacement of oil and gas wells, if saline storage option is chosen in an area with oil and gas resources. • Possible new ROW for pipeline construction.	Capture: • No mitigation measures warranted. Storage: • Displaced oil and gas wells could be relocated. • Existing ROWs would be used for pipeline placement to the extent possible.
Socio-economics and Environmental Justice	Capture: • Addition of capture technologies could increase electricity rates and have a long-term adverse impact. Storage: • Construction and operation of storage facilities generally would have negligible to minor adverse impacts on demographic and socioeconomic conditions; additional revenue from EOR would have potential beneficial impact on the local economy.	Capture: • Consider distributing potential increases in utility costs to support the proposed project to mitigate the potential for adverse and disproportionate impacts on low-income populations. Storage: • Mitigation measures would be implemented as required according to specific demographic conditions.
Community Services	Capture/Storage: • No unavoidable adverse impacts would occur to community services. BMPs would be used to minimize impacts.	Capture/Storage: • No mitigation measures warranted.
Utility Systems	Capture: • Capture technologies would result in increased electricity needs, referred to as an energy penalty as described in Table 5.1-1; overall impact for capture and compression is estimated to be 2.6-8% of the power plant's output, depending on the capture scenario chosen. Storage: • Transport and re-compression of the CO_2 would result in increased electricity usage. Amount is minor compared to CO_2 separation and compression described under capture. Capture/Storage: • Impacts on water and wastewater infrastructure would be related to the size and distribution of potential facilities and/or region-specific issues affecting the ability to obtain a sustained supply of water or dispose of treated wastewater. Because volumes would be relatively small, the impacts are expected to be negligible or minor.	Capture: • No mitigation measures warranted. Storage: • No mitigation measures are warranted
Transportation and Traffic	Capture: • No additional impact on transportation and traffic would be anticipated. Storage: • Slightly increased traffic volumes near construction sites for compression facilities may be anticipated, but impact would be negligible.	Capture/Storage • Traffic controls would be implemented as required during construction across roadways.

Table 5.1-2. Summary of Impacts and Mitigation Measures for CO_2 Capture and Storage

Resource Area	Summary of Impacts	Possible Mitigation Measures
Materials and Waste Management	<u>Capture:</u> • Some waste materials, including amine reclaimer sludge and spent carbon from the filter would be generated; with proper disposal impacts are negligible. <u>Storage:</u> • Anhydrous ammonia is needed for some compressors; following BMPs will mitigate any impacts. • Injection practices would generate waste from cutting and drilling, use of tracers, as well as fuel for equipment. Best management practices would mitigate any impacts.	<u>Capture/Storage</u> • All hazardous, solid, or industrial wastes should be disposed of according to Federal, state and local regulations. • Require implementation of a system to respond to spills of hazardous materials or waste including reporting the spill to the correct authority, providing appropriate means of cleaning up spills, and properly disposing of the resulting waste.
Human Health, Safety, and Accidents	<u>Capture:</u> • Operation and maintenance of capture equipment is similar to other environmental control technologies; negligible impact is expected provided OSHA workplace standards are followed. <u>Storage:</u> • Remote potential exists for release of large quantities of CO_2; impact would be unlikely provided BMPs for site selection, risk assessment, and monitoring, mitigation and verification are followed. Some industry knowledge of CO_2-specific BMPs exist, and experience can be drawn from the natural gas industry as well as the EPA's UIC Program. Should a large-scale release occur, impact could be severe.	<u>Capture/Storage:</u> • Prepare a comprehensive safety program that addresses the construction and operations phases of the project. Ideally that plan would include a training plan, regular safety meetings, and an employee safety-awareness program. • Confer with the local emergency planning committee early in the planning process to establish a dialogue, explain the proposed facility, and learn how the emergency plan can be amended to address the new facilities. • Since the sudden release of a large quantity of CO_2 can have ground-level impacts on nearby flora, fauna, and humans, monitoring for leaks in and around pipelines and around injection points is an important consideration of any system design. Transmission piping and wells should be located to allow for adequate dispersion of CO_2 (away from populated areas) in the event of an accidental release. • Design an effective monitoring and alarm system to detect CO_2 leaks from pipelines, valves, and other equipment. • Prepare a Risk Management Plan if any of the facilities would use chemicals in quantities sufficient for the facility to become subject to the risk management provisions of Section 112r of the CAA amendments.

Table 5.1-2. Summary of Impacts and Mitigation Measures for CO_2 Capture and Storage

Resource Area	Summary of Impacts	Possible Mitigation Measures
Noise and Vibration	Capture: • Construction of the capture facility may result in unavoidable temporary elevated noise levels. BMPs would reduce impacts. Storage: • Construction of the pipeline and associated facilities would result in unavoidable temporary elevated noise impacts BMPs would reduce impacts.	Capture and storage: • Require the implementation of noise suppression equipment and BMPs to reduce noise to acceptable levels at property boundaries of adjacent communities.

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5.2 POTENTIAL CUMULATIVE IMPACTS

This section presents the results of the joint DOE and MDOC analysis of potential cumulative impacts of the Mesaba Energy Project combined with the potential impacts of other relevant on-going actions and reasonably foreseeable future activities in the vicinities of the West Range and East Range Sites. The CEQ regulations implementing NEPA require the consideration of cumulative impacts (40 CFR 1508.7) as part of the EIS process. Although the Mesaba Energy Project is subject to the Minnesota Power Plant Siting Act (Minnesota Rules Chapter 4400), which does not require the consideration of cumulative impacts comparable to those of the Minnesota Environmental Policy Act (MEPA) in Minnesota Rules Chapter 4410, MDOC has agreed to the consideration of cumulative impacts in this joint Federal/state EIS document based on public comments received.

5.2.1 Approach and Analytical Perspective

As described in Appendix D, DOE used the following approach and analytical perspective to perform this cumulative impacts analysis:

- DOE required the use of quantitative modeling specifically for this cumulative impacts analysis.
- Projects included in the cumulative impacts analysis are those that have the highest potential for causing identifiable cumulative impacts and considered potential Federal, state, and private activities.
- DOE considered a reasonably foreseeable action to be a future action for which there is a reasonable expectation that the action could occur, such as a proposed action under analysis by a regulatory agency, a project that has already started, or a future action that has obligated funding.

As outlined in the approach to cumulative impacts analysis (Appendix D), based on a consideration of the regions of influence for impacts on environmental resources from respective foreseeable actions, not all of the resource areas addressed in Chapter 3 and 4 of this EIS would be subject to cumulative impacts. For example, potential impacts on vegetation and archaeological resources generally would be limited to the locations of anticipated land disturbance, which are specific to the individual projects. Therefore, the needs for cumulative impacts analyses were specifically identified for air quality conditions (Section 5.2.2), air inhalation health risk (Section 5.2.3), water resources (Section 5.2.4), wetlands (Section 5.2.5), wildlife habitat (Section 5.2.6), and rail traffic (Section 5.2.7). The cumulative impacts analyses for these resources were developed based on specific methodologies and assumptions as described for each.

5.2.2 Air Quality

Air quality analyses were conducted to assess the cumulative impacts on Class I areas related to the Mesaba Energy Project (Phases I and II) in combination with existing and reasonably foreseeable future emission sources. The analyses addressed the BWCAW, VNP, RLW**, and IRNP**. **The air impact analysis for the Final EIS was updated to reflect Excelsior's revised air modeling protocol (TRC, 2009) and is described in Section 4.3. As discussed in the sub-section *Class I Area (Far-Field) Modeling Results* under Section 4.3.2.5, it was determined that a cumulative impact analysis for SO_2 and PM_{10} was required because of the 3-hour and 24-hour SO_2 and 24-hour PM_{10} projected impacts. Since publication of the Draft EIS, a more comprehensive cumulative air analysis has been conducted and is described in greater detail in Appendix D1. This section has been updated to reflect the results from the approved modeling protocol and summarizes the revised cumulative analysis documented in Appendix D1.**

The cumulative air analysis reflects a comprehensive, updated inventory of regional SO_2 and PM_{10} increment sources, reasonably foreseeable sources, and Mesaba Phases I and II. The recently updated SO_2 and PM_{10} multi-source inventories were developed and used to evaluate PSD increment consumption. The multi-source modeling results for the same pollutants were also used

in combination with historical monitoring data obtained in or nearby each Class I area to provide an indication of cumulative source impacts on ambient air quality therein. Cumulative Class I area impacts on the deposition of sulfur and nitrogen compounds were estimated using historical monitoring data collected in or nearby each Class I area and adding to this data the modeled impacts of the Mesaba Generating Station and other reasonably foreseeable future sources for which Class I area impacts had been modeled and were publicly available.

As recommended by the Forest Service, cumulative impacts on visibility in Class I areas have been evaluated in conjunction with the revised Draft Regional Haze State Implementation Plan (SIP) published by the MPCA in July 2009 for public comment, discussed later in Section 5.2.2.2. (The impacts of the Mesaba Generating Station on visibility in Class I areas are presented in the sub-section *Class I Visibility/Regional Haze Analysis* under Section 4.3.2.6 and mitigation of such impacts are discussed in Section 5.3.2.2.)

Maximum predicted mercury emissions from the Mesaba Generating Station were modeled to predict average concentrations of mercury in air at receptors in each Class I area. The mercury concentration results were compared to global background levels to provide a basis for estimating the relative impact of the project's emissions on the potential ambient concentrations of mercury in or nearby each Class I area.

5.2.2.1 Methodology and Multi-Sources Inventory

All cumulative air impacts modeling in Class I areas utilized the CALPUFF modeling system, EPA's guideline methodology for simulation of long-range transport and dispersion. As noted in Section 4.3 and Appendix B, modeling of the Mesaba Generating Station impacts on PSD increment consumption at Class I area receptors within 50 km of the source (hereafter referred to as near-field receptors [NFRs]) was also conducted using AERMOD (i.e., for a small number of receptors in the BWCAW that fell within 50 km of the East Range Site). Such use of AERMOD was originally specified and approved by the FLMs as part of Excelsior's revised modeling protocol (TRC et al., 2008 and 2009). However, relative to CALPUFF, the impacts on PSD increment consumption predicted by AERMOD at NFRs were found to be systematically lower for all short- and long-term concentrations of SO_2 and PM_{10} (observed for both the single and multi-source runs conducted) (the comparison of AERMOD and CALPUFF predictions are summarized in Section 4.3 and detailed in Appendix B). Therefore, for purposes of conservatism, all cumulative impacts presented in this analysis reflect the predictions modeled using the CALPUFF modeling system (see Appendix D1 for more details).

Emissions data and source parameters for increment consuming/expanding sources of SO_2 and PM_{10} within a 300 km radius of each Class I area were compiled for the cumulative Class I modeling analyses. Data was provided by the FLMs, MPCA, the Wisconsin Department of Natural Resources, and the Michigan Department of Environmental Quality. Additionally, information was acquired from permit applications, publicly available regulatory submittals, the respective State regulatory agency websites, and the construction and operating permits issued for each facility. Appendix D1 provides a list of the sources of data used to assemble the Class I multi-source inventory (Table 1 in Appendix D1) and a list of the PSD increment consuming/expanding emission sources for SO_2 and PM_{10} (Table 2 in Appendix D1).

The modeling analysis conducted using the emission sources identified in Appendix D1 is conservative because it uses: 1) maximum actual SO_2 emission rates for the existing inventoried power plant sources required to monitor and report such emissions (i.e., those sources having their hourly emissions presented in the EPA Clean Air Markets database), 2) estimated maximum actual PM_{10}, emission rates for those same sources, and 3) maximum allowable SO_2 and PM_{10} emission rates for all other inventoried sources (i.e., no attempt was made to confirm the actual rates of these sources, some operations of which may have permanently ceased or have otherwise reduced

emission rates since the applicable baseline date). Furthermore, since nearly all of the sources in the inventory presently exist and were in operation during the 2006-2007 time period, their actual emissions already contribute to the air pollutant concentrations, deposition rates and other AQRV impacts observed in Class I areas. Therefore, the summation of the maximum modeled impacts of the emission rates of the inventoried sources more than double counts their actual impacts on the Class I areas as those actual impacts are already included in the monitoring data that have been recorded there. It is expected that the planned addition of new sources, including the Mesaba Generating Station, would contribute only a small quantity of SO_2, PM_{10}, and AQRV impacts relative to the existing sources whose impacts are already accounted for in the monitoring data recorded in the Class I areas.

Historical monitoring data for SO_2 and PM_{10} concentrations and sulfur and nitrogen deposition were collected from various monitoring programs in some of the Class I areas. With respect to elemental mercury concentration in ambient air, it is assumed that, based on studies from the EPA, the global background of elemental mercury in ambient air is between 1-2 nanograms per cubic meter (USEPA, 1997b, c). Thus, the relative significance of the Mesaba Generation Station's impact on the deposition of elemental mercury can be estimated from its impact on ambient air concentrations of elemental mercury since the deposition of elemental mercury from the atmosphere would be independent of whether it is from the global background concentration or from the proposed facility.

5.2.2.2 Impacts from Operations-Related Emissions

Pollutant Concentrations in Class I Areas Solely Due to Operation of the Mesaba Generating Station

Class I impacts associated with operation of Mesaba Phases I and II are discussed in sub-section *Class I Area (Far-Field) Modeling Results* under Section 4.3.2.6 and Appendix B (Section B.2.1.3). As noted in those sections, worst-case emissions from Phases I and II differ between the West Range and East Range Sites due to the East Range Site's closer proximity to BWCAW. Therefore, in order to minimize modeled impacts from the combined Phases I and II from the East Range Site on AQRVs in BWCAW, "enhanced" controls are assumed to be required on Phase II relative to those placed on Phase I. These two scenarios represent the worst-case operating conditions creating maximum impacts from each site and are described as follows:

- **"proposed" controls (referred to by Excelsior as BACT controls) – "proposed" emission rates reflect control of sulfur in product syngas via an amine-based solvent – methyldiethanolamine (MDEA) – and control of nitrogen oxides via nitrogen dilution (for West Range Site, Phase I and Phase II were modeled using "proposed" controls); and**
- **"enhanced" controls (referred to by Excelsior as "Beyond BACT" controls) – "enhanced" emission rates reflect control of sulfur in syngas via Selexol™ (a physical solvent and control of nitrogen oxides via selective catalytic reduction (for East Range Site, Phase I was modeled using "proposed" controls and Phase II was modeled using "enhanced" controls).**

Tables 4.3-12 and 4.3-13 present CALPUFF model-predicted impacts of the Phase I and II operating at the West Range and East Range Sites, respectively (also discussed in Appendix D1, Tables 3 and 4). The estimates shown in these tables represent the highest predicted concentrations of pollutants (for which ambient air increments have been established) modeled for each Class I area, year, pollutant, and averaging time. Note that no analyses of Phases I and II impacts on IRNP are required for the West Range Site as the distance between these locations exceeds 300 km.

Despite the added controls placed on Phase II at the East Range Site, impacts in the BWCAW would be higher than those attending operation of Phases I and II at the West Range Site where both facilities would operate with "proposed" controls. This observation would generally be true

for RLW also, except for NO_2 – the predicted annual average concentration of NO_2 at RLW would be the only pollutant/averaging period where operation of Phases I and II at the West Range Site exceed the impacts at the East Range Site. For the VNP, impacts caused by operations of Phases I and II at the West Range Site exceed those modeled for the East Range Site for every pollutant/averaging period.

Emissions from the Mesaba Generating Station would be considered "significant" under the PSD regulations for short-term SO_2 and PM_{10} emissions at the BWCAW and VNP (see sub-section *Class I Impacts and Increment Consumption* under Section 4.3.2.5 for an explanation as to why a cumulative analysis was not conducted for the RLW and IRNP). However, Phases I and II impacts would still be below the allowable PSD increment in these cases. All annual average impacts (SO_2, PM_{10} and NO_2) at these Class I areas, including the RLW and IRNP, were determined to be below significant levels.

Cumulative Pollutant Concentrations in Class I Areas Based on Operation of PSD Increment Consuming/Expanding Sources and the Mesaba Generating Station

Multi-source PSD increment modeling results are shown in Table 5.2.2-1. Results from this table indicate that the projected future regional emission scenario, including the Mesaba Generating Station at either the West Range Site or East Range Site, would not pose a threat to the Class I PSD increments or ambient air quality standards in the applicable Class I areas.

Based on historical monitoring data, the highest ambient SO_2 concentrations have been identified in order to evaluate cumulative SO_2 impacts. Similarly, ambient 24-hour and annual average concentrations of PM_{10} have been identified. Table 5.2.2-2 includes the highest monitored ambient concentrations of SO_2 and PM_{10} in their respective multi-year datasets for each averaging period in each applicable Class I area (fourth column of Table 5.2.2-2). This table also provides, where appropriate, an estimate of the 3-hour average SO_2 concentrations as derived from an EPA-endorsed algorithm (see Section 5.2 of Appendix D1). These highest monitored concentrations were added to the highest predicted concentrations derived from the multi-source modeling studies described previously (the highest modeled results for the West Range Site and East Range Site are shown in the fifth and sixth columns of Table 5.2.2-2, respectively) to produce conservative estimates of cumulative impacts in the relevant Class I areas (the resulting sums for the West Range Site and East Range Site are shown in the seventh and eighth columns of Table 5.2.2-2, respectively). In comparing the estimated total cumulative ambient air impacts to applicable state and federal ambient air quality standards, it is expected that there would be no threat to such standards in any Class I area in which the Mesaba Generating Station would result in levels above the applicable SILs. Additionally, the cumulative impacts analyses demonstrate that there would be minor differences in cumulative impacts between the West Range Site versus East Range Site.

Table 5.2.2-1. Estimated Impacts of Mesaba Phases I and II and All Other Existing/Planned Increment Consuming/Expanding Sources on PSD Increments[(1)] at Relevant Class I Area Receptors (all tabulated concentrations expressed in μg/m³)

Class I Area	Pollutant	Averaging Time	Mesaba I & II[(2)] Plus All Other Sources – West Range	Mesaba I & II[(3)] Plus All Other Sources – East Range	Allowable Increment	Minn/NAAQS
Boundary Waters Canoe Area	SO_2	3-hour	8.63	8.06	25.0	915
		24-hour	2.68	2.45	5.0	365
		annual	NAR	NAR	2.0	60
	PM_{10}	24-hour	1.21	1.18	8.0	150
		annual	NAR	NAR	4.0	50
Voyageurs National Park	SO_2	3-hour	8.13	7.33	25.0	915
		24-hour	1.90	1.82	5.0	365
		annual	NAR	NAR	2.0	60
	PM_{10}	24-hour	1.03	0.98	8.0	150
		annual	NAR	NAR	4.0	50
Rainbow Lakes Wilderness Area	SO_2	3-hour	No SILs exceeded by operation of Mesaba Phases I and II for any pollutant and its averaging period at either site			
		24-hour				
		annual				
	PM_{10}	24-hour				
		annual				
Isle Royale National Park	SO_2	3-hour	Park is located outside of 300 km radius from stacks on West Range site.	No SILs exceeded by operation of Mesaba Phases I and II for any pollutant and its averaging period.		
		24-hour				
		annual				
	PM_{10}	24-hour				
		annual				

(1) Impacts are shown for those pollutants and averaging periods for which Mesaba Phases I and II operating under 100% capacity factor and normal operating conditions (i.e., both Mesaba Phases I and II operating at full load for all hours of the year) create impacts above the SILs over the time period 2002-2004. The values shown for 3-hour and 24-hour average concentrations are "highest second-high" values modeled at receptors; annual concentrations are highest values modeled at those receptors.
(2) The "worst case" ambient impact scenario presented for the West Range site is "proposed" emission controls on both Mesaba Phases I and II.
(3) The "worst case" ambient impact scenario presented for the East Range site is "proposed" emission controls on Mesaba Phase I and "enhanced" controls on Phase II.
NAR = No Analysis Required

Table 5.2.2-2. Estimated Cumulative Impacts of Mesaba Phases I and II(1), All Existing Sources, and Reasonably Foreseeable Future Sources(2) on Ambient Air Quality at Relevant Class I Area Receptors (all tabulated concentrations expressed in µg/m^3)

Class I Area	Pollutant	Averaging Time	Maximum Historical Background Data	Increment Consuming & Expanding Source Impacts – West Range	Increment Consuming & Expanding Source Impacts – East Range	Cumulative West Range Impacts	Cumulative East Range Impacts	Most Constraining State or National AAQS
Boundary Waters Canoe Area	SO_2	3-hour	See SO_2 Results	9.8	8.4	29	28	915
		24-hour	for VNP Below	4.1	3.7	13	12	365
		annual	30.4	NAR	NAR	NAR	NAR	60
	PM_{10}	24-hour	7.4	2.4	2.3	33	33	150
		annual		NAR	NAR	NAR	NAR	50
Voyageurs National Park	SO_2	3-hour	19	12	11	31	30	915
		24-hour/7-day	8.6/3.8	2.4	2.1	11	11	365
		annual	0.97	NAR	NAR	NAR	NAR	60
	PM_{10}	24-hour	34	1.5	1.4	36	35	150
		annual	7.6	NAR	NAR	NAR	NAR	50
Rainbow Lakes Wilderness Area	SO_2	3-hour	NA	No SILs exceeded for any pollutant and its averaging period.		NAR for any normal operating scenario		
		24-hour/7-day	NA/7.9					
		annual	1.8					
	PM_{10}	24-hour	NA					
		annual	<10					
Isle Royale National Park	SO_2	3-hour	NA	Park is located outside of 300 km radius from stacks on West Range site.	No SILs exceeded for any pollutant and its averaging period.	NAR for any normal operating scenario		
		24-hour	4.0					
		annual	0.60					
	PM_{10}	24-hour	36.7					
		annual	8.2					

(1) Impacts are shown for those pollutants for which Mesaba One and Mesaba Two operating under 100% capacity factor and normal operating conditions (i.e., both Mesaba One and Mesaba Two operating at full load for all hours of the year) create impacts above the SILs (see Tables 3 and 4 in Appendix D1).
(2) The values shown for all modeled values are the highest concentrations modeled over the time period 2002-2004. For the West Range site, cumulative impacts are based on Mesaba One and Mesaba Two operating at “proposed” emission rates; cumulative impacts for the East Range site are based on operation of Mesaba One and Mesaba Two at “proposed” and “enhanced” emission rates, respectively.
NA = Not Available; VNP = Voyageurs National Park; RLWA = Rainbow Lakes Wilderness Area; SIL = Significant Impact Level; NAR = No Analysis Required; IRNP = Isle Royale National Park; AAQS = Ambient Air Quality Standard

Class I Visibility/Regional Haze Analysis

In comments on the Draft EIS, the Forest Service stated "the assessment of cumulative visibility impacts [in the Boundary Waters Canoe Area and Voyageurs National Park] are probably best dealt with through the regional haze program and plan being developed by the State of Minnesota." (See Comment 49-12 in the Comment Response Document, Volume 3 of the Final EIS.)

The state's program and plan to address regional haze are in support of its responsibilities under the federal Regional Haze Regulation promulgated by EPA on July 1, 1999 and codified at 40 CFR Part 51, §§ 51.300 through 51.309. The requirements call for states to establish reasonable progress goals for each Class I area within its boundaries. Also, states are required to submit a long-term strategy that includes measures to achieve such goals. The regulations specify emission limitations representing Best Available Retrofit Technology (BART).

In 2005, EPA promulgated final guidelines for BART determinations. The guidelines specify five steps of determining BART on a case by case basis, the first step of which addresses how to identify all available retrofit emission control techniques, which involves identifying potentially applicable retrofit control technologies that represent the full range of demonstrated alternatives. Examples are given of general information sources to consider, one of which includes technical reports issued as part of DOE's Clean Coal Program.

EPA released final guidance on June 1, 2007 to use in setting "reasonable progress goals" (RPGs). Section 1.2 of the EPA guidance states:

> ***"RPGs are interim goals that represent incremental visibility improvement over time toward the goal of natural background conditions and are developed in consultation with other affected States and Federal Land Managers (FLMs). In determining what would constitute reasonable progress, section 169A(g) of the CAA requires States to consider the following four factors:***
>
> - ***The costs of compliance;***
> - ***The time necessary for compliance;***
> - ***The energy and non-air quality environmental impacts of compliance; and***
> - ***The remaining useful life of existing sources that contribute to visibility impairment.***
>
> ***States must demonstrate in their SIPs how these factors are taken into consideration in selecting the RPG for each Class I area in the State... the Regional Haze Rule establishes an additional analytical requirement for States in the process of establishing the RPG. This analytical requirement requires States to determine the rate of improvement in visibility needed to reach natural conditions by 2064, and to set each RPG taking this 'glidepath' into account…EPA adopted this approach, in part, to ensure that States use a common analytical framework that accounts for the regional difference affecting visibility and, in part, to ensure an informed and equitable decision making process. The glidepath is not a presumptive target, and States may establish a RPG that provides for greater, lesser, or equivalent visibility improvement as that described by the glidepath."***

In Chapter 10 of Minnesota's Draft Regional Haze SIP, MPCA lays out its long-term strategy for achieving its reasonable progress goals and includes its "Concept Plan for Addressing Major Point Sources in Northeastern Minnesota." The concept plan establishes five principles under which it proposes to attain its vision and goals. One of the goals states, "*The MPCA commits to develop a Regional Haze State Implementation Plan (SIP) that spurs development of innovative emission control strategies in source sectors that currently are uncontrolled or under-controlled.*" Additionally, the Mesaba Energy Project would not affect the goals of the concept plan as exemplified by the first of the Project's two statements of Purpose provided in Appendix F1:

"Confirm the commercial viability of generating electrical power by means of a fuel-flexible integrated gasification combined cycle ("IGCC") technology in a utility-scale application."

The Mesaba Energy Project is designed to achieve SO_2 and NO_X emission rates that are comparable or better than those of other advanced coal-fired steam electric generating technologies. However, IGCC technology is not currently considered a BART alternative for relevant facilities or as BACT for new sources or for those undergoing major modification, presumably because it has not been commercially demonstrated in a large utility-scale application across a broad spectrum of feedstocks. Once the Mesaba Energy Project demonstrates the commercial readiness of fuel flexible IGCC using ConocoPhillips' E-Gas™ technology the capital cost of constructing such facilities is expected to decrease. Such decreases could lower the cost of compliance, allowing IGCC to be considered a future BART and BACT alternative for sources using a variety of coal-based feedstocks.

Although projections of net effects of commercialization of IGCC technology alone are not currently available, DOE has made projections of the market penetration of various technologies under various scenarios of fuel prices and regulations to estimate the benefits of the implementation of the fossil energy research and development program (DOE, 2007). This analysis considers the potential market penetration of fossil energy technologies, as well as nuclear and renewable energy technologies. Depending on the scenario considered, the implementation of the fossil energy R&D program would result in IGCC capturing from three percent to nine percent of the total market by 2025. Since fossil energy would still provide a substantial portion of the nation's electricity supply under all scenarios, the analysis shows that implementation of the fossil energy R&D program, which includes IGCC, would result in emission reductions of NO_X, SO_2, and CO_2 by the year 2025, relative to a scenario that does not involve fossil energy R&D and the subsequent advancement of IGCC technology.

Additionally, on May 16, 2008, Excelsior submitted comments to the MPCA on the Draft Regional Haze SIP. In their comments, Excelsior recommended that the Mesaba Energy Project be included in the 2018 emission inventory of Minnesota sources to reflect the project's potential role in helping meet future increases in electrical demand, while minimizing SO_2 and NO_x emissions. Excelsior contended that, to meet increasing demand, existing electric generating units would be required to operate at higher capacity factors. These existing units comprised of BART-eligible units and others that are not considered eligible for BART. The SIP lists BART-eligible units with BART emission limits ranging from 0.07 to 0.41 lbs/MMBtu for NO_x and 0.09 to 2.3 lbs/MMBtu for SO_2 (see Table 9.4 in the revised Draft Regional Haze SIP; MPCA, 2009a). In comparison, the Mesaba Energy Project's prescribed emissions rates for NO_x and SO_2 are 0.058 lbs/MMBtu and 0.025 lbs/MMBtu, respectively. The following excerpt from the Technical Support Document for the Draft Regional Haze SIP (MPCA, 2009b) is in reference to the Northeast Minnesota Plan:

In this plan, the six counties in northeast Minnesota would maintain a 30 percent reduction in NO_x and SO_2 from 2002 emissions levels. About 21 percent of that reduction is already associated with the Minnesota Power—Boswell and –Taconite Harbor projects described above and included in the on-the-books controls. In order to model this plan in the uniform rate of progress analysis, the remaining approximately 10 percent was applied to taconite industry sources. The emission reductions were based on permit limits, furnace modifications in 2006 and 2007, fuel switching, a new scrubber, newer rate information, and some reductions due to BART.

The Mesaba Energy Project was not included in the state's emissions projections. However, MPCA indicates that the 20 percent reduction goal can be achieved by the reductions occurring at the Boswell and Taconite Harbor power plants. To the extent that power from the Mesaba Energy Project would replace power from existing coal-fired generating units, the Project would not affect the goals outlined in the Northeastern Minnesota Plan.

Terrestrial and Aquatic Impacts

Deposition of Nitrogen and Sulfur

Total annual sulfur and nitrogen depositions to the ground surface were determined by summing contributions from all S and N species (gaseous and particle-bound) at each Class I receptor **using the CALPUFF/CALPOST modeling programs**. Results of the analysis represent the highest annual deposition value for any receptor and any of the three years modeled, for each Class I area. **For foreseeable future projects that have submitted formal Class I modeling reports to a public agency, these projects' deposition values were used and represent the highest annual deposition value for any receptor, for any of the three years modeled, and for each relevant Class I area. Tables for the total (wet plus dry) sulfur and nitrogen deposition predictions for the Mesaba Generating Station, historical sulfur and nitrogen deposition data from existing monitoring sites; and the summation of sulfur and nitrogen deposition from these sources are presented in Appendix D1 (Tables 7 through 11 in Appendix D1).**

The Forest Service has defined screening criteria for terrestrial and aquatic impacts of deposition (see Section 4.3) in the Green Line criteria**, which define levels "at which it was reasonably certain that no significant change would be observed in ecosystems that contain large numbers of sensitive components**.**"** Predicted cumulative deposition impacts compared to the Green Line criteria **for terrestrial and aquatic resources** are presented in Table 5.2.2-3 **for BWCAW and RWL**. **For NPS Class I areas (i.e., VNP), no acceptable deposition values for impacts on soils or waters have been established. A "deposition analysis threshold" (DAT) of 0.01 kg/ha-yr is given as a level below which no adverse impacts are expected.**

Table 5.2.2-3. Comparison of Annual Cumulative Sulfur and Nitrogen Deposition to Green Line Criteria or DAT Threshold for Impacts to Terrestrial and Aquatic Ecosystems

Class I Area	Parameter	Background (kg/ha-yr)	Reasonably Foreseeable Project Impacts (kg/ha-yr)	Mesaba Phases I and II (kg/ha-yr)		Cumulative Impacts (kg/ha-yr)		Green Line[1] Value or DAT[2] (kg/ha-yr)
				West Range	East Range	West Range	East Range	
BWCA	Terrestrial							
	Total S Depo	2.01	0.047	0.014	0.038	2.07	2.10	5-7
	Total N Depo	3.85	0.048	0.0082	0.025	3.91	3.92	5-8
	Aquatic							
	Total S Depo	2.01	0.047	0.014	0.038	2.07	2.10	7.5-8
	S + 20% N	2.78	0.057	0.016	0.043	2.85	2.88	9-10
RLWA	Terrestrial							
	Total S Depo	3.21	0.009	0.0065	0.0067	3.23	3.23	5-7
	Total N Depo	6.03	0.008	0.0042	0.0047	6.04	6.04	5-8
	Aquatic							
	Total S Depo	3.21	0.009	0.0065	0.0067	3.23	3.23	3.5-4.5
	S + 20% N	4.42	0.011	0.0073	0.0076	4.43	4.43	4.5-5.5
VNP	Terrestrial							
	Total S Depo	1.98	0.012	0.016	0.012	2.01	2.00	0.01
	Total N Depo	4.20	0.016	0.0099	0.0074	4.23	4.22	0.01
	Aquatic							
	Total S Depo	1.98	0.012	0.016	0.012	2.01	2.00	0.01
	S + 20% N	2.82	0.015	0.018	0.013	2.85	2.85	0.01
IRNP	Terrestrial							
	Total S Depo	2.61	0.010	Not Applicable	0.0049	Not Applicable	2.62	0.01
	Total N Depo	4.48	0.007		0.0017		4.49	0.01
	Aquatic							
	Total S Depo	2.61	0.010	Not Applicable	0.0048	Not Applicable	2.62	0.01
	S + 20% N	3.51	0.011		0.0051		3.52	0.01

[1] Green Line Values from "Screening Procedure to Evaluate Effects of Air Pollution on Eastern Region Wilderness Cited as Class I Air Quality Areas", USFS, 1991.
[2] For NPS Class I areas (i.e., VNP), no acceptable deposition values for impacts on soils or waters have been established. A "deposition analysis threshold" (DAT) of 0.01 kg/ha-yr is given as a level below which no adverse impacts are expected.

The highest Mesaba deposition relative to total cumulative deposition ranges from 1.8 percent for the East Range Site's sulfur impacts in the BWCAW to 0.6 percent for the East Range Site's nitrogen impacts in the BWCAW. Table 5.2.2-3 indicates that total sulfur and nitrogen deposition, including background, would be within the acceptable Green Line criteria for the BWCAW and RLW. For VNP and IRNP, total deposition levels exceed the DAT criteria. It should be noted, however, that the analysis is considered very conservative as it uses worst-case emissions and 100 percent operation. Furthermore, the background values presented likely include the current impacts of some of the modeled sources considered in this analysis. Therefore, the predicted future total deposition data in Table 5.2.2-3 is assumed to be conservative.

The DAT represents a screening level to assess any possibility of adverse impact and is not a regulatory limit. Additionally, based on the deposition assessment criteria that the Forest Service uses, the sulfur and nitrogen deposition rates at the VNP and IRNP would below Green Line limits. Thus, for this reason and assuming conservative cumulative predictions in Table 5.2.2-3, it is not expected that cumulative levels of sulfur and nitrogen deposition would result in any impacts for which DOE would require mitigation to protect terrestrial and aquatic resources in any of the Class I areas. However, DOE recognizes that the FLMs have the responsibility for determining whether a more refined analysis would be required or whether mitigation of these predicted impacts would be recommended. If mitigation is recommended by the FLMs, DOE would consider such mitigation as a condition of the Record of Decision.

SO_2 Concentration

Table 5.2.2-4 presents the annual cumulative estimates of SO_2 and the applicable Forest Service Green Line limit for terrestrial and flora/fauna resources. The SO_2 concentration estimates in the table indicate that the cumulative impacts for the West Range Site and East Range Site would result in increments of SO_2 concentrations that would be approximately 9.8 and 8.4 percent, respectively, of the Green Line criteria at the BWCA and 12 and 11 percent, respectively, at the VNP; therefore, significant cumulative impacts from SO_2 concentration are not expected.

Table 5.2.2-4. Comparison of Cumulative[1] SO_2 Concentrations to Green Line Criteria for Impacts to Terrestrial Ecosystems, Flora and Fauna (All Tabulated Concentrations Expressed in µg/m³)

Class I Area	Pollutant	Averaging Time	Maximum Historical Background Data	Increment Consuming & Expanding Source Impacts: West Range	Increment Consuming & Expanding Source Impacts: East Range	Cumulative Mesaba West Range Impacts	Cumulative Mesaba East Range Impacts	Green Line Criteria[2]
BWCA	SO_2	3-hour	19	9.8	8.4	29	27	100
		24-hour[3]	8.6					
		annual	0.97	No multi-source analysis required		0.097+0.018=0.12	0.097+0.053=0.15	5
VNP	SO_2	3-hour	19	12	11	31	30	100
		24-hour[3]	8.6					
		annual	0.97	No multi-source analysis required		0.097+0.024=0.12	0.097+0.012=0.11	5
RLWA	SO_2	3-hour	20	No multi-source analysis required		20+0.49=20	20+0.72=21	100
		24-hour[3]	NA					
		annual	1.8			1.8+0.01=1.8	1.8+0.010=1.8	5
IRNP	SO_2	3-hour	9.0	Site >300 km from West Range site	No multi-source analysis required	Site >300 km from West Range site	9.0+0.36=9.4	100
		24-hour[3]	4.0					
		annual	0.60				0.60+0.004=0.60	5

(1) Cumulative impacts from all sources – including Mesaba One and Mesaba Two – are shown for those pollutants for which Mesaba One and Mesaba Two operating under 100% capacity factor and normal operating conditions (i.e., both Mesaba One and Mesaba Two operating at full load for all hours of the year) create impacts above the SILs; the values shown for all modeled values in such instances are the highest concentrations modeled using the multi-source inventory over the time period 2002-2004. For the West Range site, cumulative impacts are based on Mesaba One and Mesaba Two operating at BACT emission rates; cumulative impacts for the East Range site are based on operation of Mesaba One and Mesaba Two at BACT and Beyond BACT emission rates, respectively.

(2) Green Line Values from "Screening Procedure to Evaluate Effects of Air Pollution on Eastern Region Wilderness Cited as Class I Air Quality Areas", USFS, 1991.

(3) There is no "green line" SO_2 concentration for the 24-hour averaging period. Monitored SO_2 concentrations for the 24-hour averaging period are shown because where they exist, they are used to estimate the concentrations for 3-hour averaging periods using an algorithm taken from "Screening Procedures for Estimating the Air Quality Impact of Stationary Sources, Revised", EPA Office of Air Quality and Standards, EPA454/R-92-019, October 1992, page 4-15. The estimate involves dividing the 24-hour SO_2 concentration by 0.4 and multiplying the resulting value by 0.9. Where no 24-hour average SO_2 concentration was available, the highest annual concentration was used to estimate a 3-hour concentration by dividing the annual concentration by 0.08 and multiplying the quotient by 0.9.

NA = Not Available; BWCA = Boundary Waters Canoe Area; VNP = Voyageurs National Park; RLWA = Rainbow Lakes Wilderness Area; RNP = Isle Royale National Park

Deposition of Mercury

Combined sources modeling results for mercury concentration**, including those resulting from Mesaba Phases I and II,** are presented in **Tables 5.2.2-5 and 5.2.2-6 for the West Range Site and East Range Site, respectively**. These concentrations represent the three-year average highest ambient mercury concentration at any point in each Class I area. There are no standards for ambient mercury levels in air to use as a basis for impact assessment; however, **the highest values in the tables can be compared to the commonly accepted background ambient air concentration of 1 to 2 ng/m^3 to obtain an indication of the overall impact of Phases I and II. Presuming the background ambient air concentration of elemental mercury in rural areas to be 1.5 ng/m^3, the estimates in Tables 5.2.2-5 and 5.2.2-6 provide a relative indication of the contribution the Mesaba Generating Station would have on background elemental mercury concentrations – less than 0.5 percent. Additionally,** these predicted values, which estimate maximum levels of combined mercury forms, were considered in the air inhalation health risk assessment (Section 5.2.3).

Table 5.2.2-5. Maximum Estimated West Range Mercury Concentration & Impacts on Background Mercury Concentration

Year	Boundary Waters Canoe Area (ng/m^3)	Voyaguers National Park (ng/m^3)	Rainbow Lake Wilderness Area (ng/m^3)
2002	1.34E-03	1.57E-03	7.96E-04
2003	1.23E-03	1.59E-03	6.82E-04
2004	1.19E-03	1.52E-03	5.27E-04
	Phases I and II Impacts on Ambient Mercury Concentration Presuming Background Ambient Air Concentration of Elemental Mercury Is 1.5 ng/m^3		
	0.09%	0.11%	0.05%

Table 5.2.2-6. Maximum Estimated East Range Mercury Concentration & Impacts on Background Mercury Concentration

Year	Boundary Waters Canoe Area (ng/m^3)	Voyaguers National Park (ng/m^3)	Rainbow Lake Wilderness Area (ng/m^3)	Isle Royale National Park (ng/m^3)
2002	3.55E-03	1.13E-03	8.58E-04	7.25E-04
2003	4.14E-03	1.10E-03	8.73E-04	6.42E-04
2004	3.46E-03	1.15E-03	9.87E-04	6.30E-04
	Phases I and II Impacts on Ambient Mercury Concentration Presuming Background Ambient Air Concentration of Elemental Mercury Is 1.5 ng/m^3			
	0.28%	0.08%	0.07%	0.05%

Minnesota is currently in the process of determining how to implement the statewide mercury TMDL, which set an annual air emission target of 789 lb by 2025. However, no rules have yet been finalized nor have draft rules been placed on notice for public review. A mercury offset program has not yet been established and any offset project that Mesaba might implement would depend on the specifics of that program, which are not known at this time. To date, Excelsior has met with the MPCA to discuss how to permit the Mesaba Energy Project while working within the framework of evolving guidelines being established for new and expanding sources. Based on discussions at these meetings, MPCA would consider the innovative nature of the Mesaba Energy Project (i.e., the lack of a robust historical testing database from which emission factors might be generated) and MPCA would allow Excelsior to establish the Project's expected annual emissions using the best

information it can assemble from published research studies, expert testimony, and testing results from similar mercury control technologies applied on sources in different industrial sectors (i.e., technology transfer). Discussions between MPCA and Excelsior have focused around developing mercury offsets in the amount the Project's expected actual annual emissions exceed the *de minimis* threshold of three pounds per year. As discussed above, Excelsior has proposed mercury emission control consistent with a minimum removal rate of 90 percent, which meets or exceeds best available controls. The need for any additional offsets would be determined by MPCA in the permitting process and the Mesaba Energy Project would be subject to applicable future requirements as final rules are promulgated.

5.2.2.3 Conclusion

Modeling results from the cumulative impact analysis indicate that the combined criteria pollutant emissions of Mesaba Energy Project and the all existing and foreseeable future sources would not pose a threat to Class I PSD increments or ambient air quality standards. Additionally, **cumulative** deposition of sulfur and nitrogen from the combined sources would not cause adverse impacts to **terrestrial, aquatic,** and **vegetative resources** in Class I areas **for which DOE would require mitigation; however, DOE would consider any recommendation from the FLMS as a condition of the Record of Decision.**

Potential options for reducing the modeled impacts of Mesaba Phases I and II on visibility in the Class I areas where visibility is an AQRV are discussed in Section 5.3. Based on correspondence from the Forest Service dated July 31, 2009 (see Appendix E), DOE understands that the Forest Service feels that the modeled impacts to visibility at either site require mitigation. Therefore, DOE would consider such mitigation as a condition of the Record of Decision, pending progress in negotiations between Excelsior and MPCA regarding the BACT decision.

The Project's cumulative visibility impacts would be addressed as part of updating Minnesota's State Implementation Plan in compliance with the Federal Regional Haze Rule. Demonstration of this IGCC technology and widespread commercialization would contribute to the State's goal of reducing regional haze impacts in nearby Class I areas over the long term.

5.2.3 Air Inhalation Health Risk

5.2.3.1 Analysis for the Draft EIS

The Draft EIS summarized the results of the cumulative impacts **analysis** of air toxics emissions from the Mesaba Energy Project, nearby existing facilities, and other potential future emission sources **in proximity to** the East Range and West Range **Sites**. Future emissions from the proposed Minnesota Steel Industries (MSI) plant, east of the West Range **Site**, were included in this evaluation. Emission sources considered at the East Range **Site** included the exiting Laskin Energy Center (southwest of the power plant footprint), the proposed Mesabi Nugget facility (northwest of the footprint) and the proposed PolyMet Mining (PolyMet) project (north of the footprint). Only the Laskin Energy Center (Laskin) **was** in operation **at the time of the Draft EIS**.

Two proposed wood-fired boilers at the existing coal-fired power Laurentian Energy Generation Plants located near Virginia and Hibbing are also potential future emission sources. The Laurentian facility at Hibbing would be approximately 35 kilometers from the proposed West Range Site, and the Laurentian facility at Virginia would be approximately 40 kilometers from the proposed East Range Site. Because of the relatively large distances from these sites, the incremental risk resulting from inhalation of air toxics that the Laurentian facilities would contribute would not be significant and was therefore not considered in the analysis **completed for the Draft EIS**.

[Text in the Draft EIS describing the approach for the cumulative health risk analysis was deleted.]

West Range Site

As described in the Draft EIS, the facilities considered for the West Range Site include the Mesaba Generating Station and **the** MSI **plant**. The combined acute hazard indices from both facilities resulted in a maximum acute cumulative hazard index of 1. A sub-chronic hazard index was not calculated for the MSI facility in the MSI Human Health Screening-Level Risk Assessment; therefore, a cumulative sub-chronic hazard index could not be evaluated.

The cumulative non-carcinogen and carcinogen results for the West Range Site **were** summarized in **Table 1 in Draft EIS** Appendix D2. The maximum sub-chronic contribution from the Mesaba Generating Station was 0.1, well below the threshold value of concern established by the MDH. The combined chronic hazard indices from both facilities resulted in a maximum cumulative hazard index of 0.2. The combined cancer risks from both facilities resulted in a maximum cumulative cancer risk of 9×10^{-7}. Likewise, the combined acute hazard indices resulted in a maximum cumulative acute hazard index of 1. Thus, the predicted cumulative total chronic and acute non-carcinogenic hazard indices did not exceed the acceptable MPCA hazard value. The combined cancer risks from both facilities resulted in a maximum cumulative cancer risk of 3×10^{-5}. The background individual lifetime cancer risk of 3×10^{-5} would exceed the MPCA acceptable limit for individual projects, but is within the upper bound U.S. EPA guideline for cumulative risks. The cumulative cancer risk for the Mesaba Energy facility would not exceed the U.S. EPA National Contingency Plan limit**.**

East Range Site

As described in the Draft EIS, four facilities are in relatively close proximity near the East Range Site. Three of those facilities, the Mesaba Generating Station, Mesabi Nugget, and PolyMet are close enough geographically to result in the overlap of all three buffer zones. To evaluate potential impact from these sources, **the analysis for the Draft EIS** assumed that emissions from all three facilities could potentially impact a receptor in the overlap area. Likewise, the buffer zones for the Mesaba Generating Station and Laskin facilities overlap. The Laskin buffer zone, however, does not overlap those of either Mesabi Nugget or PolyMet.

The Mesaba Energy Project and Laskin Energy Center

As summarized in the Draft EIS Appendix D2, the combined acute hazard indices from the proposed Mesaba Generating Station and Laskin facilities resulted in a maximum acute cumulative hazard index of 0.7. The combined sub-chronic hazard indices from the two facilities resulted in a maximum cumulative hazard index of 0.1. The combined chronic hazard indices from both facilities resulted in a maximum cumulative hazard index of 0.07. The combined cancer risks from both facilities resulted in a maximum cumulative cancer risk of 2×10^{-6}.

Based on the risk analyses performed for the Mesaba and Laskin facilities **for the Draft EIS**, maximum acute, sub-chronic and chronic hazard indices, and cancer risk would not exceed MDH threshold values, indicating that a cumulative air inhalation risk associated with these facilities would be within acceptable limits.

The Mesaba Energy Project, Mesabi Nugget, and PolyMet

Because the buffer zones of the Mesaba Generating Station, Mesabi Nugget, and PolyMet facilities overlap, a combined evaluation of all three facilities was conducted.

[Text in the Draft EIS describing the 3-step approach to the health risk analysis was deleted.]

As reported in the Draft EIS, the combined acute hazard indices from the Mesaba Generating Station and Mesabi Nugget facilities resulted in an acute cumulative hazard index of 1. The combined chronic hazard indices from both facilities resulted in a cumulative hazard index of 0.9. The combined cancer risks from both facilities resulted in a cumulative cancer risk of 7×10^{-6}. The projected contribution of the Mesaba Generating Station to the acute inhalation risk in this case would be 20 percent and 1 percent for both chronic non-cancer and cancer risk.

The combined acute hazard indices from the Mesaba Generating Station and PolyMet facilities resulted in a cumulative hazard index of 0.9. The combined chronic hazard indices from both facilities resulted in a cumulative hazard index of 1. The combined cancer risks from both facilities resulted in a cumulative cancer risk of 1 x 10^{-5}. The projected contribution of the Mesaba Generating Station to the acute inhalation risk would be 22 percent and 1 percent for both chronic non-cancer and cancer risk.

Taking into account geographical location of risk for the Mesaba Generating Station only, **the analysis in the Draft EIS concluded that** acute, sub-chronic, and chronic hazard indices and cancer risk would not exceed MDH threshold values for the Mesaba Generating Station combined with either the Mesabi Nugget or PolyMet facilities.

[Text in the Draft EIS describing conclusions and data refinements was deleted.]

5.2.3.2 Analysis for the Final EIS

The step-wise approach that was used in the Draft EIS to evaluate the cumulative impacts to receptors from inhaled emissions generated by the Mesaba Energy Project in combination with other sources was modified based on revised MPCA guidance following publication of the Draft EIS. Specifically, the objectives of the revised MPCA guidance, based on the "20D Rule", are to determine which, if any, sources of air pollutants, including ambient air, are likely to have a significant impact inside the significant impact area of a proposed facility. Guidance on the "20D Rule" was supplied in an e-mail from MPCA to SEH (MPCA, 2008c). For the Mesaba Generating Station, 10 km is the maximum significant impact area. This approach was used to determine those sources within the significant impact area to be included in the evaluation of cumulative impacts to receptors from inhaled emissions. Based on the guidance provided by MPCA for use of the "20D Rule", facilities whose potential allowable emissions (in tons per year) are less than 20 times the distance (D, in kilometers) between the two facilities were excluded from further consideration. However, nearby facilities whose potential allowable emissions are greater than 20 times the distance between the two facilities were included in the evaluation. The revised cumulative health risk analysis is included in revised Appendix D2, which explains the "20D Rule" in more detail.

Ambient monitoring data representing the rural Iron Range in Minnesota were provided by the MPCA and used to calculate summed risks from measured air concentrations of volatile organic chemicals (VOCs), carbonyls, and metals. Rural VOC and carbonyl data were used because of the location and population density surrounding the alternative Mesaba Energy Project sites. Since Excelsior's alternative sites are located in the Iron Range of Minnesota, the most recent data as measured at Virginia, Minnesota was used in this evaluation.

Where modeling data were available, as is the case with the Mesaba Energy Project, Mesabi Nugget, and PolyMet, the subsistence farmer scenario was used to predict potential risk at the maximum air emissions impact location, because that scenario tends to result in higher risk impacts. However the location of maximum impact would not necessarily occur at a location where a subsistence farm could be located in the future. For example, the projected Mesaba East Range maximum impact receptor would be located on a small tract of land used by the City of Hoyt Lakes for biosolids disposal. A subsistence farm would be prohibited in this area.

Based on guidance and additional direction from MPCA the analysis was conducted such that, if chronic or acute hazard indices for any individual facility would be greater than one, the hazards for that facility should be further refined by separating the risks by health endpoint, pollutant family (i.e., metals, VOCs, carbonyls, etc.), or by risk drivers.

West Range Site

Based in part on the Scoping EAW for the proposed MSI Project near Nashwauk, MN, the proposed MSI facility is the closest "reasonably foreseeable future or ongoing action" in the vicinity of the Project located near Taconite, MN. As shown in revised Appendix D2 Figure 1 (MN Steel DRI Plant Cumulative Impact Buffers), the location of highest air emission impact for the proposed Mesaba Generating Station (Receptor 3) is outside of the MSI 10 km buffer. Since the closest additional facility that would contribute to increased air concentrations is greater than 10 km away, only risk associated with background ambient air data was considered along with the calculated Mesaba Generating Station health risk.

As reported in revised Appendix D2 analysis for the Final EIS, the predicted total cumulative cancer risk for the Mesaba Generating Station at the West Range Site is 3 x 10^{-5}, mostly contributed by background conditions. The cancer risk contribution from the proposed Mesaba facility is one order of magnitude lower (3 x 10^{-6} for the farmer at the highest impact location). The cumulative cancer risk for the Mesaba Generating Station does not exceed the U.S. EPA National Contingency Plan limit.

Furthermore, the predicted chronic inhalation non-cancer hazard index from background emissions at the West Range is 1, which is an indication that the risk of deleterious health impacts is very small. The hazard index predicted for the Mesaba Generating Station would be negligible in comparison (0.08). The total acute hazard indices contributed from background (0.5) as well as the proposed Mesaba Generating Station emissions (0.7) are comparable in magnitude. Due to the uncertainty in the summed inhalation hazard indices, the cumulative total hazard indices may be rounded as per U.S. EPA guidance to acute and chronic hazard indices of 1. Therefore, the predicted cumulative total chronic and acute non-carcinogenic hazard indices attributable to the Mesaba Generating Station at the West Range Site do not exceed the acceptable MPCA risk value of 1.

East Range Site

Four facilities located within a 10 km buffer surrounding the location of highest air emission impact for the proposed Mesaba Generating Station were evaluated in the revised analysis in Appendix D2 to determine the contributions of each to cumulative risk. These facilities include the Mesaba Generating Station, Mesabi Nugget, Laskin Energy Center, and PolyMet. Appendix D2 Figure 2 (Cumulative Impact Buffer – East Range) illustrates the general area potentially impacted by these four facilities.

Information regarding maximum cancer risks and hazard indices was obtained from the following sources:

- **Mesaba Energy Project AERA, dated January 2009.**
- **PolyMet Mining, Inc. AERA, dated March 2007.**
- **Mesabi Nugget, LLC, MPCA AERA Internal Form-03, dated April 7, 2005.**
- **MPCA Annual Emissions Inventory record for year 2005, Laskin Energy Center as supplied by MPCA on February 3, 2009.**

The background individual total lifetime cumulative cancer risk for the Iron Range is the same for the East Range and the West Range locations (discussed above) at 3 x 10^{-5}. Although the background cumulative lifetime cancer risk exceeds the MPCA acceptable limit for individual projects (1 x 10^{-5}), it is within the upper bound U.S. EPA guideline for cumulative risks (1 x 10^{-4}). The maximum total lifetime cumulative cancer risks estimated for the four individual facilities (4 x 10^{-7} to 5 x 10^{-6}) are all below the MPCA acceptable limit for individual projects. Lifetime inhalation cancer risks for each individual project range from 6 x 10^{-10} to 4 x 10^{-6} and are well below the MPCA acceptable limit.

The background total chronic non-cancer hazard index for the Iron Range is the same for the East Range and West Range locations (discussed above) at 1. The predicted total and inhalation maximum chronic non-carcinogenic hazard quotients for facilities evaluated at the East Range Mesaba Energy project location range from 0.08 to 0.3. Each facility evaluated is well below the MPCA acceptable limit.

The background total acute non-cancer hazard index for the Iron Range is the same for the East Range and West Range locations (discussed above) at 0.5. The predicted total maximum non-carcinogenic acute hazard quotients for facilities evaluated at the East Range Mesaba location range from 0.1 to 0.7. All facilities are below the MPCA acceptable limit for individual projects.

Conclusions

Total cumulative impacts of air toxics from reasonably foreseeable projects in the vicinity of the Mesaba project at the West Range and East Range Sites have been examined using conservative assumptions. As concluded by the revised analysis for the Final EIS in Appendix D2, nearly all chronic and acute non-cancer hazard indices are attributable to the inhalation endpoint. Total cumulative cancer risks as well as chronic and acute non-cancer risk at each individual facility evaluated were determined to be below the MPCA acceptable limits.

5.2.4 Water Resources

The following section provides a discussion on the impacts of the Mesaba Energy Project, together with reasonably foreseeable future actions, within the watersheds of the two proposed power plant locations and the cumulative impacts on surface water resources in terms of water quantity and quality. This cumulative impacts analysis is based on the information contained in this EIS (see Sections 3.5 and 4.5), the material contained in Appendix D3 and USGS monitoring data.

5.2.4.1 West Range

Water withdrawal from the LMP and Prairie River (if required) would occur during Phase II, which would reduce flows downstream; however, no other reasonably foreseeable projects are expected to adversely impact flow in the Prairie River and, therefore, no cumulative impacts are expected. The cumulative water analysis is focused on impacts to the Swan River watershed. The West Range Site lies within the Swan River watershed. The Swan River is designated as an impaired water by the MPCA. The causes of impairment are low oxygen and a fish consumption advisory due to mercury. In addition, the Trout Lake, Swan River, Upper Panasa Lake, and Lower Panasa Lake are also impaired due to fish consumption advisories for mercury. The primary source of the mercury in the water is atmospheric deposition. Roughly, 70 percent of the atmospheric deposition of mercury is from man-made sources (such as energy, mining, and product disposal) and the remainder is from natural sources, such as volcanoes (MPCA, 2004b).

The only reasonably foreseeable future action in the watershed, besides the Mesaba Energy Project, is the MSI project, located near Nashwauk. Also, the Nashwauk and Coleraine-Bovey-Taconite WWTFs would receive additional wastewater influent from the MSI and Mesaba projects, respectively. In addition, the water currently pumped from the HAMP would be diverted from the Upper Panasa Lake **to the CMP** for use at the Mesaba Generating Station.

Water Quantity

Limited water flow information exists for the Swan River. The USGS has operated two gauging stations on the Swan River; one just downstream of Swan Lake and the other just upstream of its confluence with the Mississippi River. The average flow of the Swan River downstream of Swan Lake is 64.8 cubic feet per second (29,000 gallons per minute) based on gauging data from 1965 to 1990. Prior to its confluence with the Mississippi River, the average reported flow is 188.6 cubic feet per second (85,000 gallons per minute) in the Swan River; however, there is only one year of record (1954).

CMP water levels would be maintained within a relatively narrow range (i.e., ± 2 feet) and impacts to Swan River from use of the CMP are not expected as the CMP currently generates limited outflow and does not directly discharge to any surrounding surface waters.

Currently the HAMP Complex dewaters into the Upper Panasa Lake**, which discharges into the Lower Panasa Lake and then the Swan River**. **MNDNR records indicate that annual average discharge of approximately 2,500 from the HAMP was needed in recent years to maintain the HAMP at the desired level (see Table 4.5-8), but the MNDNR's current NPDES permit allows for annual transfers of water from the HAMP at an average pumping rate of 6,500 gallons per minute. However, d**ue to financial reasons, **seasonal freeze-ups, and pump capacity, the HAMP Complex is generally dewatered for 6 months per year at a rate of 6,200 gallons per minute (maximum pump capacity)**. **Therefore, loss of such flow (6,200 gallons per minute) would represent the maximum possible cumulative loss of flow from the HAMP to the Swan River resulting from either the IGCC Power Station or from other industrial users.**

The MSI project, located upstream of Swan Lake **(see Figure 1 of Appendix D3)**, plans to use mine pit water as their primary source of process water for their operations. **Studies done for MSI's EIS concluded that the net reduction in water flows in the Swan River due to MSI would average 1,660 gallons per minute and would rise to 2,110 gallons per minute in dry years (MSI, 2008). While higher short-term reductions were predicted, these reductions would coincide with periods of high flow in the Swan River, and are therefore not considered problematic. MSI's Final EIS also states that approximately 1,200 gallons per minute of stream flow augmentation would be required during latter years of operation. The HAMP would be the preferred source, although no water appropriation permit application has yet been filed. As discussed above, the maximum withdrawal from the HAMP is assumed to be 6,200 gallons per minute.**

For annual average flows, the cumulative reduction would be approximately 4,800 gallons per minute (based on MSI's normal-year reduction and the elimination of MNDNR's pumping from the HAMP. The maximum short-term cumulative reduction in flow is approximately 8,300 based on MSI's dry-year net reductions and the elimination of pumping from the HAMP. These flows represent 17 and 29 percent of the Swan River's average during normal- and dry-year reductions, respectively.

Both MSI and the Mesaba Generating Station would discharge domestic wastewaters to their respective WWTFs and both have sufficient capacity to accept the additional flows. The additional flows into and out of these WWTFs would have little net affect on the total water flow in the Swan River.

Water Quality

The primary pollutants of concern in the Swan River Watershed and associated with the Mesaba Energy Project are mercury and phosphorus. As the MSI project would not discharge any process or industrial wastewater, it is not being considered further in this analysis. **Use of an enhanced ZLD system has eliminated wastewater discharges to nearby water bodies and, therefore, eliminates cumulative water quality impacts as no net increases of any water pollutants in the Swan River watershed would occur as a result of industrial wastewaters from the Mesaba Generating Station.**

There would be a very small net increase in domestic wastewater discharges into the Swan River watershed from the Mesaba Generating Station and MSI operations via their connections to local WWTFs. However, these increased flows would not cause either WWTF to exceed their permit requirements for either flow or phosphorus loadings.

5.2.4.2 East Range

The East Range Site lies within the Partridge River watershed. The Partridge River is not designated as an impaired water by the MPCA, however, two of the local water bodes (Colby Lake and Whitewater

Reservoir) are impaired due to fish consumption advisories for mercury. As with the West Range Site, the primary source of the mercury in the water is atmospheric deposition.

The foreseeable future actions in the watershed, besides the Mesaba Energy Project East Range Site, are the proposed PolyMet Mining project and the proposed Mesabi Nugget plant (both north of Hoyt Lakes). The only other existing facility that would be affected by the Mesaba Generating Station and the proposed PolyMet or Mesabi Nugget projects is the Hoyt Lakes WWTF. The Syl Laskin Energy Center is also located on Colby Lake.

Water Quantity

The USGS has operated several gauging stations on the Partridge River and two are used in this analysis: one just upstream of Colby Lake (Upper Partridge River) and the other several miles just downstream of Colby Lake (Lower Partridge River). The average flow at the Upper Partridge River station is 87.7 cubic feet per second (39,400 gallons per minute) based on data from 1979 to 1988. **Based on PolyMet's Environmental Activity Worksheet, average flow in the Upper Partridge River is approximately 17,500 gallons per minute (PolyMet, 2007).** Downstream of Colby Lake, the average flow of the Lower Partridge River is 111.2 cubic feet per second (49,900 gallons per minute) based on data from 1943 to 1967 **(USGS, 2009)**. **The Upper Partridge River is defined as the portion of the river upstream of Colby Lake and the Lower Partridge River is the stream reach downstream of the lake.**

Mesabi-Nugget has been issued a permit to withdraw water at a rate of **up to** 5,000 gallons per minute from Mine Pit 1, located north of the proposed East Range Site. If necessary, the permit also allows the appropriation of up to 5,000 gallons per minute from Mine Pit 2WX, as a standby source. **However, actual average required use would likely be much lower. Pit 2WX does not currently discharge to any surface waters. According to water flow records, Mine Pit 1 has a base discharge of approximately 3,300 gallons per minute to Second Creek, which subsequently flows to the Lower Partridge River (Johnson, 2009). This would be reduced or eliminated by Mesabi Nugget's use and by the Mesaba Energy Project's potential use of dewatering and wastewater flows from Mesabi Nugget.**

PolyMet would not appropriate water directly from the Partridge River, but it may appropriate water from Colby Lake. The PolyMet operation could appropriate process water from Colby Lake, at an estimated rate of **4,000 to 8,000** gallons per minute**. Since PolyMet would not directly appropriate water from the Partridge River, there would be no direct impacts on stream flow in the river. PolyMet may have some indirect impacts on the stream flow in the Partridge River by cutting off a portion of the runoff to the river and dewatering of the mine pit, which could cause a localized drop in the groundwater levels; however, this potential impact has not been quantified due to lack of available information.**

The Mesaba Generating Station is proposing to withdraw water (see Table 4.5-11) from a series of mine pits that would be interconnected with piping and pumps to provide a majority of water necessary for operation. **Several of these mine pits are currently discharging into the Upper and Lower Partridge Rivers – mine pits 3 and 5N currently contribute an estimated average flow to the Upper Partridge River of 1,100 gallons per minute; the Stephens and Knox mine pits contribute an estimated average flow of 435 gallons per minute to the Lower Partridge River. The flows from these mine pits would potentially be eliminated if used for the Mesaba Energy Project.** In addition, the Mesaba Generating Station would utilize 1,000 gallons per minute from the Mesabi-Nugget project's wastewater discharge and 2,900 gallons per minute from Colby Lake to provide high water demand supplies.

Regarding the Upper Partridge River, impacts would be attributed from the Mesaba Generating Station, which could remove up to 1,100 gallons per minute from the river. This

removal represents six percent of the Upper Partridge River's average flow (using PolyMet's data of 17,500 gallons per minute) (if based on available USGS data, this flow would represent three percent of average Prairie River flow). Regarding the Lower Partridge River, the total maximum flow that the Mesaba Generating Station and Mesabi Nugget could remove from the river could be as much as 3,735 gallons per minute ; however, this is not considered a cumulative impact with respect to removals from the Upper Partridge River as water levels in the lake (and hence outflows) are controlled according to existing permits. When Colby Lake reaches its established minimum allowable level, Minnesota Power is required to augment lake levels by pumping water from Whitewater Reservoir. When Colby Lake is at its minimum allowable level, flow out of the lake to Lower Partridge River is also at its minimum, which is approximately 5,835 gallons per minute. This means that flows on the Lower Partridge River would never fall below 5,835 gallons per minute.

There are a number of significant water appropriations in and near Colby Lake. The Syl Laskin Energy Center is permitted to pump 50,000 million gallons per year from Colby Lake for once-through cooling water. The average amount used, over the last 4 years, is 48,334 million gallons per year (92,000 gallons per minute). However, this water is returned to the lake with some evaporative losses. The City of Hoyt Lakes is also permitted to withdraw 160 million gallons per year (304 gallons per minute) for drinking water purposes, and has averaged about 125.4 million gallons per year (239 gallons per minute) over the past four years. A joint permit, issued to MP and Cliffs-Erie, LLC (CE), allows for withdrawing 6,307 million gallons per year (12,000 gallons per minute) to be used for mine processing, however, no water has been appropriated from Colby Lake under this permit since 2001. The City of Hoyt Lakes also is permitted to withdraw 4 million gallons per year (7.6 gallons per minute) from the Partridge River for watering a public golf course and has averaged 1.7 million gallons per year (3.2 gallons per minute) for the past four years.

In addition to the water appropriation permits for Colby Lake and the Partridge River, CE has a number of individual permits for dewatering mine pits (the same mine pits that are proposed for the source of process water for the Mesaba Generating Station East Range Site); however, no water has been withdrawn from these pits since 2001, as mining operations have ceased.

As discussed in the Section 4.5.4.1, the Mesaba Generating Station (Phases I and II) may use an average of 1,300 gallons per minute from Colby Lake, and peak use could reach 4,300 gallons per minute. Combined with PolyMet's potential use, Mesaba's potential appropriation from Upper Partridge River, and other Colby Lake users, total potential short-term withdrawal from the lake could reach approximately 13,600 gallons per minute, although this would represent a worst-case scenario – when mine pit storage is unable to reduce short-term appropriation rates. For comparison, this rate is lower than the historical short-term permit limit of 15,000 gallons per minute for the LTV mine.

The maximum total estimated amount of water that PolyMet and the Mesaba Generating Station could appropriate from Colby Lake would be determined by the MNDNR. Thus, determining precise appropriations and the net impact on water quantity for the Partridge River watershed is difficult at this time, due to the uncertainty of the status and design of each project. As discussed previously, it is expected that Minnesota Power would maintain Colby Lake water levels using water from the Whitewater Reservoir. Therefore, it is estimated that long-term average appropriations from Colby Lake would have minor adverse impacts to fish populations, boat access and property values, as the cumulative appropriation is not expected to reach historical levels of appropriation. However, fluctuation would then occur in the Whitewater Reservoir.

During historical periods when maximum appropriations from Colby Lake occurred, transfers of water from the reservoir caused short-term water level fluctuations therein of approximately 5 to 10 feet. Such water fluctuations could have adverse effects on fish populations, however, fish

populations and sizes have generally increased since stocking began, even while LTVSMC operated during most of that period of time. Water losses through leaky dikes in Whitewater Reservoir are estimated to be about 9,000 gallons per minute when the water levels in the reservoir are at high levels. An option for mitigating such fluctuations would be to repair its leaky dikes allowing for water in the reservoir system be more effectively stored. This would allow both Colby Lake and Whitewater Reservoir to be maintained at higher levels, and may allow for Whitewater Reservoir levels to be controlled through the overflow outlet to the St. Louis River, rather than leaving the lake through leakage and required pumping into Colby Lake. Further hydrologic modeling and investigations into limiting losses of water from Whitewater Reservoir would be conducted by Excelsior as part of the water appropriation permit process to demonstrate that Phase I and Phase II of the Mesaba Energy Project would not result in significant adverse impacts to regional water resources. Any credit ultimately ascribed to recovering waters leaking from Whitewater Reservoir would be required to be supported by in-depth studies conducted in conjunction with input from the MNDNR.

Water Quality

As the Mesaba Generating Station East Range Alternative would not discharge process or industrial wastewater, cumulative impacts from the project were not considered. There would be a small discharge of domestic (or sanitary) wastewater from the plant to the Hoyt Lakes WWTF, but this discharge is within the treatment capacity of the WWTF and should not result in significant pollutant loadings to the environment.

5.2.5 Wetlands

This section provides an analysis of cumulative wetland impacts within the defined Study Areas, as described below, for the West and East Range Site alternatives for the proposed Mesaba Energy Project in conjunction with other reasonably foreseeable future actions. This section represents a summary of a more detailed analysis by consultants to the project proponent, which is provided in its entirety in Appendix D4 **and was independently reviewed by DOE**.

The quantitative impact estimates from the analysis performed in this section are not completely consistent with results reported in Section 4.7 or Appendix D4 for two reasons: (1) This cumulative effects analysis was performed for defined study areas based on watersheds, as described below, therefore some of the associated project infrastructure, as described in Section 4.7, lies outside the study areas and is not included in this particular analysis. (2) This cumulative effects analysis includes potential impacts to wetlands that could occur in the interiors of potential rail line center loops; the analysis performed by the project proponent's consultants, which is included in Appendix D4, excluded these impacts. DOE determined that it would be most appropriate to include those potential impacts.

5.2.5.1 Study Areas

Because many of the primary functions performed by wetlands are closely related to the surrounding watershed, the study areas for the cumulative effects assessment was defined according to the limits of the affected subwatersheds for each alternative site.

West Range Site

The West Range Site is located within subwatersheds on the boundary between the Swan River and Prairie River watersheds. Therefore, the study area associated with the West Range site is defined as follows:

- That part of the Swan River watershed upstream of the point where Holman Lake discharges to the Swan River. The Holman Lake discharge point represents the point on the Swan River affected by discharge and drainage from the West Range Site; and
- That part of the Prairie River watershed upstream of Prairie Lake.

East Range Site

The East Range Site is located in a subwatershed of the Partridge River in St. Louis County, Minnesota. The study area of the East Range Site is defined as that portion of the Partridge River Watershed **approximately 5 miles downstream of the confluence with First Creek.**

5.2.5.2 Methodology

This analysis includes the evaluation of the incremental impact of the proposed project when added to other past, present, and reasonably foreseeable future actions. The proposed project was evaluated along with reasonably foreseeable future actions within the study area to determine the potential for cumulative effects on wetland resources for each alternative site. Determinations of past, present, and future conditions were performed as follows:

- **Past Conditions** – The past condition of wetland resources in the project area is defined as the condition that existed at the time of the NWI (1980s). The existing NWI data were used to represent the wetland area that existed at the time aerial photography was flown.
- **Existing Conditions** – Wetland areas estimated for the existing conditions were developed by compiling the following data:
    1) The NWI was used to identify wetlands in most areas, particularly where additional detailed information was unavailable. However, more accurate or more detailed data were used in place of NWI data, where available, as described in items 2 and 3 below.
    2) Wetlands shown to be disturbed by mining and other development and industry were identified through interpretation of aerial photography. Where wetlands were shown to be filled or otherwise obliterated, they were removed from the "existing wetlands" data.
    3) A "composite" wetlands layer was developed by deleting all of the NWI wetlands from the areas where additional data and/or photo interpretation show that wetlands have been impacted.
- **Future Conditions** – Wetland areas estimated for future conditions were developed by defining reasonably foreseeable future projects. Table 5.2.5-1 provides a summary of the projects considered reasonably foreseeable in each of the study areas. The potential effects of each project on existing wetland resources was estimated using the existing conditions wetland mapping described above and an assumed footprint of disturbance for each potential future project.

Table 5.2.5-1. Foreseeable Future Actions within the Defined Study Areas

West Range Site Study Area	East Range Site Study Area
Minnesota Steel Industries	PolyMet Mining NorthMet Project
Nashwauk Gas Pipeline	Mesabi Nugget **Phase II**
Itasca County Highway 7 Realignment	St. Louis County – new roadway from Hoyt Lakes to Babbitt
Itasca County Railroad	
Keetac Mine Expansion	

5.2.5.3 Cumulative Effects Analysis Results

Tables 5.2.5-2 and 5.2.5-3 provide the results of the analysis for the West Range Site and the East Range Site respectively. The impacts of the Mesaba Generating Station are limited to areas inside of the defined Study Areas that would be permanently impacted by being filled. Temporary impacts or changes in wetland type are not included in the analysis. In instances where infrastructure alternatives (e.g., alternative rail alignments) would produce differing impact acreages, the more conservative (larger) estimate was utilized.

Potential impacts to wetlands located within a proposed rail line center loop for **the East Range Site** were not included in the analysis in Appendix D4, because design specifications have not yet been finalized and permitting and mitigation specifics have not yet been made by applicable regulatory bodies. For the purposes of this section, the wetland acreages have been included for the rail loop based on the analysis in Section 4.7. These acreages are considered to represent the upper limits (worst case) of the wetland acreages that would be lost as a result of rail loop construction and operation.

Wetland impacts are considered losses of wetland areas primarily through the placement of construction fill. Impacts do not consider wetland mitigation scenarios, such as wetland restoration or creation, which would lessen impact totals. More detailed information on the study areas, past and existing conditions, foreseeable future actions, and impacts, including impacts by wetland type, is included in Appendix D4.

West Range Site

Table 5.2.5-2 describes the results of the cumulative wetland impacts analysis for the West Range Site within the defined study area that includes portions of the Swan River and Prairie River watersheds. Foreseeable future actions, including the Mesaba Generating Station, are anticipated to result in **1,845** acres of wetland impacts, which would represent a loss of 1**.5** percent of the total wetland acreage contained within the Study Area. The Mesaba Generating Station implemented at the West Range Site would affect approximately **37** acres of wetlands, which would represent a loss of approximately 0.**03** percent of the total wetlands currently within the Study Area. Therefore, the Mesaba Generating Station would account for **2** percent of the total wetland loss anticipated for all of the foreseeable future actions combined.

Table 5.2.5-2. West Range Site Cumulative Wetland Impacts Analysis Results

	Wetlands in Study Area (acres)	Wetland Impacts (acres)	Percent Loss of Wetlands	
			From Past	From Existing
Past – Circa 1980	128,917			
Existing – Circa 2006	125,322		2.8%	
Future Actions				
Mesaba Energy Project Impacts		**37**[4]		0.**03**%
Minnesota Steel Impacts[1]		1,163		0.93%
Nashwauk Gas Pipeline Impacts		26		0.02%
Highway 7 Realignment Impacts		2		0.001%
Itasca County Railroad Impacts		12		0.01%
Keetac Mine Expansion		**605**		**0.48%**
Total of Future Actions[2]		**1,845**		1.**47**%
Future – Circa 2026[3]	123,**477**			

[1] This impact acreage may be reduced to 945 depending upon the final site layout for the facility.
[2] This impact acreage may be reduced to **1,627** if the final site layout for the Minnesota Steel project affects 945 acres.
[3] This acreage may increase to **123,695** if only 945 acres of wetlands are impacted as a result of future actions.
[4] The 37 acres includes 31.36 acres for the Central IGCC plant footprint, 5.73 acres for Rail 3B, 0.19 acres for the access road and 0.01 acres for the HVTL Alt. 1
NOTE: See Section 5.2.5 for explanation of differences between this table and Appendix D4.

East Range Site

Table 5.2.5-3 describes the results of the cumulative wetland impacts analysis for the East Range Site within the defined study area that includes a portion of the Partridge River watershed. Foreseeable future actions, including the Mesaba Generating Station with worst-case rail loop impact, are anticipated to result in 1,**339** acres of wetland impacts, which would represent a loss of 4 percent of the total wetland acreage contained within the Study Area. The Mesaba Generating Station implemented at the East Range Site would affect approximately **82** acres of wetlands, including potential impacts to 48 acres within the center loop of the proposed rail line, which would represent a loss of approximately 0.25 percent of the total wetlands currently within the Study Area. Therefore, the Mesaba Generating Station would account for about 6 percent of the total wetland loss anticipated for all of the foreseeable future actions combined.

Table 5.2.5-3. East Range Site Cumulative Wetland Impacts Analysis Results

	Wetlands in Study Area (acres)	Wetland Impacts (acres)	Percent Loss of Wetlands	
			From Past	From Existing
Past – Circa 1980	34,500			
Existing – Circa 2006	33,212		3.7%	
Future Actions				
Mesaba Energy Project Impacts[1]		**82**[4]		0.25%
PolyMet Mining Corp.		1,257		3.78%
Mesabi Nugget[2]		unknown		0%
Roadway from Hoyt Lakes to Babbitt[3]		unknown		0%
Total of Future Actions		1,**339**		4.03%
Future – Circa 2026	31,**873**			

[1] This impact acreage includes potential impacts to **51** acres of wetlands located inside of proposed rail line center loop.
[2] Approximately **1,667** acres of wetlands have been identified within the boundaries of the Mesabi Nugget project; however it is currently unknown how much will actually be impacted by the project.
[3] At this time no specific footprint has been decided upon with respect to this potential roadway. Therefore, no impact acreage can be determined, however, due to the general planned location it is expected that construction would cause some wetland impacts.
[4] **The 82 acres includes 17.15 acres of the IGCC plant footprint, 13.38 for Rail 1, 0.44 for the access road, 0.09 for the HVTL, and 51 acres of indirect impacts to the center loop of the rail that would become isolated.**

5.2.6 Wildlife Habitat

This section provides an analysis of cumulative wildlife habitat impacts within the defined Study Areas, as described in Section 5.2.6.1, for the West and East Range Site alternatives for the proposed Mesaba Energy Project in conjunction with other reasonably foreseeable future actions. The analysis consists of two parts:

- The total amount of habitat, by habitat type, that would be impacted by the Mesaba Energy Project and the other foreseeable future actions as compared to the total amount of existing habitat within the Study Areas.
- The potential effects of the Mesaba Energy Project and the other foreseeable future actions to wildlife travel corridors across the Iron Range minerals formation within the Study Areas. These habitat travel corridors have been identified in a study by the MNDNR and documented in a report titled *Cumulative Effects Analysis on Wildlife Habitat Loss/Fragmentation and Wildlife Travel Corridor Obstruction/Landscape Barriers in the Mesabi Iron Range and Arrowhead Regions of Minnesota*. The MNDNR study examined the Iron Range minerals formation because this location represents a linear feature approximately 100 miles long that, due to substantial historic mining activities, has become a barrier for wildlife travel from the northwestern to southeastern portions of the Arrowhead Region in northern Minnesota. The study identified 13 existing travel corridors, of which three are located within the Study Area for the West Range Site and four are located within the Study Area for the East Range Site.

This analysis provides a summary of a more thorough cumulative effects analysis performed by the project proponent. The project proponent's analysis is included in this EIS as Appendix D5.

5.2.6.1 Study Areas

Since many of the primary wildlife habitat functions performed by vegetation communities are closely related to a surrounding watershed, the study areas for the cumulative effects assessment were defined according to the limits of the affected subwatersheds for each alternative site.

West Range Site

The West Range Site is located within subwatersheds on the boundary between the Swan River and Prairie River watersheds. Therefore, the study area associated with the West Range site is defined as follows:

- That part of the Swan River watershed upstream of the point where Holman Lake discharges to the Swan River. The Holman Lake discharge point represents the point on the Swan River affected by discharge and drainage from the West Range Site; and
- That part of the Prairie River watershed upstream of Prairie Lake.

East Range Site

The East Range Site is located in a subwatershed of the Partridge River. The study area of the East Range Site is defined as that portion of the Partridge River Watershed upstream of its confluence with the St. Louis River.

5.2.6.2 Methodology

This analysis to assess potential cumulative impacts to wildlife habitat included the evaluation of the incremental impact of the proposed project when added to other past, present, and reasonably foreseeable future actions. Determinations of past, present, and reasonably foreseeable future conditions were performed as follows:

- **Past Conditions** – The past condition of wildlife habitat was determined by utilizing MNDNR Gap Analysis Program land cover data in GIS software to determine areas that are presently disturbed by mining and development. Those areas were then considered locations that were at some point in the past covered by natural features and provided habitat for wildlife. Those estimates were combined with the total amount of currently existing natural habitat to provide a total estimate of the amount of habitat that existed without human disturbance within each Study Area.

- **Existing Conditions** – The existing condition was defined as the areal extent of habitat types described in the MNDNR **Gap Analysis Program** land cover data, which were mapped with GIS, in each Study Area.

- **Future Conditions** – Wildlife habitat areas estimated for future conditions were developed by defining reasonably foreseeable projects that would be expected to be implemented in the future. Table 5.2.6-1 provides a summary of the projects considered reasonably foreseeable in each of the study areas.

Table 5.2.6-1. Reasonably Foreseeable Future Actions within the Defined Study Areas

West Range Site Study Area	East Range Site Study Area
Minnesota Steel Industries	PolyMet Mining NorthMet Project
Nashwauk Gas Pipeline	Mesabi Nugget
Itasca County Highway 7 Realignment	St. Louis County – new roadway from Hoyt Lakes to Babbitt
Itasca County Railroad	
Keetac Mine Expansion	

Using the "Existing Conditions" GIS mapping described above and an assumed footprint of disturbance for each potential future action, potential habitat loss estimates were calculated for existing habitats. This provided data on the total area of each habitat type that would be impacted by the implementation of each action, which were then compared to total amounts currently existing in the Study Areas. For consideration of potential impacts to wildlife travel corridors, GIS data was used to spatially orient the MNDNR-defined wildlife travel corridors with the assumed footprints of disturbance for the potential future actions. Based on the relative locations of these features, the potential for impacts to the travel corridors was characterized based on best professional judgment. The analysis is focused on impacts to larger mammals as they are considered the most mobile terrestrial species.

The analysis included in this FEIS differs from the DEIS in terms of impact values; however, the overall conclusions generally remain the same. New GIS analyses were performed in order to produce more accurate impact calculations as well as a slightly more detailed habitat classification scheme. For example, in the DEIS, there was a single class of deciduous forest and in the FEIS there are five classes of deciduous vegetation (lowland deciduous forest, lowland deciduous shrubland, upland conifer/deciduous forest mix, upland deciduous forest [aspen/birch], and upland deciduous forest [hardwoods]). In particular, the impacts of the Minnesota Steel Industries project have been increased substantially. Also, for the West Range Site analysis, the Keetac Mine Expansion project was added to the list of reasonably foreseeable future actions.

5.2.6.3 Cumulative Effects Analysis Results

The impacts of the Mesaba Energy Project would be limited to areas inside the defined Study Areas that would be permanently impacted (e.g., wetlands filled, habitat conversion). In instances where infrastructure alternatives (e.g., alternative rail alignments) would produce differing impact acreages, the more conservative (larger) estimate was utilized. Wetland mitigation scenarios, such as wetland restoration or creation, which would lessen impact totals, were not considered for the cumulative impact analysis. Impacts from reasonably foreseeable future actions, other than the Mesaba Energy Project, were based on assumed site boundaries; therefore, these impacts may be reduced as facilities layouts within the site boundaries are finalized. For purposes of this analysis, it was conservatively assumed that the entire area within the site boundaries would be impacted by the actions. **Overall, the term impact refers to instances in which habitat would be permanently lost through placement of fill, excavation, or the placement of structures.**

West Range Site

Habitat Loss

Overall, the impacts of the combined foreseeable future actions, including the Mesaba Energy Project, on the Study Area for the West Range Site would include a loss of **1.4** percent of the total wildlife habitat as compared to existing conditions (Table 5.2.6-2). The habitat type that would experience the greatest amount of **relative** disturbance would be **upland** deciduous forest **(hardwoods)** at **2.9** percent **of the existing habitat within the study area** (Table 5.2.6-3). It is estimated that the existing conditions represent a loss of **3.2** percent in overall wildlife habitat in the Study Area as compared to past conditions (pre-human settlement) (Table 5.2.6-2).

Table 5.2.6-2. West Range Site Cumulative Wildlife Habitat Impacts Analysis Results

	Total Habitat in Study Area (acres)	Total Habitat Impacts (acres)	Percent Loss of Total Habitat		Proportion of Cumulative Impact
			From Past	From Existing	
Past	**400,052**				
Existing	**387,754**		**3.2**%		
Future Actions					
Mesaba Energy Project		**523**		**0.13%**	**9.5**%
Minnesota Steel		**3,324**		**0.9%**	**60.3**%
Nashwauk Gas Pipeline		**157**		**0.04%**	**2.8**%
Highway 7 Realignment		**59**		**0.0002%**	**1.1**%
Itasca County Railroad		**122**		**0.0003%**	**2.2**%
Keetac Mine Expansion		**1,324**		**0.3%**	**24.0%**
Total of Future Actions		**5,509**		**1.4%**	100%
Future	**382,245**				

Table 5.2.6-3. Total Habitat Impacts for Existing Conditions and Proportion Lost Due to Reasonably Foreseeable Future Actions within West Range Site Study Area

Habitat Type	Existing Conditions (acres)	Impacts of Reasonably Foreseeable Future Actions (acres)	Percent Loss Resulting from Implementation of Reasonably Foreseeable Future Actions
Open Wetland	7,763	113	1.5%
Lowland Deciduous Forest	8,172	26	0.3%
Lowland Deciduous Shrubland	46,527	946	2.0%
Lowland Conifer Forest	31,731	31	.001%
Lowland Conifer Shrubland	212	0	0%
Upland Conifer Forest	22,878	28	0.1%
Upland Conifer/Deciduous Forest Mix	100	0	0%
Upland Deciduous Forest (Aspen/Birch)	139,407	1,885	1.4%
Upland Deciduous Forest (Hardwoods)	12,234	350	2.9%
Upland Shrub/Woodland	64,509	1,465	2.3%
Water	34,281	526	1.5%
Cropland	3,381	35	1.0%
Grassland	16,559	104	0.6%
Total	**387,754**	**5,509**	**1.4%**

Potential impacts of the Mesaba Energy Project are listed in Table 5.2.6-4. The Mesaba Energy Project at the West Range Site would potentially result in a loss of **523** acres of wildlife habitat, which represents a loss of **0.13** percent of the total habitat within the Study Area. The habitat type that would experience the greatest impacts would be **upland deciduous forest (hardwoods)**, which would experience **a loss of 0.6 percent** of the existing acreage in the Study Area. **The total impact acreage presented in this FEIS (523 acres) is considerably less than the acreage shown in the DEIS (759 acres), which is due to alterations to the design of the project (see Chapter 2 for detailed descriptions of project elements). The main project alteration having an effect is the development of the preferred Rail Line Alternative 3B, which reduces impacts considerably as compared to the Rail Line Alternative 1A, which was included in this section of the DEIS.**

Table 5.2.6-4. Mesaba Energy Project Wildlife Habitat Impacts

Habitat Type	Habitat Impact (acres)	Percent Loss as Compared to Total Habitat within Study Area for Existing Conditions	Proportion of Cumulative Impact
Open Wetland	1	0.01%	0.9%
Lowland Deciduous Forest	9	0.1%	35%
Lowland Deciduous Shrubland	16	0.03%	1.7%
Lowland Conifer Forest	11	0.03%	35%
Lowland Conifer Shrubland	0	0%	0%
Upland Conifer Forest	5	0.02%	17.9%
Upland Conifer/Deciduous Forest Mix	0	0%	0%
Upland Deciduous Forest (Aspen/Birch)	291	0.2%	15.4%
Upland Deciduous Forest (Hardwoods)	69	0.6%	19.7%
Upland Shrub/Woodland	114	0.2%	7.8%
Water	1	0.003%	0.2%
Cropland	0	0%	0%
Grassland	6	0.04%	5.7%
Total	**523**	**0.13%**	**9.5%**

Potential impacts of the Minnesota Steel Industries project are listed in Table 5.2.6-5. This project would potentially result in a loss of **3,324** acres of wildlife habitat, which represents a loss of **0.9** percent of the total habitat within the Study Area. The habitat type that would experience the greatest impact would be **upland deciduous forest (hardwood)**, which would experience **a** loss of **1.9** percent as compared to existing conditions within the Study Area.

Table 5.2.6-5. Minnesota Steel Industries Wildlife Habitat Impacts

Habitat Type	Habitat Impact (acres)	Percent Loss as Compared to Total Habitat within Study Area for Existing Conditions	Proportion of Cumulative Impact
Open Wetland	91	1.2%	80.5%
Lowland Deciduous Forest	14	0.2%	53.8%
Lowland Deciduous Shrubland	677	1.5%	71.6%
Lowland Conifer Forest	13	0.04%	41.9%
Lowland Conifer Shrubland	0	0%	0%
Upland Conifer Forest	13	0.1%	46.4%
Upland Conifer/Deciduous Forest Mix	0	0%	0%
Upland Deciduous Forest (Aspen/Birch)	860	0.6%	45.6%
Upland Deciduous Forest (Hardwoods)	233	1.9%	66.6%
Upland Shrub/Woodland	960	1.5%	65.5%
Water	360	1.1%	68.4%
Cropland	33	1.0%	94.3%
Grassland	70	0.4%	67.3%
Total	**3,324**	**0.9%**	**60.3%**

Potential impacts of the Nashwauk Gas Pipeline project are listed in Table 5.2.6-6. This project would potentially result in a loss of **157** acres of wildlife habitat, which represents a loss of **0.04** percent of the total habitat within the Study Area. **Upland shrub/woodland** would experience the greatest impact with a loss of **0.07** percent of the total amount represented by the existing conditions.

Table 5.2.6-6. Nashwauk Gas Pipeline Wildlife Habitat Impacts

Habitat Type	Habitat Impact (acres)	Percent Loss as Compared to Total Habitat within Study Area for Existing Conditions	Proportion of Cumulative Impact
Open Wetland	0	0%	0%
Lowland Deciduous Forest	3	0.04%	11.5%
Lowland Deciduous Shrubland	13	0.03%	1.4%
Lowland Conifer Forest	5	0.02%	16.1%
Lowland Conifer Shrubland	0	0%	0%
Upland Conifer Forest	6	0.03%	21.4%
Upland Conifer/Deciduous Forest Mix	0	0%	0%
Upland Deciduous Forest (Aspen/Birch)	67	0.05%	3.6%
Upland Deciduous Forest (Hardwoods)	17	0.1%	4.9%
Upland Shrub/Woodland	42	0.07%	2.9%
Water	1	0.003%	0.2%
Cropland	0	0%	0%
Grassland	3	0.02%	2.9%
Total	**157**	**0.04%**	**2.8%**

Potential impacts of the Itasca County Highway 7 Realignment are listed in Table 5.2.6-7. This project would result in a potential loss of **59** acres of wildlife habitat, which represents a loss of **0.02** percent of the total habitat within the Study Area. The habitat type that would experience the greatest impact would be **upland shrub/woodland**, which would experience a loss of **0.04** percent as compared to existing conditions within the Study Area.

Table 5.2.6-7. Itasca County Highway 7 Realignment Wildlife Habitat Impact s

Habitat Type	Habitat Impact (acres)	Percent Loss as Compared to Total Habitat within Study Area for Existing Conditions	Proportion of Cumulative Impact
Open Wetland	0	0%	0%
Lowland Deciduous Forest	0	0%	0%
Lowland Deciduous Shrubland	0	0%	0%
Lowland Conifer Forest	0	0%	0%
Lowland Conifer Shrubland	0	0%	0%
Upland Conifer Forest	1	0.004%	3.6%
Upland Conifer/Deciduous Forest Mix	0	0%	0%
Upland Deciduous Forest (Aspen/Birch)	30	0.02%	1.6%
Upland Deciduous Forest (Hardwoods)	2	0.02%	0.6%
Upland Shrub/Woodland	24	0.04%	1.6%
Water	<1	0%	0%
Cropland	0	0%	0%
Grassland	2	0.01%	1.9%
Total	**59**	**0.02%**	**1.1%**

Potential impacts of the Itasca County Railroad project are listed in Table 5.2.6-8. This project would potentially result in a loss of **122** acres of wildlife habitat, which represents a loss of **0.03** percent of the total habitat within the Study Area. **Upland shrub/woodland** would experience the greatest impact with a loss of **0.06** percent of the total amount represented by the existing conditions.

Table 5.2.6-8. Itasca County Railroad Wildlife Habitat Impacts

Habitat Type	Habitat Impact (acres)	Percent Loss as Compared to Total Habitat within Study Area for Existing Conditions	Proportion of Cumulative Impact
Open Wetland	0	0%	0%
Lowland Deciduous Forest	<1	0%	0%
Lowland Deciduous Shrubland	3	0.006%	0.3%
Lowland Conifer Forest	<1	0%	0%
Lowland Conifer Shrubland	0	0%	0%
Upland Conifer Forest	0	0%	0%
Upland Conifer/Deciduous Forest Mix	0	0%	0%
Upland Deciduous Forest (Aspen/Birch)	72	0.05%	3.8%
Upland Deciduous Forest (Hardwoods)	3	0.02%	0.9%
Upland Shrub/Woodland	39	0.06%	2.7%
Water	4	0.01%	0.8%
Cropland	<1	0%	0%
Grassland	1	0.006%	1.0%
Total	**122**	**0.03%**	**2.2%**

Potential Impacts of the Keetac Mine Expansion are listed in Table 5.2.6-9. This project would potentially result in a loss of 1,324 acres of wildlife habitat, which represents a loss of 0.3 percent of the total habitat within the Study Area. Lowland deciduous shrubland and water would experience the greatest impact with losses of 0.5 percent of the total amount represented by the existing conditions.

Table 5.2.6-9. Keetac Mine Expansion Wildlife Habitat Impacts

Habitat Type	Habitat Impact (acres)	Percent Loss as Compared to Total Habitat within Study Area for Existing Conditions	Proportion of Cumulative Impact
Open Wetland	21	0.3%	18.6%
Lowland Deciduous Forest	0	0%	0%
Lowland Deciduous Shrubland	237	0.5%	25.1%
Lowland Conifer Forest	2	0.006%	6.5%
Lowland Conifer Shrubland	0	0%	0%
Upland Conifer Forest	3	0.01%	10.7%
Upland Conifer/Deciduous Forest Mix	0	0%	0%
Upland Deciduous Forest (Aspen/Birch)	565	0.4%	30.0%
Upland Deciduous Forest (Hardwoods)	26	0.2%	7.4%
Upland Shrub/Woodland	286	0.4%	19.5%
Water	160	0.5%	30.4%
Cropland	2	0.06%	5.7%
Grassland	22	0.1%	21.2%
Total	**1,324**	**0.3%**	**24.0%**

Development of the Mesaba Energy Project as well as the other foreseeable future actions would likely cause localized habitat fragmentation around areas of development. This fragmentation may cause direct mortality to wildlife species by restricting access to necessary resources for survival, such as food and water. Over time, fragmented areas may experience a decline in the number of species present, affecting species diversity. However, due to the fact that the Mesaba Energy Project and the other foreseeable future actions would be located in regions of Minnesota with large amounts of similar habitat surrounding them, fragmentation impacts would be expected to individuals only and not to a population of a particular species.

Wildlife Travel Corridors

There are three MNDNR-defined wildlife travel corridors located within the Study Area for the West Range Site – wildlife travel corridors #2, #3, and #4 (refer to Appendix D5, Figure 3). Wildlife travel corridor #2 could potentially be severely disrupted by the Mesaba Energy Project, Itasca CR 7 Realignment, Itasca County Railroad, and Nashwauk Gas Pipeline. The footprint of the Mesaba Generating Station would be located just north of the western boundary of this wildlife travel corridor. Development of the plant site would place a relatively large barrier to wildlife utilizing the wildlife travel corridor when entering or exiting to or from the northwest. The Itasca CR 7 Realignment would run along the northern and eastern boundary of wildlife travel corridor #2. The roadway would fragment existing habitat in the area, however, this would not be an impenetrable barrier for larger mammals to cross. It would be expected that the roadway would cause some direct mortality to species crossing the roadway that would be struck by vehicles. The Itasca County Railroad would run across the southeastern corner and the southern boundary of wildlife travel corridor #2. Similar to the effects of the Itasca CR 7 realignment, the railroad would fragment existing habitat in the area without creating an impenetrable barrier for larger mammals to cross. Direct mortality to species could result from being struck by moving locomotives. The Nashwauk Gas Pipeline would run northeast to southwest to the north of the eastern half of wildlife travel corridor #2 and would then turn and run north to south through the center of the wildlife travel corridor. Maintenance during the operation of the pipeline would most likely involve clearing of trees and shrubs in the ROW, which would result in a permanent habitat conversion within the right-of-way where forested areas would be converted to grasslands. This would fragment existing habitat, but would not cause an impenetrable barrier for larger mammals to cross.

Wildlife travel corridor #3 is located approximately two miles east of corridor #2. This corridor could be disrupted by the Itasca County Rail Alignment. The Itasca County Rail Alignment would run along the northern boundary of the wildlife travel corridor and would fragment existing habitat in the area without creating an impenetrable barrier for larger mammals to cross. The Nashwauk Gas Pipeline would run in an east to west direction approximately 0.75 miles north of wildlife travel corridor #3. The pipeline is far enough away from the corridor that no impacts would be expected to result.

Wildlife travel corridor #4 is located approximately two miles east of the proposed Minnesota Steel Industries site. No impacts from the Mesaba Energy Project or any of the other foreseeable future actions would be anticipated to occur to this corridor.

East Range Site

Habitat Loss

Overall, the impacts of the combined reasonably foreseeable future actions, including the Mesaba Energy Project, on the Study Area for the East Range Site would include a loss of **5.2** percent of total wildlife habitat as compared to existing conditions (Table 5.2.6-**10**). The habitat type that would experience the greatest amount of **relative** disturbance would be **lowland conifer shrubland** at **46.6** percent **of the existing habitat within the study area** (Table 5.2.6-**11**). It is estimated that the existing conditions represent a loss of **11.6** percent in overall wildlife habitat in the Study Area as compared to past conditions (pre-human settlement) (Table 5.2.6-**10**).

Table 5.2.6-10. East Range Site Cumulative Wildlife Habitat Impacts Analysis Results

	Total Habitat in Study Area (acres)	Total Habitat Impacts (acres)	Percent Loss of Total Habitat		Proportion of Cumulative Impact
			From Past	From Existing	
Past	**103,562**				
Existing	**92,758**		**11.6**%		
Future Actions					
Mesaba Energy Project		**433**		**0.5%**	**8.9%**
PolyMet Mining NorthMet Project		**2,956**		**3.2%**	**61.0%**
Mesabi Nugget		**1,456**		**1.6%**	**30.0%%**
Total of Future Actions		**4,845**		**5.2%**	**100.0**%
Future	**87,912**				

Table 5.2.6-11. Total Habitat for Existing Conditions and Proportion Lost Due to Reasonably Foreseeable Future Actions within East Range Study Area

Habitat Type	Existing Conditions	Impacts of Reasonably Foreseeable Future Actions (acres)	Percent Loss Resulting from Implementation of Foreseeable Future Actions
Open Wetland	1,585	15	0.9%
Lowland Deciduous Forest	1,555	20	1.3%
Lowland Deciduous Shrubland	14,868	244	1.6%
Lowland Conifer Forest	18,712	804	4.3%
Lowland Conifer Shrubland	702	327	46.6%
Upland Conifer Forest	12,418	1,267	10.2%
Upland Conifer/Deciduous Forest Mix	269	3	1.1%
Upland Deciduous Forest (Aspen/Birch)	27,579	1,558	5.6%
Upland Deciduous Forest (Hardwoods)	1,278	214	1.7%
Upland Shrub/Woodland	6,513	113	1.7%
Water	5,431	199	3.7%
Cropland	61	0	0%
Grassland	1,787	81	4.5%
Total	**92,758**	**4,845**	**5.2%**

Potential impacts of the Mesaba Energy Project are listed in Table 5.2.6-**12**. The Mesaba Energy Project would potentially result in a loss of **433** acres of wildlife habitat, which represents a loss of 0.5 percent of the total habitat within the Study Area. The habitat type that would experience the greatest impact would be grassland, which would experience **a** loss of **4.3** percent of the existing acreage in the Study Area.

Table 5.2.6-12. Mesaba Energy Project Wildlife Habitat Impacts

Habitat Type	Habitat Impact (acres)	Percent Loss as Compared to Total Habitat within Study Area for Existing Conditions	Proportion of Cumulative Impact
Open Wetland	3	0.9%	20.0%
Lowland Deciduous Forest	18	1.2%	90.0%
Lowland Deciduous Shrubland	34	0.2%	13.9%
Lowland Conifer Forest	9	0.05%	1.1%
Lowland Conifer Shrubland	2	0.3%	0.6%
Upland Conifer Forest	21	0.2%	1.7%
Upland Conifer/Deciduous Forest Mix	1	0.4%	33.3%
Upland Deciduous Forest (Aspen/Birch)	218	0.8%	14.0%
Upland Deciduous Forest (Hardwoods)	1	0.08%	0.5%
Upland Shrub/Woodland	42	0.6%	37.2%
Water	7	0.1%	3.5%
Cropland	0	0%	0%
Grassland	77	4.3%	95.0%
Total	**433**	**0.5%**	**8.9%**

Potential impacts of the PolyMet Mining NorthMet Project are listed in Table 5.2.6-**13**. This project would potentially result in a loss of **2,956** acres of wildlife habitat, which represents a loss of **3.1** percent of the total habitat within the Study Area. The habitat type that would experience the greatest impacts would be **upland conifer forest**, which would experience **a** loss of **9.7** percent as compared to existing conditions within the Study Area.

Table 5.2.6-13. PolyMet Mining NorthMet Project Wildlife Habitat Impacts

Habitat Type	Habitat Impact (acres)	Percent Loss as Compared to Total Habitat within Study Area for Existing Conditions	Proportion of Cumulative Impact
Open Wetland	12	0.8%	80.0%
Lowland Deciduous Forest	1	0.06%	5.0%
Lowland Deciduous Shrubland	199	1.3%	81.6%
Lowland Conifer Forest	786	4.2%	97.8%
Lowland Conifer Shrubland	7	1.0%	2.1%
Upland Conifer Forest	1,201	9.7%	94.8%
Upland Conifer/Deciduous Forest Mix	2	0.7%	66.7%
Upland Deciduous Forest (Aspen/Birch)	640	2.3%	41.0%
Upland Deciduous Forest (Hardwoods)	23	1.8%	10.7%
Upland Shrub/Woodland	71	1.1%	62.8%
Water	10	0.2%	5.0%
Cropland	0	0%	0%
Grassland	4	0.2%	4.9%
Total	**2,956**	**3.1%**	**61.0%**

Potential impacts of the Mesabi Nugget project are listed in Table 5.2.6-**14**. This project would result in a potential loss of **1,456** acres of wildlife habitat, which represents a loss of 1.6 percent of the total habitat within the Study Area. **Lowland conifer shrubland** would experience the greatest impact with a loss of **45.3** percent of the total amount represented by the existing conditions.

Table 5.2.6-14. Mesabi Nugget Wildlife Habitat Impacts

Habitat Type	Habitat Impact (acres)	Percent Loss as Compared to Total Habitat within Study Area for Existing Conditions	Proportion of Cumulative Impact
Open Wetland	0	0%	0%
Lowland Deciduous Forest	1	0.06%	5.0%
Lowland Deciduous Shrubland	11	0.07%	4.5%
Lowland Conifer Forest	9	0.05%	1.1%
Lowland Conifer Shrubland	318	45.3%	97.2%
Upland Conifer Forest	45	0.4%	3.6%
Upland Conifer/Deciduous Forest Mix	0	0%	0%
Upland Deciduous Forest (Aspen/Birch)	700	2.5%	4.5%
Upland Deciduous Forest (Hardwoods)	190	14.9%	88.8%
Upland Shrub/Woodland	0	0%	0%
Water	182	3.4%	91.5%
Cropland	0	0%	0%
Grassland	0	0%	0%
Total	**1,456**	**1.6%**	**30.1%**

There is currently no information available for a footprint for the anticipated St. Louis County roadway from Hoyt Lakes to Babbitt; therefore, no quantitative information could be included in this analysis. However, due to the general planned location of the roadway, it is assumed that construction of it would result in wildlife habitat impacts.

It is generally assumed that development of the Mesaba Energy Project, as well as the other foreseeable future actions, would cause some localized habitat fragmentation around areas of development. This fragmentation may cause some direct mortality to wildlife species resulting from those individuals being restricted from obtaining necessary resources for survival, such as food and water. Over time, fragmented areas may become less populous of species causing overall habitat quality to decline. However, because the Mesaba Energy Project and the other foreseeable future actions are located in regions of Minnesota with large amounts of similar habitat surrounding them, fragmentation impacts are expected to result at the level of the individual and not to a population-wide level.

Wildlife Travel Corridors

There are four MNDNR-defined wildlife travel corridors located entirely or partially within the Study Area – wildlife travel corridors #9, #10, #11, and #12 (refer to Appendix D5, Figure 4). Wildlife travel corridor #10 could be substantially affected by the Mesabi Nugget project to the point that the corridor could be rendered unusable by wildlife. The assumed footprint for the project shows the entire northern boundary of the corridor being impacted, which would completely remove this area from being a viable wildlife movement corridor. However, the final site layout for the project with locations of facilities and ground disturbances would have to be analyzed to confirm or deny this assumption.

Wildlife travel corridor #11 could possibly be affected by the PolyMet Mining NorthMet Project. The PolyMet project would be located approximately one mile northwest of the corridor and it appears that the project could remove a large area of habitat that would affect the ability of wildlife to cross through into habitats to the north and south. However, the final site layout for the project with locations of facilities and ground disturbances would be necessary to determine if it would affect corridor #11.

Wildlife travel corridors #9 and #12 are both located on the boundary of the Study Area and would not be impacted by the Mesaba Energy Project or any of the foreseeable future projects.

The Study Area and the locations of the Mesaba Energy Project and the other reasonably foreseeable future actions have been historically used for mining activities. Both Mesabi Nugget and the PolyMet Mining NorthMet Project would be located on lands that have been degraded by previous mining activities. Therefore, the majority of the areas that would be impacted by the proposed projects have historically been disturbed.

5.2.7 Rail Traffic

As discussed in Section 3.15, the BNSF and CN rail lines are well established in the Arrowhead Region and experience infrequent to moderately frequent rail traffic on a daily basis. Any additional rail traffic would have the potential to cause increased noise and vibration levels along the rail lines and increased traffic congestion, delays, and safety hazards at public grade rail crossings. Due to current rail traffic along the existing rail lines, cumulative rail impacts would primarily result from the increase in the number, size, and frequency of trains proposed to result from the Mesaba Energy Project and other reasonably foreseeable projects. The cumulative impacts analysis from increased rail use is focused on the potential routes provided by the railways that would serve the Mesaba Generating Station. More specifically, the region of influence for the West Range Site includes the BNSF line from Grand Rapids to Hibbing. For the East Range Site, the region of influence includes the CN line from Iron Junction to Hoyt Lakes (see Appendix D6).

As discussed in Chapter 2, a small segment of rail between Gunn and the proposed West Range Site is currently inoperable due to rising water levels in the CMP. From the 1990's to 2001, this track was experiencing approximately four trains per day and even higher levels during the 1970s. As of October 2006, the Itasca County Regional Rail Authority has been soliciting interest for a shortline railroad operator to provide switching service along this line. The County is currently under contract with a consultant to design and permit the track, and operation is anticipated to begin April of 2009, which would provide a direct eastbound route from Grand Rapids to the West Range Site. Service along this route would most likely return to similar operating conditions when the track was serviceable during the 1990s and local train service would likely resume between Grand Rapids and Superior, Wisconsin. Currently, an estimated six trains daily pass through Grand Rapids in either direction (Excelsior, 2006c).

Once this segment returns to its prior operating condition, Minnesota Steel would satisfy their transport requirements through the base local train trips that would otherwise occur under these conditions. As a result, additional train trips are not expected to be generated by Minnesota Steel, and cumulative impacts related to rail traffic would be substantially similar to those described in Section 4.15 for the West Range Site.

5.2.7.1 Emergency Response

Potential congestion and delays at rail crossings may be a mere nuisance to everyday motorists; however, these delays may mean significant reductions in response time for emergency vehicles, which could result in increased loss of life or property damage. Since emergencies and train crossings are random events, predicting the likelihood of a passing train delaying an emergency vehicle and the length of delay becomes a complicated matter. In responding to an emergency, an emergency vehicle may encounter one of the following scenarios at a grade crossing:

- Not encounter a train and pass without delay through the crossing;
- Arrive at a crossing just as the train arrives and be required to wait the full train pass-by event or detour to the nearest unblocked or nearest grade-separated crossing;
- Arrive during the train crossing. Under this circumstance, the emergency vehicle could utilize the oncoming traffic lane to approach the crossing, avoiding any vehicle queue; or
- Arrive near the end of a train pass-by event and be required to make its way through traffic that has built up during the event.

The amount of time a crossing is blocked is based on the length of the train and the speed of travel. The faster a train is moving and/or the shorter the train length, the less time the crossing would be blocked. To analyze the cumulative impacts that additional train traffic would impose on emergency response vehicles at grade crossings, the time each crossing would be blocked per train crossing event was determined by assuming a length of train and the speed at which it was traveling. The estimated delay time also includes the time for the train to pass along with time for active warning devices to be deployed and restored after a train had passed (an additional 20 seconds). Since trains in the region typically travel at speeds ranging between 12 and 50 miles per hour, a traveling speed of 25 miles per hour was used for calculations concerning potential vehicle delay from non-project-related trains; for projected-related trains, a speed of 10 miles per hour was used as a conservative estimate based on the rail noise analysis in Section 4.18. Therefore, the blocked crossing time per train passing event for trains resulting from the project was estimated to be approximately 8 minutes for a 115-car train (approximately 7,000 feet) and 9 minutes for a 135-car train (approximately 8,000 feet). For other trains not related to the project, delays would be 3.2 minutes for a 115-car train and 3.6 minutes for a135-car train. The numbers of trains passing through any grade crossing within the regions of influence for the West Range Site and East Range Site are based on estimates provided in Appendix D6, which count each round trip on a rail line as 2 trains per day passing a given crossing. The potential delay times associated with current and reasonably foreseeable projects at both sites are listed in Table 5.2.7-1. These delays are considered conservative estimates and would be shorter at crossings farther away from the plant site, where project-related trains would travel at speeds greater than 10 miles per hour.

The delay time per unit train (i.e., delay time per train crossing event) shown in Table 5.2.7-1 represents the maximum delay time that an emergency vehicle would experience if it arrived at the beginning of a train crossing event. Since details of future train operations for the reasonably foreseeable projects are speculative at this time, conservative estimates on the number of cars per unit train were used to determine more conservative delay times. Discussions on how these delay times would affect each potential project site are provided below.

Table 5.2.7-1. Grade Rail Crossing Delay Times

	Number of cars per unit train	Delay time per unit train	Number of trains crossing per day	Total delay time per day
West Range Site				
Base train traffic	135 cars	3.6 minutes	6 trains (either direction)	21.6 minutes
Minnesota Steel, Inc.	90 cars	-	(included in base traffic)	-
Mesaba Generation Station	135 cars	9 minutes	4 trains (2 round trips*)	36 minutes
			Total	57.6 minutes
East Range Site				
Base train traffic	135 cars	3.6 minutes	12 trains (either direction)	43.2 minutes
Mesabi Nugget	115 cars	3.2 minutes	2 trains (1 round trip)	6.4 minutes
PolyMet	135 cars	3.6 minutes	2 trains (1 round trip)	7.2 minutes
Mesaba Generation Station	135 cars	9 minutes	4 trains (2 round trips*)	36 minutes
			Total	**92.8 minutes**

Source: Excelsior, 2006c
Note: *Maximum for Phases I and II assuming 5 deliveries every 4 days (Excelsior, 2006b)

West Range Site

As shown in Table 5.2.7-1, trains in the West Range Site vicinity could result in a total of 57.6 minutes of delay at the grade crossings each day, which represents a 4 percent probability that an emergency vehicle would be delayed at a grade intersection on any given day. As previously mentioned, Minnesota Steel, Inc. would be the only other reasonably foreseeable project within the region of influence and their transport needs would be accommodated with rail cars in the expected base traffic level. Therefore, from a cumulative standpoint, the time delay estimate for the West Range Site would most likely be equivalent to the estimate predicted in Section 4.13.3.2. However, to account for the unlikely event that the inoperable rail line between Gunn and Taconite could not be renovated, potential impacts to grade crossing delays resulting from Minnesota Steel's activities have been included for comparison. Under these circumstances, trains traveling eastbound from Grand Rapids would be required to detour south and loop back north to access the Taconite area.

West of the West Range Site, the BNSF rail line between Grand Rapids and Taconite comprises a total of 17 grade rail crossings, including eight in Grand Rapids, one in Coleraine, and two in Taconite. This rail line also includes grade-separated crossings at US 169 and US 2 on the northeastern outskirts of Grand Rapids and one at CR 7 near the project site. East of the West Range Site, the BNSF line between Hibbing and Taconite there are eight grade rail crossings and five grade-separated crossings (see Appendix D6).

The BNSF portion west of the site bisects the city of Grand Rapids. The Grand Itasca Clinic and Hospital is located on the south side of the railroad tracks and because of the rural nature of the region, limited road access to many areas could impede the movement of emergency vehicles. A number of emergency providers, including hospitals and the Itasca County Sheriff's Department were contacted to determine whether there were formal procedures to follow in the event of train passes. All had indicated that there were no specific procedures that were followed. The only grade rail crossings that could create a potential delay for emergency vehicles are in Grand Rapids and in Taconite because there are no grade-separated rail crossings within the city limits. Therefore, emergency vehicles stop and wait for trains to pass or take an indirect route around the train if possible. The only city that has one grade rail railroad crossing and no other means of crossing the railroad is Taconite (Clark, 2006). According to the Deputy Sheriff of the Itasca Sheriff's Department, all other communities between Grand Rapids and Nashwauk, have a bridge crossing and, therefore, do not typically have delay problems at grade crossings.

East Range Site

Rail lines serving the East Range Site have grade crossings at eight locations between Hoyt Lakes and Clinton Township south of Iron Junction, including one crossing in Aurora, one near McKinley, and three near Iron Junction (see Appendix D6). As shown in Table 5.2.7-1, trains in the East Range Site vicinity could result in a total of 92.8 minutes of delay at the grade crossings each day, which represents a 6.4 percent probability that an emergency vehicle would be delayed at a grade intersection on any given day.

Since most of the city limits of the communities near the East Range Site are located wholly on either the north or south sides of the rail line, there would be limited potential for delays at rail compared to the West Range Site. The only grade railroad crossing of concern to emergency response vehicles would be in Aurora – the grade crossing on Main Street is the only one in town. At this location, emergency vehicles would have no other choice, but to wait for the train to pass. All of the other grade rail crossings within the region of influence currently are not a concern, because most of the areas have access to at least one grade-separated crossing within a reasonable distance for re-routing, if necessary.

5.2.7.2 Public Safety at Grade Rail Crossings

The potential increase in risk of accidents at grade crossings is a public safety concern. The Proposed Action would not create new grade crossings; however, the increase in rail usage could increase the likelihood of a rail crossing accident along the existing rail corridors. The rail corridors within the regions of influence at the West Range and East Range Sites already experience daily rail traffic. Therefore, cumulative rail impacts on hazards at-grade crossings would primarily result from the increase in the frequency as a result of the Mesaba Energy Project and other reasonably foreseeable projects.

The most recent five years of accident history that was available at each grade crossing within the regions of influence were examined. In general, because there is relatively little traffic in the regions of influence, there were very few incidents at grade crossings reported in all of Itasca and St Louis Counties. Only two accidents occurred at grade crossings between Grand Rapids and Hibbing – one occurred in Grand Rapids at 3rd Avenue, NE, which employs passive warning signs (crossbuck signs), and the other incident occurred in Keewatin at 1st Street, which employs active signaling (flashing lights and sound).

No incidents were reported in the region of influence for the East Range Site. Rail data for the past five years indicate that there are no planned or recommended improvements to existing safety guards at the grade crossings. Due to the low frequency of accidents at the grade crossings, it is assumed that the level of protection is adequate for the current level of traffic. It is expected that any additional increase in safety hazards would remain low as the incremental addition of trains (see Table 5.2.7-1) is small.

5.2.7.3 Noise and Vibration

Noise and vibration generated by the rail operations have the potential to affect sensitive noise receptors near the rail corridors. Noise sources from rail operations include diesel locomotive engine and exhaust noise, wheel/rail interaction noise (collectively referred to as wayside noise) and horn noise. Wayside noise affects all locations along the rail corridor. Horn noise is an additional noise source at and near grade crossings where trains are required by law to sound a horn for safety.

Since the new rail alignments for the Mesaba Energy Project would be in the proximity of the proposed plant and away from population centers, the cumulative impact discussion on noise and vibration is mainly concerned with the existing rail corridors. Hence, the sounds associated with rail traffic are already part of the existing environment within the regions of influence. The number of sensitive noise receptors and magnitude of noise and vibration levels that would be experienced by the receptors as analyzed in Section 4.18 would generally remain the same, as only one train pass-by would occur at any given time. Therefore, cumulative noise and vibration impacts at the West Range and East Range Sites are expected to be substantially similar under the Proposed Action discussed in Section 4.18.

The frequency at which these impacts occur would increase as the frequency of train traffic would increase. However, as these are on established rail lines, it is expected that the incremental addition of train events would not cause significantly different impacts of the noise and vibration levels. This increase in occurrence of vibration events would present an inconvenience or annoyance to individuals experiencing it, but they would not be expected to cause any structural damage or significant reduction in individuals' quality of life. The most significant increase in noise levels would result from the increased occurrence of train horns at public grade crossings. Since these soundings are required by law to enhance safety of grade crossings the number of instances related to horn sounds would be equal to the number of additional grade crossings. This noise impact is considered a minor tradeoff when considered in the context of the safety benefits. Past FRA studies have indicated that banning whistles had averaged approximately 80 percent more collisions than comparable crossings where whistles were sounded (FRA, 1999).

5.2.8 Greenhouse Gases and Climate Change

5.2.8.1 Background

Greenhouse gases include water vapor, CO_2, methane, N_2O, ozone, and many chlorofluorocarbons. After water vapor, CO_2 is the most abundant greenhouse gas and, unlike water vapor, remains in the atmosphere for long periods of time and tends to mix quickly and evenly throughout the lower levels of the global atmosphere. Many anthropogenic activities release these gases. In the United States, CO_2 emission sources include energy facilities (primarily from fossil fuel combustion) and industrial plants. Industrial processes that emit these gases include cement manufacture, limestone and dolomite calcination, soda ash manufacture and consumption, CO_2 manufacture, and aluminum production (EIA, 2007b).

In the pre-industrial era (before 1750 AD), the concentration of CO_2 in the atmosphere appears to have been in the range of 275-285 ppm (IPCC, 2007c). In 1958, C.D. Keeling and others began measuring the concentration of atmospheric CO_2 at Mauna Loa in Hawaii (Keeling et al., 1976). The data collected by Keeling's team and others since then indicate that the amount of CO_2 in the atmosphere has been steadily increasing from about 316 ppm in 1959 to 386 ppm in 2008 (NOAA, 2009). This secular increase in atmospheric CO_2 is attributed almost entirely to the anthropogenic

activities noted above. In addition, industrial and agricultural activities release greenhouse gases other than CO_2 – notably methane, nitrous oxides, ozone and chlorofluorocarbons – to the atmosphere, where they can remain for long periods of time.

5.2.8.2 The Impacts of Greenhouse Gases on Climate

Climate is usually defined as the "average weather" of a region, or more rigorously as the statistical description of a region's weather in terms of the means and variability of relevant parameters over time periods ranging from months to thousands of years. The relevant parameters include temperature, precipitation, wind, and dates of meteorological events such as first and last frosts, beginning and end of rainy seasons, and appearance and disappearance of pack ice. Because greenhouse gases in the atmosphere absorb energy that would otherwise radiate into space, the possibility that anthropogenic releases of these gases could result in warming that might eventually alter climate was recognized soon after the data from Mauna Loa and elsewhere confirmed that the atmosphere's content of CO_2 was steadily increasing (IPCC, 2007c).

Changes in climate are difficult to detect because of the natural and complex variability in meteorological patterns over long periods of time and across broad geographical regions.[1] There is much uncertainty regarding the extent of global warming caused by anthropogenic greenhouse gases, the climate changes this warming has or will produce, and the appropriate strategies for stabilizing the concentrations of greenhouse gases in the atmosphere. The World Meteorological Organization and United Nations Environment Programme established the Intergovernmental Panel on Climate Change (IPCC) to provide an objective source of information about global warming and climate change, and the IPCC's reports are generally considered to be an authoritative source of information on these issues.

According to the IPCC Fourth Assessment Report, "*Warming of the climate system is unequivocal, as is now evident from observations of increases in global average air and ocean temperatures, widespread melting of snow and ice and rising global average sea level*" (IPCC, 2007c). The IPCC report finds that the global average surface temperature has increased by about 0.74°C in the last 100 years; global average sea level has risen about 150 millimeters over the same period; and cold days, cold nights and frosts over most land areas have become less frequent during the past 50 years. The report concludes that most of the temperature increase since the middle of the 20th century "*is very likely due to the observed increase in anthropogenic [greenhouse gas] concentrations*."

The 2007 report estimates that, at present, CO_2 accounts for about 77 percent of the global warming potential attributable to anthropogenic releases of greenhouse gases, with the vast majority (74 percent) of this CO_2 coming from the combustion of fossil fuels. Although the report considers a wide range of future scenarios regarding greenhouse gas emissions, CO_2 would continue to contribute more than 70 percent of the total warming potential under all of the scenarios. The IPCC therefore believes that further warming is inevitable, but that this warming and its effects on climate could be mitigated by stabilizing the atmosphere's concentration of carbon dioxide through the use of: (1) "low-carbon technologies" for power production and industrial processes; (2) more efficient use of energy; and (3) management of terrestrial ecosystems to capture atmospheric CO_2 (IPCC, 2007c).

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[1] Detection of these types of changes was also difficult because of the limited tools that were available for collecting data and for modeling climate systems. However, scientific advances over the last 20 years have vastly improved the tools available for climatological research.

5.2.8.3 Environmental Impacts of Climate Change

The IPCC and the U.S. Climate Change Science Program have examined the potential environmental impacts of climate change at global, national and regional scales. The IPCC report states that, in addition to increases in global surface temperatures, the impacts of climate change on the global environment may include:

- **More frequent heat waves, droughts, and fires;**
- **Rising sea levels and coastal flooding; Melting glaciers, ice caps and polar ice sheets;**
- **More severe hurricane activity and increases in frequency and intensity of severe precipitation;**
- **Spread of infectious diseases to new regions;**
- **Loss of wildlife habitats; and**
- **Heart and respiratory ailments from higher concentrations of ground-level ozone (IPCC, 2007c).**

On a national scale, average surface temperatures in the United States have increased, with the last decade being the warmest in more than a century of direct observations (CCSP, 2008b). Impacts on the environment attributed to climate change that have been observed in North America include:

- **Extended periods of high fire risk and large increases in burned area;**
- **Increased intensity, duration, and frequency of heat waves;**
- **Decreased snow pack, increased winter and early spring flooding potentials, and reduced summer stream flows in the western mountains; and**
- **Increased stress on biological communities and habitat in coastal areas (IPCC, 2007c).**

On a regional scale, there is greater natural variability in climate parameters that makes it difficult to attribute particular environmental impacts to climate change (IPCC, 2007c). However, based on observational evidence, there is likely to be an increasing degree of impacts such as coral reef bleaching, loss of specific wildlife habitats, reductions in the area of certain ecosystems, and smaller yields of major cereal crops in the tropics (IPCC, 2007c). For the northern hemisphere, regional climate change could affect physical and biological systems, agriculture, forests, and amounts of allergenic pollens (IPCC, 2007c).[2]

In the region where the Mesaba Generating Station would be located, the average temperature over the last century has increased slightly from 43.9°F (1888-1917 average) to 44.9°F (1963-1992 average)[3] and precipitation in some areas of Minnesota has increased by up to 20 percent (EPA, 1997). During the next century, Minnesota's climate may change even more – the IPCC predicts that the largest increases in future temperatures are likely to occur in the northern latitudes (IPCC, 2007c).

A report by the Union of Concerned Scientists and the Ecological Society of America identifies other potential impacts of global climate change on the Great Lakes region. The report describes potential impacts on regional wildlife and habitats that could change the distribution of aquatic

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[2] The IPCC report provides more detailed information on the current and potential environmental impacts of climate change and on how climate may change in the future under various scenarios of greenhouse gas emissions.

[3] Temperature measurements for Minneapolis, Minnesota.

species, cause the northward movement of species typical of southern ecosystems, reduce the number of boreal species in the region, and change the composition of forests (Kling et al., 2003).

5.2.8.4 Addressing Climate Change

Because climate change is a cumulative phenomenon produced by releases of greenhouse gases from industry, agriculture and land use changes around the world, it is generally accepted that any successful strategy to address it must rest on a global approach to controlling these emissions. In other words, imposing controls on one industry or in one country is unlikely to be an effective strategy. In addition, because greenhouse gases remain in the atmosphere for a long time and industrial societies will continue to use fossil fuels for at least 25-50 years, climate change cannot be avoided. As the IPCC report states, "*Societies can respond to climate change by adapting to its impacts and by reducing [greenhouse gas] emissions (mitigation), thereby reducing the rate and magnitude of change*" (IPCC, 2007c).

According to the IPCC, there is a wide array of adaptation options. While adaptation will be an important aspect of reducing societies' vulnerability to the impacts of climate change over the next two to three decades, "*adaptation alone is not expected to cope with all the projected effects of climate change, especially not over the long term as most impacts increase in magnitude*" (IPCC, 2007c). Therefore, it will also be necessary to mitigate climate change by stabilizing the concentrations of greenhouse gases in the atmosphere. Because these gases remain in the atmosphere for long periods of time, stabilizing their atmospheric concentrations will require societies to reduce their annual emissions. The stabilization concentration of a particular greenhouse gas is determined by the date that annual emissions of the gas start to decrease, the rate of decrease, and the persistence of the gas in the atmosphere. The IPCC report predicts the magnitude of climate change impacts for a range of scenarios based on different stabilization levels of greenhouse gases. "*Responding to climate change involves an iterative risk management process that includes both mitigation and adaptation, taking into account actual and avoided climate change damages, co-benefits, sustainability, equity, and attitudes to risk*" (IPCC, 2007c).

5.2.8.5 Climate Change, Greenhouse Gases, and the Mesaba Project

As discussed in Section 2.2.3.1, DOE estimates that annual emissions of greenhouse gases from the Mesaba Generating Station would be approximately 11.2 million tons per year of CO_2-equivalents. Over the 20-year commercial life of the project, total emissions would be approximately 224 million tons. These emissions, without mitigation, would add to the approximately 2.6 billion tons (2.4 billion metric tonnes) of energy-related CO_2 emissions released annually by the electric power sector in the United States. Coal-fired power plants account for 2.1 billion tons (1.9 billion metric tonnes) of that amount (EIA, 2008). Globally, 54 billion tons (49 billion metric tonnes) of CO_2-equivalent anthropogenic greenhouse gases are emitted annually, with fossil fuel combustion contributing about 32 billion tons (29 billion metric tonnes). However, it cannot be assumed that, if the Mesaba Generating Station were not built, these additional emissions would be avoided – other fossil fuel power plants might be constructed in its stead, or existing plants might produce more power, thereby increasing their CO_2 emissions.

As noted earlier, emissions of greenhouse gases from the proposed power plant by themselves would not have a direct impact on the environment in the proposed plant's vicinity; neither would these emissions, by themselves, cause appreciable global warming that would lead to climate changes. However, these emissions would increase the atmosphere's concentration of greenhouse gases, and, in combination with past and future emissions from all other sources, contribute incrementally the global warming that produces the adverse effects of climate change described above. At present there is no methodology which would allow DOE to estimate the specific impacts (if any) this increment of warming would produce in the vicinity of the plant or elsewhere.

5.2.8.6 Potential Mitigation through Carbon Capture and Sequestration

The estimates of emissions from the Mesaba Energy Project do not account for any CO_2 removal that could occur as a result of the addition of carbon capture and sequestration systems. The project would be designed to be carbon-capture adaptable (Excelsior, 2006f). The project proponent, Excelsior Energy, has a plan for carbon capture and sequestration with regards to the Project (Excelsior, 2006f). The plan identifies opportunities for CO_2 emissions capture and sequestration from IGCC power plants. Additionally, the plan sets out options for meeting obligations to reduce greenhouse gas emissions that may be imposed on coal-fired power plants in the future. Appendix A provides further details of the carbon capture and sequestration plan. The potential impacts of implementing the plan are addressed in Section 5.1.2.1.

It is important to keep in mind the nature and extent of DOE's proposed action with regard to the Mesaba Generating Station – it is to provide $36 million in funding to Excelsior for a project with a total cost of about $2.16 billion (based on the Cooperative Agreement). About $22 million of that funding has already been made available to Excelsior to allow for it and DOE to share the costs of developing project information (such as project definition, preliminary design, and environmental studies and permitting) needed for this EIS.[4] If DOE were to decide to refrain from providing this funding – or to make installation of carbon capture and sequestration technology a prerequisite for such funding – Excelsior could still decide to build the power plant using other sources of funds.

5.2.8.7 Climate Change, Greenhouse Gases, and the Clean Coal Power Initiative

As described in more detail in Section 1.2, the Clean Coal Power Initiative (CCPI) provides funding to the private sector for projects intended to demonstrate the commercial potential of advanced technologies that could improve the performance of coal-fired power plants as to energy efficiency, pollution control, and cost of operation. DOE selected the Mesaba proposal in Round 2 of a competitive solicitation for projects that would demonstrate advanced power generation technologies that could result in, among other things, better environmental and economic performance.[5] DOE selected this project because of its potential to demonstrate the commercial-readiness of the Conoco Phillips E-Gas™ technology in a fully integrated, utility-scaled IGCC facility. This technology offers, among other advantages, enhanced environmental performance, and increased efficiency. These enhanced performance features include carbon beds for mercury control, ZLD for process and cooling water blowdown, and a CO_2 capture-ready design.

Increased efficiencies can result in small but cumulatively significant reductions in CO_2 emissions from power stations because less fuel is burned in producing each kilowatt hour of electricity. Producing power with IGCC units can facilitate carbon capture because the volume of the gas stream from which the CO_2 would be removed is much smaller; it is a pre-combustion stream and at a higher pressure than the exhaust gas of a pulverized coal unit. In Round 3 of CCPI, DOE has offered funding for projects that would demonstrate carbon capture and sequestration technologies (Funding Opportunity Number DE-FOA-0000042 available at http://www.fossil.energy.gov/programs/sequestration/publications/arra/DE-FOA-0000042.pdf).

Demonstrations of technologies that increase efficiency, facilitate carbon capture, and sequester CO_2 are important steps in developing strategies for stabilizing atmospheric concentrations of

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[4] DOE may also provide a loan guarantee to Excelsior under the EPAct of 2005 for a portion of the private financing of the Mesaba project.

[5] One particular aspect of environmental improvements DOE sought in Round 2 was reduction of mercury emissions.

greenhouse gases. The IPCC report states that there is "high agreement" that atmospheric concentrations can be stabilized by "*deployment of a portfolio of technologies that are either currently available or expected to be commercialized in coming decades assuming that appropriate and effective incentives are in place for their development.*" It identifies carbon capture and storage for coal-fired power plants as one of the "key mitigation technologies" for development before 2030 (IPCC, 2007c). It notes that energy efficiency will also play a key role in stabilizing atmospheric concentrations. DOE believes that the objectives of the CCPI embody these recommendations of the IPCC, and that by providing funding to the Mesaba Generating Station and other CCPI projects, the Department is providing appropriate incentives for developing technologies that can address global warming and the adverse environmental impacts of climate change.

5.3 MITIGATION OF IMPACTS

5.3.1 Mitigation Measures

For all environmental resources, the mitigation of potential adverse impacts from project activities would be achieved through the implementation of BMPs generally required by permitting processes and other Federal, state, or municipal regulations and ordinances. Table 5.3-1 outlines specific mitigation measures, including those required under Federal, state, or local regulations and permitting requirements that Excelsior would implement for each resource area.

Table 5.3-1. Mitigation Measures for the Mesaba Energy Project

Environmental Resources	Mitigation Measures[1, 2]
Aesthetics	**Construction:** • Prior to the commencement of construction, Excelsior would develop a SWPPP, which would outline the erosion BMPs that would be used to minimize landscape scarring. • Use of dust suppression BMPs. **Operation:** • Prior to operation, Excelsior would submit a request to the FAA for a determination of no hazard to avaiation from the emission stacks and HVTL towers. If applicable, obstruction lighting would be installed. • A comprehensive light plan would be generated using input from the Taconite and Hoyt Lakes City councils. • **Beyond BACT (Excelsior has conducted air impacts analysis using "Beyond BACT" emission controls – the emission rates reflect control of sulfur in syngas via Selexol™ [a physical solvent] and control of nitrogen oxides via selective catalytic reduction [SCR]) on Phase II for the East Range Site)**
Air Quality and Climate	**Construction:** During construction, Excelsior would implement the following standard practice with regard to minimizing impacts to ambient air quality: • Use of dust abatement techniques such as wetting soils, covering storage piles with tarps, enclosing storage piles, and limiting operations during windy periods on unpaved, unvegetated surfaces to reduce airborne dust. • Surfacing of unpaved access roads with stone whenever appropriate. • Covering construction materials and stockpiled soils to reduce fugitive dust. • Minimizing disruption to disturbed areas. • Watering land prior to disturbance (excavation, grading, backfilling, or compacting). • Revegetating disturbed areas as soon as possible after disturbance. • Moistening soil before loading into dump trucks. • Covering dump trucks before traveling on public roads. • Minimizing the use of diesel or gasoline generators for operating construction equipment. **Operation:** The following process modification and improved work practices would be implemented to mitigate emissions: • To reduce NO_x: Use of diluent injection in the CTGs; use of clean syngas or natural gas in the TVBs; incorporating good flare design; flaring only treated syngas; implementing good combustion practices (GCP) in the TVBs; limiting the hours of operation of the fire pumps and emergency generators; and using low-sulfur diesel in the fire pumps and emergency generators. • To reduce CO and VOCs: Implementing GCP in the CTGs and TVBs; use of clean syngas or natural gas in the TVBs; incorporating good flare design; flaring only treated syngas; limiting the hours of operation of the fire pumps and emergency generators; and using low-sulfur diesel in the fire pumps and emergency generators.

Table 5.3-1. Mitigation Measures for the Mesaba Energy Project (continued)

Environmental Resources	Mitigation Measures[1, 2]
	• To reduce SO_2: Use of clean syngas in the CTGs; use of clean syngas or natural gas in the TVBs; implementing GCP in the TVBs; incorporating good flare design; flaring only treated syngas; limiting the hours of operation of the fire pumps and emergency generators; and using low-sulfur diesel in the fire pumps and emergency generators. • To reduce H_2SO_4: Use of clean syngas in the CTGs. • To reduce PM: Implementing GCP in the CTGs and TVBs; incorporating high efficiency drift eliminators in the cooling towers; use of clean syngas or natural gas in the TVBs; incorporating good flare design; flaring only treated syngas; limiting the hours of operation of the fire pumps and emergency generators; and use of low-sulfur diesel in the fire pumps and emergency generators. BACT has not yet been determined by the MPCA and the need for additional mitigation would be addressed by MPCA, in consultation with FLMs, through the PSD permitting process. DOE may consider additional mitigation as a condition of the Record of Decision. See also Section 5.3.2.2.
Geology and Soils	**Construction:** • Prior to the commencement of construction, Excelsior would develop and implement a SWPPP, which addresses erosion prevention measures, sediment control measures, permanent stormwater management, dewatering, environmental inspection and maintenance, and final stabilization. The SWPP would be submitted to the MPCA for approval prior to the initiation of any construction activities. • As part of the SWPPP, Excelsior would implement erosion BMPs, such as stockpiling and covering topsoil, installing wind and silt fences, and reseeding disturbed areas. • **When crossing agricultural land, Excelsior would follow the mitigations procedures outlined in an Agricultural Mitigation Plan to avoid and reduce the impacts to agricultural quality of the soils.”** **Operation:** • Prior to the commencement of operation, Excelsior would develop and implement an MPCA-approved SWPPP (see Geology and Soils - Construction). • Prior to commencement of operation, Excelsior would develop and implement a SPCC Plan covering all facility operations as required by MPCA under the Clean Water Act.
Water Resources	**Construction:** • Prior to the commencement of construction, Excelsior would develop and implement an MPCA-approved SWPPP for construction activities (see Geology and Soils - Construction). The SWPPP would address both the plant site**, laydown areas,** and construction along utility corridors. • Implement BMPs within the SWPPP for construction activities for dust suppression and sedimentation control measures (see Air Quality and Climate – Construction). • Prior to construction of the utility infrastructure, Excelsior would apply for MNDNR Public Waters Work Permit for all stream and water crossing, and implement all requirement BMPs or **mitigation** measures to protect these water resources. **Operation:** • Prior to the commencement of operation, Excelsior would develop and implement an MPCA-approved SWPPP for industrial activities and implement the required BMPs, inspections, and training requirements. • Prior to commencement of operation, Excelsior would develop and implement a SPCC Plan to mitigate potential impacts due to the release of petroleum products (see Geology and Soils – Operation). • For the West Range Site, Excelsior would develop a water management plan that would minimize potential impacts on water resources and control the withdrawals of water for use in the power plant.

Table 5.3-1. Mitigation Measures for the Mesaba Energy Project (continued)

Environmental Resources	Mitigation Measures[1, 2]
Floodplains	**Construction:** • Prior to the commencement of operation, Excelsior would develop and implement an MPCA-approved SWPPP (see Geology and Soils - Construction). • Should the Mesaba Energy Project be modified in such a manner as to impact a FEMA defined flood hazard boundary at the selected site, it may become necessary to submit the proposed plans to FEMA for incorporation into the community's FIRM panel. All affected communities and applicable local agencies, Mn/DOT and MNDNR, would have to be contacted by the Excelsior during the design phases of the project in order to ensure all flood control requirements are met. **Operation:** • For the West Range Site, Excelsior would develop a water management plan that would minimize potential impacts on water resources and would include pumping details on the CMP, which would prevent flooding potential currently associated with this mine pit.
Wetlands	**Construction:** • Prior to the commencement of operation, Excelsior would develop and implement an MPCA-approved SWPPP (see Geology and Soils - Construction) that would minimize potential impacts on wetlands. • Mitigation of wetland impacts would be in the form of direct replacement or through the purchase of credits through an approved wetland bank under USACE and BWSR requirements and guidance. A Combined Wetland Permit Application would be submitted to applicable Federal, State, and local regulatory entities and would include any design details on wetland replacement sites, wetland banks, and/or sources of wetland credits for the project. Mitigation requirements would be determined during the wetland-permitting phase of the project following the NEPA process and before the commencement of construction activities. See also Section 4.7.7 and Appendix F2. **Operation:** • Prior to the commencement of operation, Excelsior would develop and implement an MPCA-approved SWPPP (see Geology and Soils - Construction) that would minimize potential impacts on wetlands. • Prior to commencement of operation, Excelsior would develop and implement a SPCC Plan (see Geology and Soils – Operation). • **Use of an enhanced ZLD system would eliminate any discharges of process water and cooling tower blowdown into any water bodies and would, therefore, mitigate water quality impacts to wetlands.**

Table 5.3-1. Mitigation Measures for the Mesaba Energy Project (continued)

Environmental Resources	Mitigation Measures[1, 2]
Biological Resources	**Construction:** • Prior to the commencement of operation, Excelsior would develop and implement an MPCA-approved SWPPP (see Geology and Soils - Construction) that would minimize potential impacts on Biological Resources. • Implementing BMPs for dust suppression and sedimentation control measures (see Air Quality and Climate – Construction). • Complying with the provisions of the Federal MBTA, which would include limiting timber and land clearing activities, in particular within woodland and forest habitats, to periods outside of the songbird-nesting season. • For state-listed species protected by the Minnesota Endangered Species Statute, species or sensitive habitats listed in the MNDNR NHIS database that may be potentially affected would require coordination with the MNDNR Division of Ecological Services. Mitigation of impacts to state-listed species can incorporate a wide variety of options ranging from passive measures, such as construction timing outside of critical breeding periods, permanent protection of known habitats elsewhere that contain the resource to be affected, or more aggressive measures including complete avoidance of impact. **Operation:** • Prior to the commencement of operation, Excelsior would develop and implement an MPCA-approved SWPPP (see Geology and Soils - Construction). • Prior to commencement of operation, Excelsior would develop and implement a SPCC Plan (see Geology and Soils – Operation). • For the West Range Site, Excelsior would develop a water management plan that would minimize potential impacts on biological resources. • Implementation of wetland mitigation requirements would minimize potential impacts on aquatic and wetland habitats (see Wetlands – Construction).
Cultural Resources	**Construction:** • In accordance with Section 106 of the National Historic Preservation Act, surveys and cultural resource assessments have been provided to MN SHPO and other appropriate agencies for review and comment. A Phase I archaeological survey of locations with high and medium potential **was** conducted at the West Range site in the summer of 2007, consistent with the recommendations of the SHPO. • With regard to the roads, rail lines, HVTL and utility corridors related to either site, archaeological surveys would only be conducted for the site to be permitted by the PUC. And then, only those corridors that are permitted by the PUC would be surveyed. Surveys would necessarily be completed after the DOE Record of Decision. However, DOE intends to enter into an agreement with SHPO and other appropriate parties that will ensure the following: cultural resources are identified through a Phase I archaeological survey; architectural history resources within the APE are identified; eligibility of any resources for listing on the NRHP is determined; a determination of effects on such resources is made; a comprehensive Historic Property Treatment Plan is developed; and a plan for unanticipated discovery of cultural resources during construction is implemented. The DOE Record of Decision would then be conditional upon implementing the provisions of the agreement. • **Following publication of the Draft EIS, DOE continued its outreach to Native American tribes and participated in conferences with tribal representatives (Section 1.8). Through meetings with Native American tribes a MOA addressing concerns of the tribes was being developed. DOE also intends to enter into a separate PA with the Minnesota SHPO, ACHP, Native American tribes and Excelsior Energy to ensure that: an appropriate APE is specified for any additional cultural resource surveys; cultural resources are identified through a Phase I archaeological survey; architectural history resources within the APE are identified; eligibility of any resources for listing on the NRHP is determined; a determination of effects on such resources is made; a comprehensive Historic Property Treatment Plan is developed; and a plan for unanticipated discovery of cultural resources during construction is implemented.**

Table 5.3-1. Mitigation Measures for the Mesaba Energy Project (continued)

Environmental Resources	Mitigation Measures[1, 2]
Traffic and Transportation	**Construction:** • To prevent unnecessary traffic congestion and increased road hazards, Excelsior would coordinate with local authorities and implement transportation measures, especially during the movement of oversized loads, construction equipment and materials. • Where traffic disruptions would be necessary, Excelsior would coordinate with local authorities and implement detour plans, warning signs, and traffic diversion equipment to improve traffic flow and road safety.
	Operation: • Excelsior would implement road improvements at the intersection of CR 7 and US 169 to minimize traffic congestion and road hazards currently associated with this intersection. Improvements include adding turning and acceleration lanes.
Safety and Health	**Construction/Operation:** • Comply with OSHA requirements and DOE safety-related directives as they apply to the project during construction and operation activities.
Noise	**Construction:** • Excelsior would implement a noise mitigation plan, which includes the contact of affected receptors during steam blowing and major construction events. • Steam piping would be equipped with silencers that would reduce noise levels during steam blows by 20 dBA to 30 dBA at each receptor location. **Operation:** • Once Phase I begins commercial operations, Excelsior would perform a noise survey to ensure that such operations are in compliance with applicable noise standards. Assuming that construction of Phase II would be concomitant with Phase I operations, Excelsior would perform a noise survey to confirm that the combination of activities (i.e., simultaneous Phase I operation and Phase II construction) would comply with MPCA requirements. • To ensure that noise levels would be below MPCA noise thresholds, Excelsior would conduct an acoustical analysis of the final design and evaluate and select the best suite of noise reduction alternatives to be incorporated as part of the plant design basis. Acceptable ambient noise levels for the proposed land use would be specified in contractor bids to ensure that appropriate noise attenuation features are included in the final facility design and layout specifications.

[1]Mitigation measures listed are applicable to both the West and East Range Sites unless specifically noted.
[2]List of Acronyms: APE – area of potential effect; BACT – best available control technology; BMPs – best management practices; BWSR – Board of Water and Soil Resources (Minnesota); CMP – Canisteo Mine Pit; CO – carbon monoxide; CTG – combustion turbine generator; DOE – Department of Energy; FEMA – Federal Emergency Management Agency; FIRM – Flood Insurance Rate Map; GCP – good combustion practice; H_2SO_4 – sulfuric acid; HVTL – high voltage transmission line; MBTA – Migratory Bird Treaty Act; MNDNR – Minnesota Department of Natural Resources; Mn/DOT – Minnesota Department of Transportation; MPCA – Minnesota Pollution Control Agency; MN SHPO – Minnesota State Historic Preservation Office; NHIS – National Heritage Information System; NO_x – nitrogen oxides; OSHA – Occupational Safety and Health Administration; PM – particulate matter; PUC – Public Utilities Commission; SO_2 – sulfur dioxide; SPCC – Spill Prevention, Control and Countermeasure; SWPPP – Stormwater Pollution Prevention Plan; TVB – tank vent boiler; USACE – U.S. Army Corps of Engineers; VOC – volatile organic compound.

5.3.2 Additional Mitigation Options

If not otherwise required by Federal, state or local ordinances, there are mitigation options for cooling water discharge at the West Range Site that could reduce impacts to water resources. In addition, there are options for mitigation of visibility impacts to Class I areas that may or may not be included in the final air permit for the project. These mitigation options are discussed and assessed in the following sections.

5.3.2.1 Cooling Water Discharge Options at West Range Site

After publication of the Draft EIS, Excelsior announced its commitment to implement an enhanced ZLD system for the West Range Site, comparable to the system discussed below, under *Mitigation Alternative 3 – ZLD Treatment*. A new Appendix H2, which discusses the ZLD system to treat the non-contact wastewater from the proposed facility, has been added for the Final EIS. As described in Section 2.3.1.3, the project proponent's plan ("base case") for the West Range Site is to discharge most of the cooling tower blowdown (CTB) back to the Canisteo Mine Pit (CMP), with limited discharges to Holman Lake. Because the CMP is the source of process water for the plant, the water quality of the CMP would gradually decrease as certain constituents (TDS, hardness, and mercury) increase in concentration. While the plant would be operated to ensure that mercury concentrations would not exceed water quality standards within the CMP, other parameters (TDS, hardness, specific conductivity) could increase to levels above standards. The decreased water quality in the CMP would cause an increase in operational costs for the plant as a result of added treatment costs and chemical usage to improve the process water quality. At present water levels in the CMP, there is a net inflow of groundwater. Once water levels in the CMP are lowered for power plant operations, the flow into the mine pit would likely increase as the water level in the pit decreases).

The following mitigation alternatives, developed by the project proponent (see Appendix H) and summarized in Table 5.3-2 below, are presented to reduce or eliminate CTB discharges to the CMP:

- Mitigation Alternative 1 – Discharge all CTB effluent to Holman Lake; no discharge to the CMP during normal operation conditions;
- Mitigation Alternative 2 – Similar to the base case in regard to the CMP discharges, but discharge a portion or all of the effluent directly Swan River (rather than Holman Lake); and
- Mitigation Alternative 3 – Use ZLD to treat all CTB and recycle the treated CTB back to plant for process water use.

Table 5.3-2. Summary of CTB Mitigation Alternatives

Parameters	Base Case		Mit. Alt. 1		Mit. Alt. 2a		Mit. Alt. 2b		Mit. Alt. 3	
Phase	**1**	**2**	**1**	**2**	**1**	**2**	**1**	**2**	**1**	**2**
Cycles of Concentration	5	3	5	5	5	3	5	5	≥10	≥10
Discharge to CMP (gpm)	300	2,675	0	0	300	2,675	0	0	0	0
Discharge to Holman Lake (gpm)	600	825	900	1,800	0	0	0	0	0	0
Discharge to Swan River (gpm)	0	0	0	0	600	825	900	1,800	0	0
Cooling Water Requirements from the CMP (gpm)	4,400	10,300	4,400	8,800	4,400	10,300	4,400	8,800	3,500	7,000
Net Water Required (gpm)	4,100	7,625	4,400	8,800	4,100	7,625	4,400	8,800	3,500	7,000
Air Emissions (PM) from Drift(tons/year)	20	39	18	35	20	39	18	35	39	78

In addition to these three mitigation alternatives, CTB discharge directly to either the Mississippi or Prairie Rivers was also considered, but neither of these options offered an advantage over the mitigation alternatives. Discharge to either river would increase the capital costs for constructing the additional length of discharge pipelines and would also likely increase operational costs, as the discharge may require pumping. Both rivers are also impaired for the same pollutants (mercury and dissolved oxygen) as the Swan River. The flow in the Mississippi and Prairie Rivers offer more assimilative capacity than the Swan River, but no other advantages, so these are not considered further.

The environmental impacts of each of these mitigation alternatives are discussed below.

Mitigation Alternative 1 – Discharge all CTB Effluent to Holman Lake

Mitigation Alternative 1 provides an upper limit to the potential effluent volume discharged to Holman Lake compared to the base case presented in Section 4.5. Mitigation Alternative 1 would discharge 900 gpm during Phase I and 1,800 gpm during Phase II, and would not include a discharge to the CMP during either phase under normal operating conditions.

Under this alternative, the generating station would operate at 5 COCs during Phase II and, therefore, would require less water for cooling purposes with a resultant decrease in discharge volume. Operating the power station at 5 COCs would result in an increase in pollutant concentrations as more water would be evaporated during cooling. However, this increase would be partially offset by cleaner process water, because no discharges to the CMP (the source of process waster) would occur, and the process water chemistry would remain relatively constant throughout the operating period (subject only to the mixing of the different water sources).

Mitigation Alternative 1 was reviewed to determine the resources that would be affected by this alternative. Because the construction of the process water and discharge pipelines, as well as all the other supporting power generation and transmission infrastructure is the same as the base case, it was determined that the resources that would be affected would be water resources, wetlands, biological resources, and air quality.

Water Resources

Mitigation Alternative 1 would affect water resources in terms of process water withdrawals and the discharges of CTB to Holman Lake. The impacts to these resources are presented in the following sections.

Process Water Supply Systems

The effects on water resources from modifications to the water management plan under Mitigation Alternative 1 include: a decreased requirement for process water that results from operating the power station at 5 COCs rather than 3 COCs during Phase II; the elimination of discharges (during normal operations) to the CMP, reducing the available water supply in the CMP; and improved water quality of the process water and the CMP due to the elimination of discharges to the CMP from the plant that would contain TDS and mercury. As in the base case, the source water is the origin of mercury and phosphorus, rather than the generating station (although the pollutants become concentrated due to evaporation of water in the cooling towers).

Table 5.3-3 compares the process water requirements between the base case and Mitigation Alternative 1. The data shows that sufficient water should be available from the proposed water sources for both phases under Mitigation Alternative 1 under normal operating conditions.

During peak operating conditions, the process water requirements for Phase II could reach 13,000 gpm under Mitigation Alternative 1, which would appear to exceed the assumed sustainable flow (8,800 gpm). However, the peak requirements are of short duration and the water recharge rates in the mine pits are expected to increase as the water levels in the mine pits decrease. In addition, the power station could operate the pumping stations at the mine pits to transfer water (roughly 300 gpm), during normal operating conditions, into storage (CMP or HAMP) for use during peak demands. Under extreme drought conditions, Excelsior could take all or a portion of the discharge going to Holman Lake and route it back to the CMP as an additional water supply. Therefore, there appears to be sufficient water supply capacities to handle both normal and peak operating conditions for this proposed alternative.

Table 5.3-3. Water Source Supply Capacities

Water Source	Estimated Range of Flow (gpm)	Assumed Sustainable Flow for Water Balance Modeling (gpm)	
		Base Case	Mitigation Alternative 1
Canisteo Mine Pit	810-4,190	2,800	2,800
HAMP Complex	1,590-4,030[1]	2,000[2]	2,000[2]
Lind Mine Pit	1,600-2,000	1,800[3]	1,800[3]
Prairie River	0-2,470[4]	2,470[4]	2,470[4]
Discharge from Mesaba Generating Station	350-3,500	Varies[5]	0
Total	4,350-16,190	>9,100[6] >11,700[7]	9,100
Phase I Requirements		4,400	4,400
Phase II Requirements		10,300	8,800

[1] Maximum flow occurs at minimum operating elevation.
[2] At an operating elevation of 1,230 feet msl.
[3] Estimates of flow are based on one summer flow measurement at the LMP outlet and one summer and one winter measurement taken at the West Hill Mine Pit outlet.
[4] Maximum available flow assumed to be 25% of the 7Q10 flow of the Prairie River.
[5] Water returned to the CMP is expected to be 350 gpm during Phase I operations and 2,650-3,500 gpm during Phase II (Alternative 1) operations.
[6] Total does not include any of the water discharged back to the CMP from the Mesaba Generating Station.
[7] Total includes the minimum quantity of water expected to be discharged back to the CMP during the operation of Mesaba I and II of 2650 gpm, rounded to two significant figures.
Source: Table 4.5-2 and Appendix H

Mitigation Alternative 1 also offers an advantage over the base case in that the source water quality would remain relatively constant over the life of the power station. Table 3.5-4 (Section 3.5) presents the water quality of the different mine pits considered to supply process water for the West Range Site.

Process Water Discharges and Water Quality Standards

As presented in Appendix H, Mitigation Alternative 1 would route all the process water discharges (except those handled by the ZLD) to Holman Lake. The overall effects of this alternative (as compared to the base case) would be:

- An increased flow into Holman Lake (over the current flow of 1,215 gpm) during Phases I and II of 74 to 148 percent, respectively. The base case would result in an increased flow of 50 to 68 percent during Phases I and II.

- Reduced pollutant concentrations/chemical constituents in the discharge to Holman Lake, since the raw water stream from CMP would have a higher quality under this alternative than under the base case.
- A net increase in the pollutant/constituent loadings as a result of the increased flow (even with decreased concentrations). As with the base case, the origin of most of these pollutants (such as mercury and phosphorus) is the source water and not the discharge by the generating station.

Each of these effects is discussed below.

Increased Flow to Holman Lake

Holman Lake is a natural lake that has experienced both natural and man-made fluctuations in water levels and flow over the past several decades. During the operation of the Canisteo Mine, water from dewatering operations was discharged into the lake. Although the volume of water from these dewatering operations is not known, it is believed that the flow volume exceeded the amount planned under Phase II of Mitigation Alternative 1. When the lake was receiving the mine dewatering discharge, the lake level was controlled by a constructed spillway. This spillway no longer functions as a result of recurring beaver dams upstream of the spillway. The water level in the lake is now affected by the partial dismantling of the beaver dam when the water level reaches a height that inundates an adjacent railroad trestle (generally once per year). The water flow that results from this action lowers the water level in the lake approximately 1 to 2 feet over a period of several days, and the flow exiting the lake during this action exceeds the increased flow that would result from Mitigation Alternative 1.

The increased flow through Holman Lake under Mitigation Alternative 1 should help reduce periods of stagnation cited in Section 4.5. Downstream of Holman Lake, the outflow from the lake joins with the Swan River (28,000 gpm average flow, as measured at the discharge from Swan Lake). Based on the average flow for both the Swan River and Holman Lake, the net increase in flow of Mitigation Alternative 1 (during Phase II) would be 6 percent (1,800 gpm divided by 28,000 gpm and 1,215 gpm).

Reduction in Pollutant Concentrations/Chemical Constituents

By operating the generating station at 5 COCs and not using any of the CTB as part of the source for process water, the overall concentrations of pollutants/constituents in the CTB would be reduced (from that of the base case) and would not increase over time as they would under the base case. Table 5.3-4 presents the Phase II concentrations of process effluent after 30 years of operation that would be discharged to Holman Lake.

The chemical constituents that exceed water quality standards are shown in bold. The two constituents that are pollutants of concern for the Swan River are mercury and phosphorus, and the concentrations of both are below water quality standards. The constituents that exceed water quality standards have standards based on either drinking water or irrigation, neither of which would apply to Holman Lake; however, this determination would be made during the NPDES permitting process. The estimated concentrations of chemical constituents should not affect the recreational activities (swimming and boating) that currently occur on the lake.

The in-lake concentrations of these constituents (after mixing with the lake water) would be reduced up to 40 percent and would be below applicable water quality standards after mixing with the Swan River. For example, the full mixed concentration for mercury in Holman Lake would be approximately 2.8 ng/L and, after mixing with the Swan River, about 1.3 ng/L.

Overall, there is a slight beneficial effect for Mitigation Alternative 1 over the base case as a result of the overall decrease in pollutant concentrations/chemical constituents.

Table 5.3-4. Expected IGCC Power Station Discharges for the Base Case and Mitigation Alternative 1 and Applicable State Numerical Water Quality Standards

Constituent	Units	WQ Standard (chronic)	WQ Standard (acute/max)	Class	Anticipated Effluent Water Quality – Phase II (3 COCs) Base Case	Anticipated Effluent Water Quality – Phase II (5 COCs) Mitigation Alternative 1
Hardness	mg/L	250	-	3B	**2,052**	**1,540**
Alkalinity	mg/L		n/a		--	--
Bicarbonate	mg/L	305	-	4A	**1,200**	**869**
Calcium	mg/L		n/a		--	--
Magnesium	mg/L		n/a		--	--
Iron	mg/L		n/a		--	--
Manganese	mg/L		n/a		--	--
Chloride	mg/L	230 (T)	860 (T)	2B	38	26
Sulfate	mg/L		250/10	1B/4A	**590**	**487**
TDS	mg/L		500/700[5]	1B/4A	**2,070**	**1,685**
pH	mg/L		6 - 9	2B	6 - 9	6 – 9
Aluminum	µg/L	125 (T)	1072 (T)	2B	74	50
Arsenic	µg/L	53 (H)	360 (T)	2B	--	--
Barium	µg/L		n/a		--	--
Cadmium	µg/L	2[1] (T)	73[1] (T)	2B	Note 3	Note 3
Chromium (6+)	µg/L	11 (T)	16 (T)	2B	Note 3	Note 3
Copper	µg/L	15[1] (T)	34[1](T)	2B	Note 3	Note 3
Fluoride	mg/L		n/a		--	--
Mercury	ng/L	6.9 (H)	2400 (T)	2B	6.6	4.5
Nickel	µg/L	283[1](T)	2549[1] (T)	2B	37	25
Selenium	µg/L	5 (T)	20 (T)	2B	Note 3	Note 3
Sodium	mg/L		n/a		--	--
Specific Conductivity	umhos/cm	1,000	-	4A	**3,269**[4]	**2,400**[4]
Zinc	µg/L	191[1](T)	211[1](T)	2B	Note 3	Note 3
Phosphorus	mg/L		1[2]		0.05	0.02

[1] indicates a hardness based standard. It is assumed hardness in the receiving water is >200 mg/L based on available data.
[2] phosphorus standard is an effluent limit and not a water quality standard.
[3] results below detection limit.
[4] Values depicted reflect assumed values in the groundwater and LMP.
[5] WQ Standard of 700 mg/L is for total dissolved salts
WQ Standard- based on T-Toxicity Standard or H – Human Health Standard
Class denotes the appropriate MN water use classification for which the WQ standard is based upon. Note the TDS and sulfate standards would not apply to water in the CMP or Holman Lake, but would be applicable to any water used as a drinking or irrigation water source.
Source: Excelsior, 2006a and Appendix H

Increase in Net Pollutant Loadings

One of the main premises of the base case is that the overall loading of mercury and phosphorus would be less than or equal to the loading currently permitted from the dewatering operations at Hill Annex Mine Park. Under Mitigation Alternative 1, the discharge loading of mercury and phosphorus into Holman Lake would be roughly three times higher than the base case. However, the source of the mercury and phosphorus would be the existing levels in the process water sources. Some of the loading is strictly the re-introduction of mercury/phosphorus from one point to another (e.g., the mercury contained in the water removed from the Prairie River or Lind Mine Pit, which flows into the Prairie River, would be discharged to Holman Lake/Swan River and then back into the Prairie River). The remaining portion of the loading comes from the CMP, which currently does not discharge, but would if current water levels continue to rise.

As presented in Appendix H, Excelsior has explored effluent trading options with local permitted discharges. These trading options would involve funding the construction, operation and maintenance of new treatment systems at these permitted facilities to remove phosphorus or mercury to offset the increase in loadings of these pollutants from the Mesaba discharge. The potential for trading options would depend to some degree on the level of offsets required by MPCA during the NPDES permitting process.

Wetland Resources

The potential wetland impacts resulting from the proposed Mitigation Alternative 1 would be the same as those described in Section 4.7.3, West Range Process Water Blowdown Pipeline. The types of wetland functions potentially impaired by Mitigation Alternative 1 include the loss of wildlife habitat, sediment stabilization, flood flow attenuation from direct wetland impacts and the potential gain of fisheries and wildlife habitat resulting from possible secondary wetland impacts. The major difference between the base case and Mitigation Alternative 1 is that Mitigation Alternative 1 would discharge a larger volume of effluent during different operational stages of Phase I and Phase II of the IGCC power station. The increase in CTB discharged to Holman Lake by the base case would vary between 600 to 825 gpm, whereas the discharge by Mitigation Alternative 1 would vary between 900 gpm to 1,800 gpm (Phases I and II respectively).

The current volume of water discharged by Holman Lake without considering volumetric inputs from Phase I or Phase II is estimated at 1,215 gpm. By comparison, the average discharge from the lake associated with Mitigation Alternative 1 would be approximately 2,115 gpm (Phase I) and the potential maximum discharge would be 3,015 gpm (Phase II). Therefore, an increased volume of CTB entering Holman Lake would have varying levels of impacts to terrestrial and aquatic habitats, including wetlands. Changes in surface water elevations along the littoral fringe of Holman Lake could expand the size and shape of aquatic plant community based on the plants' tolerance to inundation and saturation, thereby potentially increasing fisheries wildlife habitat.

Additionally, the wetland biochemistry process could provide an opportunity to fixate or transform pollutants such as phosphorous and similar pollutants into a less mobile form, and thereby possibly improving water quality. An increase in the volume of water could have the potential to affect emergent wetlands located near Swan River. These wetlands could be subject to increased surface water elevations resulting in a slight change in wetland-dependant wildlife habitat. However, the change in habitat could be considered minor when compared to the volume of flow provided by Swan River.

Holman Lake currently experiences an annual drawdown in surface water elevation in order to keep concrete footers associated with railroad trestles near the head waters of the lake above water. Keeping water below the concrete footers functions in maintaining the structural integrity to the railroad trestles. Because Holman Lake would be receiving an increased volume of effluent, the culvert outlet and embankment may have to be structurally modified to support an increase in volume; however this would likely be required under either discharge alternative. Consequently, the aquatic resources bordering the culvert could be temporarily affected by direct and indirect impacts, such as vegetation removal or earth disturbance. Potential adverse impacts to surface water resources, including wetlands, would be avoided and minimized to the extent practicable, and implementation would be in accordance with mitigation required by the USACE during the wetland permitting phase of the project.

Biological Resources

Mitigation Alternative 1 would use the same effluent pipeline between the power plant and Holman Lake as described in Section 4.8.4, Process Water Blowdown Pipeline 1 (Mesaba IGCC Power Plant Footprint to Holman Lake) (West Range Site). Therefore, the alternative would have no additional construction impacts.

Aquatic Communities

Mitigation Alternative 1 may cause some temporary adverse impacts to aquatic fauna. Adverse impacts to aquatic communities could occur because of the increased flow into Holman Lake, which might result in the additional exporting of fish to Swan River. Impacts to the aquatic fauna would be considered minimal because the export of fish from Holman Lake to the Swan River has been occurring for a number of years, and these fish could use wetlands in or near the Swan River for food and shelter. Drawdown of Holman Lake has occurred on a yearly basis in the past; therefore, fish export has been occurring but may be more continuous under Mitigation Alternative 1.

Protected Species

There are no known occurrences of state-listed protected or otherwise rare plant species within 1 mile of the Process Water Blowdown Pipeline 1; however, investigations for protected species may be required to determine whether species of concern could be affected by the alternative.

Air Quality

For Mitigation Alternative 1, there would be a decrease in TDS concentrations within the process water compared to the base case. The result would be a decrease in worst-case emissions of particulate matter due to cooling tower drift from 39 tons per year to 35 tons per year.

Mitigation Alternative 2a – Base Case with Swan River Discharge

This mitigation alternative is similar to the base case but would relocate the outfall currently proposed for Holman Lake to the Swan River. Mitigation Alternative 2a would reduce the potential for localized impacts associated with discharge into a relatively small lake, and would expand the options for water quality trading mentioned in the discussion of Mitigation Alternative 1. The blowdown pipeline alignment would follow the proposed HVTL and natural gas pipeline corridor from the West Range Site, south approximately 4.5 miles, to where the corridor would cross the Swan River. This crossing is less than half a mile upstream from the confluence of Holman Lake's discharge and the Swan River (see Figure 2.1-2). While the currently proposed pipeline from the plant to Holman Lake could be eliminated, it may be necessary to maintain the proposed tie-in linking the CMP to Holman Lake in order to manage water levels in the CMP. In addition, this alternative could be combined with Mitigation Alternative 1, which would result in having all the CTB effluent being discharged to the Swan River (with no discharge to the CMP).

Mitigation Alternative 2a was reviewed to determine the resources that would be affected by this alternative. It was determined that the resources that would be affected would be water resources and wetlands, as described below.

Water Resources

Mitigation Alternative 2a would affect water resources in terms of process water withdrawals and the discharges of CTB to the Swan River. The impacts to these resources are presented in the following sections.

Process Water Supply Systems

The impacts to water resources from the water withdrawals associated with Mitigation Alternative 2 would be the same as discussed in Section 4.5 for the base case.

Process Water Discharges and Water Quality Standards

Under this alternative, process water discharges to the CMP would be the same as presented in Section 4.5, which indicate a gradual increase in pollutant levels within the CMP and some would eventually reach or exceed water quality standards. Mercury concentrations, however, would not exceed current water quality standards. The impacts to the Swan River would also be similar to the base case, as the mass loading to the watershed for chemicals of concern, such as phosphorus and mercury, would not change under this alternative. However, there would be no direct impacts in Holman Lake (either adverse or beneficial).

Under Mitigation Alternative 2a, impacts to the water quality in the Swan River would be similar to those presented for the base case during average flow conditions, as the discharge would mix with roughly the same overall volume of water (because the discharge would be just upstream of the confluence of Holman Lake). Once completely mixed with the Swan River under average flow conditions (roughly 28,000 gpm), the pollutant concentrations from the CTB discharges would be reduced approximately 33-fold. Based on the expected discharge concentrations shown in Table 5.3-4 for the base case, all parameters would be within water quality standards after complete mixing with the Swan River. However, no water quality monitoring data is available for the Swan River, so the additive effect of this discharge can not be determined.

There would be impacts to the Swan River under low flow conditions. Because the 7Q10 flow of the Swan River is low, 800 gpm (USGS, 2007), the river could consist primarily of CTB during low flow conditions. While the CTB discharge would augment the stream flow during such periods, the TDS and hardness concentrations would be relatively high and exceed standards. As with the base case, a variance for TDS and hardness would be required.

The discharge to Swan River instead of Homan Lake should reduce the possibility of impacts related to the formation of methyl mercury in Holman Lake. While the possibility of methyl mercury formation would not be completely eliminated, some factors that are suggested to be involved with its formation would be diminished. There would generally be less contact with adjacent wetlands under this alternative, and sulfate would be more fully diluted under normal flow conditions. While some localized impacts to the Swan River near the point of discharge are possible, they are of lesser concern in a flowing river than in a lake.

Thermal Impacts

Mitigation Alternative 2a would have minimal thermal impacts on the Swan River during normal flow conditions, as the blowdown discharge would be approximately 3 percent of the river flow. However, during low flows periods, the flow in the river (just downstream of the discharge point) would be predominantly CTB discharge. As in the discussion of water quality impacts for the base case (Section 4.5), there would likely be a need for a variance for the temperature of the discharge. During worst-case conditions, blowdown water would leave the plant at approximately 86°F during peak summer temperatures (Excelsior Energy, 2006a), which just meets absolute state water quality standards, but would exceed the relative limit of 3°F above ambient water temperatures (Minnesota Rules 7050.0220 subparagraph 5). Due to the low 7Q10 value for the Swan River, even with a mixing zone, it is unlikely that this standard could be met without a variance or without the use of cooling ponds.

Wetlands

This alternative would increase the total miles of blowdown pipeline by approximately two miles as compared to the base case. However, the additional pipeline would be along corridors used for the HVTL lines and natural gas pipeline, reducing any impacts associated with a new discharge pipeline corridor. A 150-foot right-of-way (ROW) is proposed where HVTL and natural gas pipelines share a corridor. The corridor may be able to accommodate the blowdown pipeline as proposed, or slight additional widening may be necessary. Therefore, while such widening may cause additional wetland and land use impacts, the impacts would be very small, and would be minimized by staying within established infrastructure corridors to the maximum extent possible and especially within wetlands.

Mitigation Alternative 2b – Mitigation Alternative 1 with Swan River Discharge

This alternative is a combination of Mitigation Alternatives 1 and 2a, where the CTB discharge would be directed to the Swan River rather than Holman Lake, and no CTB discharge would occur into the CMP under normal operating conditions. The impacts from construction of this alternative are the same as presented for Mitigation Alternative 2a; however, the impacts from operation are similar to Mitigation Alternative 1. The water management plan and expected discharge concentration in the CBT discharge would be the same as presented for Mitigation Alternative 1. The impacts from this alternative, not previously discussed for either Mitigation Alternative 1 or 2a, are presented below.

Process Water Discharges and Water Quality Standards

Under this alternative, impacts to the water quality in the Swan River would be similar to those presented for the Mitigation Alternative 2a during average flow conditions, but the volume of CTB discharge would increase up to 1,800 gpm, which would result in less attenuation of the discharge once mixed with the Swan River. However, once completely mixed with the Swan River, the pollutant concentrations from the CTB discharges would be reduced approximately 15-fold. Based on the expected discharge concentrations shown in Table 5.3-4 for the Mitigation Alternative 1, all parameters would be below water quality standards after complete mixing with the Swan River. However, no water quality monitoring data is available for the Swan River, so the additive effect of this discharge can not be determined.

There would be impacts to the Swan River under low flow conditions, as discussed for Mitigation Alternative 2a. While the CTB discharge would augment the stream flow during such periods, the TDS and hardness concentrations would be relatively high and exceed standards. A variance for TDS and hardness would be required.

Thermal Impacts

Mitigation Alternative 2b would have minimal thermal impacts on the Swan River during normal flow conditions, as the blowdown discharge flow would be approximately 6 percent of the river flow. However, during low flows periods, the flow in the river (just downstream of the discharge point) would be predominantly CTB discharge. For this alternative, a request for a variance for the temperature of the discharge may be necessary, as discussed for Mitigation Alternative 2a.

Mitigation Alternative 3 – ZLD Treatment

Since publication of the Draft EIS, Excelsior announced its decision to implement this alternative for the West Range Site. Mitigation Alternative 3 would employ ZLD treatment to eliminate all process-related effluent discharges from the plant. A ZLD system on the West Range Site would be implemented as described for the East Range Site in Section 4.5.4. This alternative would eliminate all CTB blowdown discharges and associated pipelines from the facility and would reduce the facility's overall water appropriation needs. The use of ZLD treatment for all the process wastewaters would result in a significant increase in capital and O&M costs, a reduction in plant efficiency and output, an increase in solid waste, and an increase particulate matter emissions from cooling tower drift.

Mitigation Alternative 3 was reviewed to determine the resources that would be affected. It was determined that the resources affected would be water resources, solid waste disposal, air quality, and plant capacity and efficiency. This alternative would also reduce the loss of wetlands (up to 17 acres) and reduce impacts to land use, as no CTB discharge pipeline would be constructed.

Water Resources

Process Water Supply Systems

Compared to the base case, the maximum water appropriation needs for two Mesaba phases under this alternative would decrease from 10,300 gpm to 7,000 gpm (Excelsior Energy, 2006a). However, the base case includes the CTB discharge from the plant to the CMP of up to 3,500 gpm, which would be eliminated under Mitigation Alternative 3. Overall, the water needs are slightly less than the base case and Mitigation Alternative 1.

Process Water Discharges and Water Quality Standards

By employing ZLD treatment of all process waters, there would be no impacts to water quality from the operation of the plant under this alternative.

Solid Waste Disposal

Mitigation Alternative 3 would increase the amount of non-hazardous salts that must be transported from the site for disposal at a landfill. For the East Range Site, the Mesaba Generating Plant could produce up to 24,000 tons/year of solid waste by employing ZLD treatment, based on the source water quality that has up to 1,800 mg/L of TDS (Excelsior Energy, 2006b). Because the source water quality on the West Range Site has a lower concentration of TDS (340 mg/L), the maximum non-hazardous waste (salt) production from the ZLD system would be less than 5,000 tons/year at full operation (Phase II). Discussions between Excelsior and the manager of the St. Louis County Solid Waste Department in Virginia, MN (the closest industrial non-hazardous waste facility) determined that the facility can accommodate the waste generated by the ZLD system.

Air Quality

Under this alternative, the cycles of concentration at which cooling towers operate would likely be increased (to 10 or more) and, therefore, there would be an increase of particular matter emissions due to cooling tower drift. At 10 COCs, the particulate emissions due to drift would increase from 39 tons/year to 78 tons/year, resulting in total facility wide particulate emissions of 532 tons/year (instead of 493 tons/yr with the base case). The visibility and air quality impacts from an additional 39 tons/year would be negligible.

Pipeline Alignment Impacts

Under this alternative, construction of blowdown pipelines from the plant would not be necessary. Impacts to wetlands may be reduced by up to 17 acres, and land use impacts would be reduced as well.

Plant Capacity and Efficiency

Operation of the ZLD system would consume electricity, adding to the parasitic load within the facility, which has two closely connected effects. First, it would reduce the net output capacity of the plant. Second, it would reduce the efficiency of the plant proportionately to this reduction in capacity. On the East Range Site, plant capacity could be reduced by up to 2 MW (approximately 0.3%), and the corresponding heat rate increase would be 31 Btu/kWh. As mentioned above, the source water quality at the West Range Site is superior, which is likely to reduce the parasitic load of ZLD treatment versus the

East Range Site. Therefore, a 2 MW reduction in plant capacity and 31 Btu/kWh increase in heat rate are likely to overestimate this effect for the West Range Site. However, to the degree that efficiency is reduced, air emissions, on a per megawatt hour basis, would increase (by a maximum of about 0.3%).

5.3.2.2 Mitigation Options for Visibility Impacts to Class I Areas

As part of the Prevention of Significant Deterioration (PSD) permitting process, Excelsior is currently negotiating with state and Federal regulators to achieve a set of operating conditions that will satisfy all applicable regulatory requirements (including those governing impacts on air quality and air quality-related values like visibility). Because of their inherently high-efficiency and low-polluting technology, IGCC power plants are able to meet more stringent emission standards than conventional power plant technologies (EPA, 2006e). The BACT analysis for the two phases of the Mesaba Energy Project emphasizes the inherently lower polluting nature of IGCC processes and improvements in the design basis of E-Gas™ technology resulting from years of experience at the Wabash River Plant. However, if the current design basis for the Project is deemed by regulators to produce modeled visibility impacts above acceptable thresholds, additional mitigation may be required.

The purpose of this section is to identify options available for mitigating the modeled visibility impacts of the Mesaba Generating Station to Class I areas discussed in Section 4.3. The essence of any option implemented along a continuum of choices would be to reduce emissions of sulfur dioxide (SO_2) and nitrogen oxides (NO_x), two important precursors of fine particulate matter that produce modeled visibility impacts. Changing the current design basis of Phase I and Phase II of the Mesaba Energy Project to reflect pre and post-combustion SO_2 and NO_X controls characterizing Lowest Achievable Emission Rate technology (*see* 40 CFR 51.165(a)(1)(xiii) to distinguish the Lowest Achievable Emission Rate from BACT represents one extreme of this continuum. Offsetting the Project's SO_2 and NO_x emissions through the purchase of emission allowances or other reduction credits from other facilities, which would not require changes to the Project's existing design basis represents the other extreme. Regardless of the outcome of Excelsior's negotiations with state and Federal regulators over the Project's modeled visibility impacts and any steps required to mitigate them, DOE can require additional mitigation as a condition of the Record of Decision for this EIS.

Enhancement of Existing Design Basis

The current design basis for Phase I and Phase II of the Mesaba Energy Project Generating Station employs a chemical solvent (i.e., methyl diethanolamine or MDEA) to reduce levels of hydrogen sulfide in syngas (which when combusted produces emissions of SO_2) and nitrogen dilution to reduce NO_X formation during syngas combustion. Although Excelsior maintains that the current design basis for the Mesaba Generating Station, involving IGCC technology, represents BACT for SO_2 and NO_x emissions as defined in 40 CFR 52.21(b)(12), Excelsior could be required to enhance its current design basis to produce further SO_2 and NO_X emission reductions to reduce modeled visibility impacts.

For SO_2 emissions, a potential design enhancement would involve increasing the capture efficiency of the acid gas removal system (i.e., the MDEA system) by altering equipment or by changing the solvent used. The MDEA system enhancement could involve adding refrigeration to the MDEA chemical solvent system or increasing the take-off height in the MDEA tower to allow for further contact between MDEA and the sour syngas. This approach would enhance capture of H_2S and ultimately reduce SO_2 emissions from the plant. Alternatively, emissions of SO_2 could be reduced by changing the MDEA chemical solvent to the more-efficient physical solvent, Selexol (a step in the continuum toward Lowest Achievable Emission Rate technology).

Although these options could reduce SO_2 emissions and mitigate modeled visibility impacts in Class I areas, their implementation would adversely impact the power plant's performance. Such impacts would include: reducing the plant's thermal efficiency and output capacity (thereby increasing emissions of CO_2 and criteria pollutants on a pound-per-megawatt-hour basis); introducing additional complexity into system operations (e.g., the addition of programmable logic controls allowing automated variation of MDEA column take-off point and the resizing of equipment to handle increased gas flow through the Claus unit), increasing production of elemental sulfur to be managed; and increasing capital and operating costs as an overall result. Excelsior is addressing the overall assessment of these impacts as part of its BACT analysis under PSD permitting rules (Excelsior, 2006d).

For NO_x emissions, a potential design enhancement could involve installing post-combustion selective catalytic reduction technology controls. In this case, ammonia would be injected into the flue gas at appropriate points within the HRSG and react with NO_x to produce nitrogen and water (such reaction being catalyzed by proprietary materials). Selective catalytic reduction has been used extensively to control NO_x emissions from pulverized coal units as well as natural gas-fired combustion turbines. However, the use of selective catalytic reduction on higher sulfur coals can result in increased levels of sulfur trioxide (SO_3) (DOE, 2002). For IGCC, there are significant concerns related to the interaction of ammonia and sulfur species, and the addition of selective catalytic reduction can require deeper sulfur removal than otherwise necessary to comply with sulfur emission restrictions. Further, the use of selective catalytic reduction results in stack releases of ammonia via ammonia slip, which can present significant performance issues in the HRSG and decrease the availability of the power plant. Additionally, ammonia releases could contribute to small particle formation that could contribute to modeled visibility impacts.

Emission Offsets

Emissions of SO_2 and NO_x from Phases I and II of the Mesaba Generating Station can be offset through allowance purchases or controls placed on previously uncontrolled or poorly controlled air emission sources. The Mesaba Energy Project represents a unique circumstance in Minnesota in that it is the only coal-fueled power plant that it is required under the Clean Air Interstate Rule to purchase SO_2 allowances equivalent to 100 percent of its SO_2 emissions. Such allowances can be purchased selectively from sources having modeled visibility impacts on Class I areas, so as to represent an effective means of reducing such impacts from Project operations. To the extent that the Project's provision of SO_2 allowances required by the Clean Air Interstate Rule are determined to be insufficient to reduce modeled visibility impacts to acceptable levels, Excelsior could purchase additional SO_2 and NO_x allowances. Excelsior also has the option to upgrade existing air emission sources of SO_2 and NO_x to the extent that such improvements are cost-effective relative to addition of controls beyond BACT and to the extent that such controls would reduce modeled visibility impacts.

As discussed in Section 4.3, Excelsior conducted supplemental modeling analyses of the effectiveness of a sample offset scenario at reducing model-predicted visibility impacts. These analyses were conducted only as examples to provide information and illustrate the concept of mitigation. They do not represent a proposal, because the necessity of mitigation has not been established and the practicability of the scenarios has not been confirmed. The scenario studied was the offset of SO_2 emissions via allowance purchases and/or emission reductions from Laskin Energy Center. This scenario was chosen due to the proximity of Laskin Energy Center to the East Range Site, where model-predicted visibility impacts were highest, and due to the existence of an established program for SO_2 allowance trading for electric generating units.

The analyses used actual SO_2 emissions from 2006 and 2007 (an average of 755 lbs per hour) as a baseline case, and studied offset cases of allowance purchases and/or emission reductions equal to 35 percent and 50 percent of actual emissions. NO_X and PM emissions from Laskin Energy Center were not modeled, so the results do not reflect Laskin Energy Center's total modeled visibility impact. The air modeling methodology was the same as for the multi-source analyses described in Appendix B. The predicted impacts are calculated using Method 2 and are compared to the Method 2 predicted impacts for the Mesaba Energy Project. It should be noted that in comparison

to Method 8, which was also used for calculating visibility impacts as discussed in Section 4.3, Method 2 would likely predict higher impacts for both Mesaba and Laskin Energy Center.

Table 5.3-5 (new table for the Final EIS) shows the results of the offset scenario analyses. Results for Laskin Energy Center alone (SO_2 emissions only) are presented on the left part of the table. Results of the remaining impact of the Mesaba Generating station - after subtracting the number of days of modeled visibility impact eliminated by the Laskin Energy Center offset – are presented on the right part of the table (only the aggregate of the three years is shown). The results from Table 5.3-5 demonstrate that emission offsets can be a viable approach to reducing the number of days for which modeled visibility impacts are predicted.

Table 5.3-5. Class I Visibility Supplementary Modeling Results – Offset Scenarios (1)

Laskin Energy Center (2)										Mesaba with Laskin Energy Center Offset (3)			
Scenario	Emission Rate (lb/hr)	2002		2003		2004		Total		East Range(4)		West Range(5)	
		Days ≥ 5%	Days ≥ 10%	Days ≥ 5%	Days ≥ 10%	Days ≥ 5%	Days ≥ 10%	Days ≥ 5%	Days ≥ 10%	Days ≥ 5%	Days ≥ 10%	Days ≥ 5%	Days ≥ 10%
Boundary Waters Canoe Area Wilderness													
Baseline	755	37	11	10	3	9	3	56	17	190	38	58	14
-35%	490	20	4	4	2	5	2	29	8	163	29	31	5
-50%	377	11	3	3	0	3	1	17	4	151	25	19	1
Voyageurs National Park													
Baseline	755	8	3	5	1	7	2	20	6	19	4	62	11
-35%	490	4	0	1	0	5	1	10	1	9	-1(6)	52	6
-50%	377	3	0	1	0	2	0	6	0	5	-2(6)	48	5

(1) 36-km MM5 data, 4-km CALMET grid resolution and Method 2 for all analyses.
(2) Results based on SO_2 emissions only and therefore do not reflect actual visibility impacts; NO_X and PM_{10} were not modeled.
(3) Results are for Mesaba Generating Station alone, for Baseline Laskin Energy Center scenario, and for Mesaba Generating Station with offset benefit from Laskin Energy Center for reduction scenarios.
(4) Emissions: Mesaba Phase I at 'Proposed' emissions levels, Mesaba Phase II at 'Enhanced' emissions levels.
(5) Emissions: Mesaba Phases I and II combined at 'Proposed' emissions levels.
(6) Negative value because Laskin Energy Center offsets reduce more days than the Mesaba Generating Station would have impacted.

5.4 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS

The Proposed Action would commit either the West Range Site or East Range Site as the location for an IGCC electricity generating station for the foreseeable future. Site preparation would include the filling of low-lying areas and grading to provide a developable site plan, which would impact wetlands, vegetation, and wildlife habitat as described in Sections 4.7 and 4.8. Although arguably these resources could be reclaimed at some point in the future, it is unlikely that they would be restored to their original conditions and functionality. Therefore, these commitments are considered irreversible.

A resource commitment is **irreversible** when primary or secondary impacts from its use limit future use options and **irretrievable** when its use or consumption is neither renewable nor recoverable for use by future generations.

The implementation of the Proposed Action would potentially result in the irretrievable commitment of building materials for construction of the Mesaba Energy Project, although many of the building materials can be reused or recycled at a future date. Operation of the proposed facility would require the irretrievable commitment of coal and/or petroleum coke, natural gas (used during startup and as a backup fuel), and small quantities of process chemicals, paints, degreasers, and lubricants as described in Sections 2.2.2 and 4.16. None of these resources is in short supply relative to the size and location of the proposed facilities. Process water and potable water used by the facility would be returned to the environment by evaporation, treatment, and discharge by publicly owned treatment works (potable water use), and **treated by ZLD (process water)**.

The construction and operation of the proposed facilities would require the commitment of human resources that would not be available for other activities during the period of their commitment, but this commitment would not be irreversible. Finally, the implementation of the Proposed Action would require the commitment of financial resources by Excelsior, its investors and lenders, and DOE for the construction, demonstration, and operation of the Mesaba Energy Project. However, these commitments are consistent with the purpose of and need for the Proposed Action as described in Chapter 1.

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5.5 RELATIONSHIP BETWEEN SHORT-TERM USES OF THE ENVIRONMENT AND THE MAINTENANCE AND ENHANCEMENT OF LONG-TERM PRODUCTIVITY

The Proposed Action would support the DOE objective of demonstrating and promoting innovative coal power technologies that can provide the United States with clean, reliable, and affordable energy using abundant domestic sources of coal. The long-term benefit of the proposed project would be to demonstrate advanced power generation systems using IGCC technology at a sufficiently large scale to allow industries and utilities to assess the technology's potential for commercial application. The ability to show prospective domestic and overseas customers an operating facility rather than a conceptual design or engineering prototype would provide a persuasive inducement for them to purchase this advanced coal power technology. Successful demonstration would enhance prospects of exporting the technology to other nations and may provide the single most important advantage that the United States could obtain in the global competition for new markets.

The proposed project would minimize SO_2, NO_x, mercury, and particulate emissions. The project is expected to remove almost 99 percent of the SO_2 produced in the IGCC process. The removal of nearly all of the fuel-bound nitrogen from the synthesis gas prior to combustion in the gas turbine would result in appreciably lower NO_x emissions compared to conventional coal-fired power plants. More than 90 percent of the mercury would be removed from the fuel as received, and particulate emissions from the preliminary turbine stack are expected to be near zero. Also, emissions of CO_2 are expected to be 15 to 20 percent less than would be produced at conventional coal-fired power plants, and the facility would be designed to be adaptable for retrofit of carbon capture technology.

The Proposed Action would also support the objectives of the Mesaba Energy Project proponent to provide a source of electric power for the State of Minnesota and the national electric grid, as well as provide economic revitalization for the Taconite Tax Relief Area and Arrowhead Region of Minnesota. Local officials, business leaders, and many residents consider the potential environmental impacts that would occur during construction and operation of the IGCC generating station to be acceptable tradeoffs for the long-term productivity of Iron Range communities. Project aspects that would enhance long-term productivity in the region include:

- The generation of **1,200** $MWe_{(net)}$ to help alleviate the need within Minnesota for **an estimated 2,000** MWe of new baseload power generation **by 2020** (**Appendix F1**).
- The direct, indirect, and induced creation of 400 to 3,600 jobs annually in the Arrowhead Region during the six years of construction for the Mesaba Energy Project Phases I and II (Section 4.11.2.1).
- The direct, indirect, and induced contribution of $3.1 billion of total economic output in the Arrowhead Region during the six-year construction period for Phases I and II (Section 4.11.2.1).
- The direct, indirect, and induced creation of more than 400 jobs annually in the Arrowhead Region during full operation of Phases I and II (Section 4.11.2.2).
- The direct, indirect, and induced contribution of $1.1 billion of total economic output in the Arrowhead Region annually during full operation of Phases I and II (Section 4.11.2.2).
- **[Statement in Draft EIS regarding stabilization of water levels in the Canisteo Mine Pit was removed based on the project announced by MNDNR.]**

Short-term uses of the environment would pertain to the activities and associated impacts during construction that have been described throughout Chapter 4 and include such effects as:

- Aesthetic impacts from construction affecting nearby residents as described in Section 4.2, including the effects on viewsheds from land-clearing activities and the exposure to emissions of fugitive dust and noise during construction.

- Impacts on air quality as described in Section 4.3, including fugitive dust emissions during construction.
- Erosion and sedimentation impacts on surface waters during construction as described in Sections 4.4 and 4.5, which generally would be mitigated through the use of required control measures.
- Loss of wetlands, vegetation, and wildlife habitat caused by land-clearing activities as described in Sections 4.7 and 4.8.
- Traffic impacts during construction attributable to temporary diversions and the movement of heavy equipment as described in Section 4.15.
- Increased noise from construction activities affecting nearby residents as described in Section 4.18.

6. REGULATORY AND PERMIT REQUIREMENTS

Statute, Regulation, Order	Description
Federal Regulations and Permitting	
Acid Rain Permit 40 CFR Part 72	Required for utility units exceeding threshold limits specified in regulation cited.
American Indian Religious Freedom Act of 1978 42 USC 1996	Ensures the protection of sacred locations and access of Native Americans to those sacred locations and traditional resources that are integral to the practice of their religions.
Antiquities Act 16 USC 431 *et seq.*	Protects historic and prehistoric ruins, monuments, and objects of antiquity (including paleontological resources) on lands owned or controlled by the Federal government.
Archaeological Resources Protection Act, as amended 16 USC 470aa *et seq.*	Requires a permit for excavation or removal of archaeological resources from publicly held or Native American lands. Excavations must further archaeological knowledge in the public interest, and the resources removed are to remain the property of the United States. If a resource is found on land owned by a Native American tribe, the tribe must give its consent before a permit is issued, and the permit must contain terms or conditions requested by the tribe.
Clean Air Act, Title I, IV, and V 40 CFR Parts 50 – 95	Establishes NAAQS set by the EPA for certain pervasive pollutants. Applicable Titles: • Title I—Air Pollution Prevention and Control. Basis for air quality and emission limitations, PSD permitting program, SIPs, NSPS, and NESHAP. • Title IV—Acid Deposition Control. Establishes limitations on SO_2 and NO_x emissions, permitting requirements, monitoring programs, reporting and record keeping requirements, and compliance plans for emission sources. This Title requires that emissions of SO_2 from utility sources be limited to the amounts of allowances held by the sources. • Title V—Permitting. Required if the plant falls within 40 CFR 70.3 designations. This Title provides the basis for the Operating Permit Program and establishes permit conditions, including monitoring and analysis, inspections, certification, and reporting. Authority for implementation of the permitting program is delegated to the state of Minnesota.

Statute, Regulation, Order	Description
Clean Water Act, Title IV 40 CFR Parts 104 – 140	Focuses on improving the quality of water resources by providing a comprehensive framework of standards, technical tools, and financial assistance to address the many causes of pollution and poor water quality, including municipal and industrial wastewater discharges, polluted runoff from urban and rural areas, and habitat destruction. Applicable Sections: • Section 402—National Pollutant Discharge Elimination System (NPDES) Permit. Requires sources to obtain permits to discharge effluents and stormwaters to surface waters. The CWA authorizes EPA to delegate permitting, administrative, and enforcement duties to stage governments, while EPA retains oversight responsibilities. The state of Minnesota has been delegated NPDES authority and therefore would issue the NPDES permit. • Section 404—Permits for Dredged or Fill Material. Regulates the discharge of dredged or fill material in the jurisdictional wetlands and waters of the United States. The USACE has been delegated the responsibility for authorizing these actions.
Determination of No Hazard to Air Navigation 14 CFR 77.19	Upon the Proponent's submission of notice of proposed construction of objects potentially affecting navigable airspace, the FAA must confirm such construction constitutes no hazard to air navigation.
Emergency Planning and Community Right-to-Know Act of 1986 42 USC 1101 *et seq.*	Requires that inventories of specific chemicals used or stored on site be reported on a periodic basis. The plant would manufacture, process, or otherwise use a number of substances subject to the Act's reporting requirements, such as some trace amounts of metals and mercury.
Endangered Species Act of 1973, as amended 16 USC 1536 *et seq.*	Enacted by Public Law 93-205, Endangered Species Act of 1973 (16 USC 1531 *et seq.*). Section 7, "Interagency Cooperation," requires any Federal agency authorizing, funding, or carrying out any action to ensure that the action is not likely to jeopardize the continued existence of any endangered species or threatened species or result in the destruction or adverse modification of critical habitat of such species. Under Section 7 of the Act, DOE has consulted with the USFWS.
Exempt Wholesale Generator Status 15 USC 79z-5a(e)	Exemption of private generation from certain requirements for public utilities.
Farmland Protection Policy Act 7 USC 4201 *et seq.*	Directs Federal agencies to identify and quantify adverse impacts of Federal programs on farmlands. The Act's purpose is to minimize the number of Federal programs that contribute to the unnecessary and irreversible conversion of agricultural land to non-agricultural uses.
Fish and Wildlife Conservation Act of 1980 16 USC 2901 *et seq.*	Encourages Federal agencies to conserve and promote conservation of non-game fish and wildlife species and their habitats.
Fish and Wildlife Coordination Act 16 USC 661 *et seq.*	Requires Federal agencies undertaking projects affecting water resources to consult with the USFWS and the state agency responsible for fish and wildlife resources. These agencies are to be sent copies of this DEIS and their comments will be considered.

Statute, Regulation, Order	Description
Migratory Bird Treaty Act, as amended 16 USC 703 *et seq.*	Protects birds that have common migration patterns between the United States and Canada, Mexico, Japan, and Russia. The Act regulates the take and harvest of migratory birds. The USFWS will review this EIS to determine whether the activities analyzed would comply with the requirements of the Migratory Bird Treaty Act.
National Environmental Policy Act (NEPA) of 1969 42 USC 4371 *et seq.*	This EIS is being prepared to comply with NEPA, the Federal law that requires agencies of the Federal government to study the possible environmental impacts of major Federal actions significantly affecting the quality of the human environment.
National Historic Preservation Act of 1966 16 USC 470 *et seq.*	Enacted by Public Law 89-665, National Historic Preservation Act of 1966 (16 USC 470 *et seq.*). Under Section 106, the head of any Federal agency having direct or indirect jurisdiction over a proposed Federal or Federally assisted undertaking in any state and the head of any Federal department or independent agency having authority to license any undertaking shall, prior to the approval of the expenditure of any Federal funds on the undertaking or prior to the issuance of any license, as the case may be, take into account the effect of the undertaking on any district, site, building, structure, or object that is included in or eligible for inclusion in the National Register. The head of any such Federal agency shall afford the Advisory Council on Historic Preservation established under Title II of the Act a reasonable opportunity to comment with regard to such undertaking.
Native American Graves Protection and Repatriation Act of 1990 25 USC 3001	Directs the Secretary of the Interior to guide the repatriation of Federal archaeological collections and collections that are culturally affiliated with Native American tribes and held by museums that receive Federal funding. Major actions to be taken under this law include: • The establishment of a review committee with monitoring and policymaking responsibilities; • The development of regulations for repatriation, including procedures for identifying lineal descent or cultural affiliation needed for claims; • The oversight of museum programs designed to meet the inventory requirements and deadlines of this law; and • The development of procedures to handle unexpected discoveries of graves or grave goods during activities on Federal or tribal land.
New Source Performance Standards (NSPS) 40 CFR Part 60	The NSPS are technology-based standards applicable to new and modified stationary sources of regulated air emissions. Where the NAAQS emphasize air quality in general, the NSPS focus on particular sources of approximately 70 industrial source categories or sub-categories of sources (e.g., fossil fuel-fired generators, grain elevators, steam generating units) that are designated by size as well as type of process.
Noise Control Act of 1972, as amended 42 USC 4901 *et seq.*	Directs Federal agencies to carry out programs in their jurisdictions “to the fullest extent within their authority” and in a manner that furthers a national policy of promoting an environment free from noise that jeopardizes health and welfare.

Statute, Regulation, Order	Description
Notice to the Federal Aviation Administration 14 CFR Part 77	The FAA must be notified if any structures more than 200 ft. high would be constructed at the proposed site pursuant to 14 CFR Part 77. The FAA would then determine if the structures would or would not be an obstruction to air navigation.
Occupational Safety and Health Act (OSHA) of 1970, as amended 29 USC §651 *et seq.*	Compliance with the OSHA would be required according to OSHA standards. Applicable Rules: • OSHA General Industry Standards (29 CFR Part 1910) • OSHA Construction Industry Standards (29 CFR Part 1926)
Permanent Exemption for New Facilities 10 CFR Part 503	Exemption to allow burning of natural gas and fuel oil for power production.
Pollution Prevention Act of 1990 42 USC 13101 *et seq.*	Establishes a national policy for waste management and pollution control that focuses first on source reduction, and then on environmentally safe waste recycling, treatment, and disposal. Executive Order 13101, *Greening the Government through Waste Prevention, Recycling, and Federal Acquisition*, and Executive Order 13148, *Greening the Government through Leadership in Environmental Management*, provide guidance to agencies to implement the Pollution Prevention Act. DOE requires specific goals to reduce the generation of waste. DOE would implement a pollution prevention plan by incorporating such waste-reducing activities as ordering construction materials in correct sizes and numbers, resulting in very small amounts of waste; and implementing best management practices to reduce the volume of waste generated and reuse waste wherever possible.
Prevention of Significant Deterioration (PSD) Permit 40 CFR 52.21	Required if the plant would have the potential to emit 100 tons per year or more of a pollutant subject to regulation under the CAA. Regulated pollutants include SO_2, NO_x, and CO. A PSD Permit would be issued by the state or local air pollution control agency.
Resource Conservation and Recovery Act (RCRA) of 1976 40 CFR Parts 239 – 299	Regulates the treatment, storage, and disposal of hazardous wastes. Project participants would be required to identify any residues that require management as hazardous waste under RCRA (40 CFR Part 261). For some waste streams, this includes testing waste samples using the toxic characteristic leaching procedure or other procedures that measure hazardous waste characteristics. Applicable Title: Title II—Solid Waste Disposal (known as the Solid Waste Disposal Act), regulates the disposal of solid wastes. Title II, Subtitle C—Hazardous Waste Management, provides for a regulatory system to ensure the environmentally sound management of hazardous wastes from the point of origin to the point of final disposal. Title II, Subtitle D—State or Regional Solid Waste Plans.
Rivers and Harbor Act Permit 33 CFR Part 322	Permit for structures or work in or affecting navigable waters of the United States.

Statute, Regulation, Order	Description
Safe Drinking Water Act 42 USC 300 *et seq.*	Gives EPA the responsibility and authority to regulate public drinking water supplies by establishing drinking water standards, delegating authority for enforcement of drinking water standards to the states, and protecting aquifers from hazards such as injection of wastes and other materials into wells. The Minnesota Department of Health is the state agency responsible for enforcement. EPA regulations for this program are codified at 40 CFR Part 141, and Minnesota rules for this program are codified at Minn. R. ch. 4720.
Sales Tap Approval 18 CFR 157.211	Approval to tap into or modify existing interstate gas pipeline.
Surface Mining Control and Reclamation Act of 1977 30 CFR Part 700 *et seq.*	Provides for the Federal regulation of surface coal mining operations and the acquisition and reclamation of abandoned mines. Title IV of the Surface Mining Control and Reclamation Act is designed to help reclaim and restore abandoned coal mine areas throughout the country.
Executive Orders	
Executive Order 11988, *Floodplain Management* ; Executive Order 11990, *Protection of Wetlands*	• Executive Order 11988, *Floodplain Management*, directs Federal agencies to establish procedures to ensure that they consider potential effects of flood hazards and floodplain management for any action undertaken. Agencies are to avoid impacts to floodplains to the extent practical. • Executive Order 11990, *Protection of Wetlands*, requires Federal agencies to avoid short- and long-term impacts to wetlands if a practical alternative exists. • DOE regulation 10 CFR Part 1022 establishes procedures for compliance with these Executive Orders. Where no practical alternatives exist to development in floodplain and wetlands, DOE is required to prepare a floodplain and wetlands assessment discussing the effects on the floodplain and wetlands, and consideration of alternatives. In addition, these regulations require DOE to design or modify its actions to minimize potential damage in floodplains or harm to wetlands. DOE is also required to provide opportunity for public review of any plans or proposals for actions in floodplains and new construction in wetlands. A statement of findings from the assessment will be incorporated into the Final EIS.
Executive Order 12856, *Right-to-Know Laws and Pollution Prevention Requirements*	Directs Federal agencies to reduce and report toxic chemicals entering any waste stream, improve emergency planning, response, and accident notification, and encourage the use of clean technologies and testing of innovative prevention technologies. In addition, this Order states that Federal agencies are persons for purposes of the Emergency Planning and Community Right-to-Know Act, which requires agencies to meet the requirements of the Act.
Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*	Requires Federal agencies to identify and address, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations.

Statute, Regulation, Order	Description
Executive Order 13007, *Indian Sacred Sites*	Directs Federal agencies, to the extent permitted by law and not inconsistent with agency missions, to avoid adverse effects to sacred sites and to provide access to those sites to Native Americans for religious practices. This Order directs agencies to plan projects to provide protection of and access to sacred sites to the extent compatible with the project.
Executive Order 13101, *Greening the Government through Waste Prevention, Recycling, and Federal Acquisition*	Directs Federal agencies to incorporate waste prevention and recycling in each agency's daily operations and work to increase and expand markets for recovered materials through preference and demand for environmentally preferable products and services.
Executive Order 13112, *Invasive Species*	Directs Federal agencies to prevent the introduction of or to monitor and control invasive (non-native) species, to provide for restoration of native species, to conduct research, to promote educational activities, and to exercise care in taking actions that could promote the introduction or spread of invasive species.
Executive Order 13148, *Greening the Government through Leadership in Environmental Management*	Makes the head of each Federal agency responsible for ensuring that all necessary actions are taken to integrate environmental accountability into agency day-to-day decision-making and long-term planning across all agency missions, activities, and functions.
Executive Order 13175, *Consultation and Coordination with Indian Tribal Governments*	Directs Federal agencies to establish regular and meaningful consultation and collaboration with tribal governments in the development of Federal policies that have tribal implications, to strengthen United States government-to-government relationships with Indian tribes, and to reduce the imposition of unfunded mandates on tribal governments.
Executive Order 13186, *Responsibilities of Federal Agencies to Protect Migratory Birds*	Requires Federal agencies to avoid or minimize the negative impacts of their actions on migratory birds, and to take active steps to protect birds and their habitats. • Directs each Federal agency taking actions having or likely to have a negative impact on migratory bird populations to work with the USFWS to develop an agreement to conserve those birds. • Directs agencies to avoid or minimize impacts to migratory bird populations, take reasonable steps that include restoring and enhancing habitat, prevent or abate pollution affecting birds, and incorporate migratory bird conservation into agency planning processes whenever possible. • Requires environmental analyses of Federal actions to evaluate effects of those actions on migratory birds, to control the spread and establishment in the wild of exotic animals and plants that could harm migratory birds and their habitats, and either to provide advance notice of actions that could result in the take of migratory birds or to report annually to the USFWS on the numbers of each species taken during the conduct of agency actions.

Statute, Regulation, Order	Description
Indian Treaties – Chippewa	
1826 Fond du Lac	Granted the right to search for and take subsurface minerals.
1837 Saint Peter River	Ceded land to the U.S. in the vicinity of the St. Croix River in Minnesota.
1847 Treaty with the Mississippi and Lake Superior Bands	Ceded land to the U.S. that was intended for the Winnebago reservation, but was never developed.
1847 Treaty with the Pillager Band at Leech Lake	Ceded land to the U.S. that was intended for the Menominee reservation, but was never developed.
1854 Treaty with the Mississippi and Lake Superior Bands	Created the Grand Portage, Fond du Lac, and Lake Vermillion reservations.
1855 Treaty with the Mississippi, Pillager, Winibigoshish bands	Ceded land to the U.S. in return for reservation to be established in traditional habitation areas such as Leech and Cass Lake, Winibigoshish, Mille Lacs, Sand Lake, Rice Lake, Gull Lake, Rabbit Lake, and Lake Pokegama.
1863 Treaty with Pillager, Winibigoshish and Mississippi bands	Created one reservation for all Indians within Minnesota.
1864 Modification to the 1863 Treaty with Pillager, Winibigoshish and Mississippi bands	Reverses many of the reservations established by the 1855 treaty.
1863 Treaty with the Red Lake and Pembina Bands	Ceded land to the U.S. in exchange for 160 acres for men and a 640-acre reservation for chief “Red Bear,” on the north side of the Pembina River.
1864 Amendment to the 1863 Treaty with the Red Lake and Pembina Bands	Modified the terms of the 1863 treaty.
1867 Treaty with the Mississippi Band	Ceded land from the Leech Lake reservation to the U.S. and created the White Earth reservation.
Indian Treaties – Sioux	
1805 Zebulon Pike treaty with the Sioux	Ceded most of Minneapolis and St. Paul to the U.S.
1837 Treaty with the Sioux	Ceded land west of the Mississippi River including Fort Snelling to the U.S.
1851 Treaty of Traverse des Sioux and the Mendota Treaty	Ceded all Sioux land in Minnesota (and Iowa) to the U.S. and created a reservation on the north and south sides of the Minnesota River.

Statute, Regulation, Order	Description
1858 Treaty with the Wahpekeute and Mdewakanton and the 1858 Treaty with the Sisseton-Wahpeton	A reservation was created with the land that the Wahpekeute and Mdewakanton possessed and each head of household was granted 80 acres.
1858 Treaty with the Yankton	Gave the Indians access to a sacred pipestone quarry.
State Regulations and Permitting	
Aboveground Storage Tank Registration Minn. R. ch. 7001 and 7151	Owners of Aboveground Storage Tanks larger than 110 gallons must notify the Agency.
Access Permit Minn. R. 8810.0050	Required whenever there is a request for change in access to or from Mn/DOT ROWs.
Air Emissions Permit Minn. R. ch. 7007	In most cases, a state construction permit is required for all new sources of air pollutants.
Air Pollution Episodes Rule Minn. R. 7009.1000 – 7009.1110	Requires the preparation of an emergency action plan to be implemented in the event that the Commissioner of the MPCA makes an air pollution episode declaration. Requirements under this rule would be considered mitigation measures to reduce emissions from the Mesaba IGCC Power Plant sources.
Beneficial Use Rule **Minn. R. 70035.2860**	**Governs how materials classified as solid waste are determined to have a beneficial use. Coal combustion slag, when used as a component in manufactured products is regulated under the standing beneficial use determination. Under this regulation, the material is considered solid waste until it is incorporated into a manufactured product, or utilized in accordance with a standing or case-specific beneficial use determination. Other materials may require a case-specific beneficial use determination, which would require MPCA agency review.**
Certificate of Need Minn. R. ch. 7829, 7849, 7851, 7853, and 7855	The Minnesota PUC requires a description of the proposed energy facility and its probable location, an indication of forecast information upon which the alleged need is based, a discussion of possible alternatives and why they were rejected, and environmental information related to construction and operation of the proposed facility.
Construction of Tunnels Under Highways Permit Minn. R. 8810.3200 – 8810.3600	Utility construction and relocation on trunk highway ROWs.
Cultural Resources Review 36 CFR Part 800	State review required under National Historic Preservation Act.
Drainage Permit Minn. R. 8810.3200 – 8810.3600	Permit issued for repairs of utility or rebuilding structure (manholes, catch basins, etc.) that are already in place.
Easement Across State-Owned Land Managed by the Minnesota Department of Natural Resources Minn. Stat. § 84.63 and § 84.631	The MNDNR may issue an easement to cross state-owned lands for the purpose of constructing and maintaining roads.

Statute, Regulation, Order	Description
Electrical Inspection Minn. R. ch. 3800	Conformance with electrical code.
Environmental Laboratory Certification Minn. R. 4740.2010 – 4740.2120	Environmental laboratory certification required before data can be submitted in support of permit programs (e.g., as prescribed under NPDES permit program).
Flammable Liquid Tanks Plan Review Minn. Stat. § 299F.011	Aboveground Storage Tank Plan Review for flammable and combustible liquids (private motor vehicle fuel dispensing station).
Hazardous Waste Generator License Minn. R. 7045.0225	Any business that generates more than 10 gallons of hazardous waste in a calendar year must be licensed and pay an annual fee.
License to Cross Public Lands and Waters Minn. R. ch. 6135	For installation of utility services (as defined in statute) across MNDNR-administered land and public waters.
Minnesota Building Code Minn. R. ch. 1305 Minn. R. ch. 1306 Minn. R. ch. 1315 Minn. R. ch. 1346 Minn. R. ch. 4715 Minn. R. ch. 5225 and 5230 Minn. R. ch. 7510 Minn. R. ch. 7512	• International Building Code—Covers the construction of all buildings except detached one- and two-family dwellings and multiple single-family dwellings not more than three stories high (townhouses). Regulations include weather-resistance, ventilation, sanitation, fire-safety, structural integrity, user safeguards, etc. Minnesota’s nonresidential code is published by the International Code Council. • Special Fire Protection Systems—Requires the installation of an automatic fire sprinkler system in most nonresidential buildings, both existing and new. • National Electric Code—Adopts a national standard for the installation of electrical wiring, apparatus, and equipment for electric light, heat, power, technology circuits and systems, and alarm and communication systems, as published by the National Fire Protection Association. • Minnesota Mechanical Code—Governs the installation and maintenance of heating, ventilating, cooling, and refrigeration systems. Regulated subjects include furnaces, ductwork, hot water heat, commercial kitchen ventilation, gas piping, exhaust ventilation, etc. • Minnesota Plumbing Code—Governs the installation of plumbing systems in new buildings, additions to buildings, and buildings undergoing alterations. Regulated subjects include water supply piping, waste and vent piping, roof drain piping, backflow protection, plumbing fixtures, etc. • Minnesota Boilers and High Pressure Piping—Governs the design, installation, alteration, repair, removal, operation, and maintenance of various types of boilers and high pressure piping equipment. • Minnesota State Fire Code—Addresses conditions hazardous to life and property from fire, explosion, hazardous material storage, handling, or use, and use and occupancy of buildings and structures. • Fire Sprinkler Systems Plan Review—Permit for fire protection system.

Statute, Regulation, Order	Description
Minnesota Endangered Species Law Minn. R. ch. 6134	Minnesota's Endangered Species Statue (Minn. Stat. § 84.0895) requires the MNDNR to adopt rules designating species meeting the statutory definitions of endangered, threatened, or species of special concern. The resulting list of Endangered, Threatened, and Special Concern Species is codified as Minn. R. ch. 6134.
Minnesota Standards for Stationary Sources Minn. R. 7011.0150, 7011.0715, and 7011.2300	• Control of Fugitive Particulate Matter—Prohibits the release of "avoidable amounts" of particulate matter. Facilities are required to take reasonable precautions to prevent the discharge of visible fugitive emissions beyond the property line. • Standards of Performance for Post-1969 Industrial Process Equipment—Applies to the Mesaba IGCC Power Plant's coal, petroleum coke, and slag handling equipment that would generate particulate matter emissions. Since the Mesaba IGCC Power Plant is located outside of Minneapolis, St. Paul, and Duluth, and is located more than one quarter mile away from any residence or public roadway, the required control equipment standard to be applied is 85%. • Standards of Performance for Stationary Internal Combustion Engines—Limits visible emissions from emergency fire water pumps and emergency generators to 20% opacity and limits SO_2 emissions to 0.5 lb/MMBTU heat input unless a higher limit has been established through modeling.
NPDES General Construction Stormwater Permit 40 CFR 122.26; Minn. R. 7001.1035	NPDES permit for stormwater discharge required for construction sites disturbing 1 acre or more of land.
NPDES General Industrial Stormwater Permit Minn. R. 7001.1035	Permit for stormwater discharges associated with industrial activity.
NPDES/SDS Permit Minn. R. 7001.0020	Permit required for discharging wastewater to waters of the United States.
Open Burning Permit Minn. Stat. § 88.16	Registering with local forestry office or fire warden is required in forested counties.
Part 70 Operating Permit Minn. R. 7007.0200 and 7007.0250	Construction of a major new source meeting specifications in rules must receive an air emissions permit prior to commencement of construction.
Public Water Supply Plan Review Minn. R. ch. 4720	Required for drinking water systems serving greater than 25 persons.
Public Waters Work Permit (Protected Waters Permit) Minn. R. 6115.0160 – 6115.0280	Work permit for activities that change or diminish the course, current or cross section of public waters within the state.

Statute, Regulation, Order	Description
Railroad Grade Crossing Operating License Minn. R. 8830.2150 and 8830.9991	Operating license will be issued upon submittal and approval of railroad grade crossing signal circuit plans.
Route Permit for High Voltage Transmission Lines Minn. R. ch. 4400	Any proposed power line over 100 kV must obtain a route permit from the PUC, although an applicant has the option to seek local approval for power lines under 200 kV and certain other lines specified in Minn. Stat. § 216E.05.
Route Permit For Natural Gas Pipeline Minn. R. 4415.0035	Pipelines with a nominal diameter of 6 in. or more designed to transport hazardous liquids and pipelines designed to be operated at pressure of more than 275 lbs. per in.^{2} to carry natural gas are required to obtain a Pipeline Routing Permit from the PUC.
Sanitary Sewer Extension Permit Minn. R. 7001.0020	Required when a project does not meet the MPCA design criteria via the Design Certification for Sanitary Sewer Extension Plans and Specifications Checklist.
Site Permit for Large Electric Generating Power Plant Minn. R. ch. 4400	Any proposed power plant over 50 MW must obtain a site permit from the PUC, although an applicant has the option too seek local approval for power plants under 80 MW and natural-gas-fired peaking plants.
Solid Waste Storage Permit Minn. R. ch. 7001 and 7035	Any non-hazardous solid waste **that would be stored in quantities larger than 10 cubic yards for more than 48 hours** would require a permit from the MPCA. **Materials that are authorized for beneficial use do not need a Solid Waste Storage Permit, but do need to comply with the storage standard requirements in subparts 2, 6, and 7 of Minn. R. 7035.2855.**
Underground Storage Tank Registration Minn. R. 7150.0120	Regulated Underground Storage Tank systems must be registered.
Utility Permit on Trunk Highway ROW Minn. R. 8810.3100 – 8810.3600	Permit required to install or move utilities on highway ROWs.
Water Appropriation Permit – Long Term (Exceeding two years) Minn. R. 6115.0600 – 6115.0810; 6115.0010	Permit required to appropriate waters of the state (ground or surface). All active water appropriation permit holders are required to measure monthly water use with an approved measuring device to an accuracy of 10 percent and report water use yearly. Permit holders receive water use reporting forms each year to report their water use.
Water Appropriation Permit – Temporary (1-2 year maximum) Minn. R. 6115.0600 – 6115.0810; 6115.0010	General permit notification form for certain temporary appropriations for construction dewatering, landscaping and hydrostatic testing.

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7. AGENCIES AND TRIBES CONTACTED

Federal Agencies

Federal Energy Regulatory Commission
- Division of Gas – Environment & Engineering

U.S. Army Corps of Engineers
- St. Paul District

U.S. Department of Agriculture – Forest Service
- Superior National Forest

U.S. Department of the Interior
- Fish and Wildlife Service – Twin Cities Field Office
- National Park Service
- Bureau of Indian Affairs

U.S. Department of Transportation – Federal Highway Administration
- Minnesota Division

U.S. Environmental Protection Agency – Region 5
- Water Division

Minnesota Agencies

Minnesota Department of Natural Resources
- Natural Heritage and Nongame Research Program

Minnesota Department of Transportation
- District 1 – Duluth

Minnesota Historical Society
- Minnesota State Historic Preservation Office

Minnesota Indian Affairs Council

Native American Tribes in Minnesota

Bois Forte Reservation
Fond du Lac Reservation
Grand Portage Reservation
Leech Lake Band of Ojibwe
Leech Lake Reservation
Lower Sioux Community
Mille Lacs Band of Ojibwe
Minnesota Chippewa Tribe
Prairie Island Indian Community
Red Lake Band of Chippewa
Red Lake Nation
Shakopee Mdewakanton Dakota Community
Upper Sioux Community
White Earth Reservation
Iron Range Council for Native Americans
1854 Authority

Native American Tribes Located Outside Minnesota

Bad River Band of Lake Superior Chippewa
Cheyenne River Sioux Tribe
Crow Creek Sioux Tribe
Flandreau Santee Sioux
Fort Peck Assiniboine and Sioux Tribes
Keweenaw Bay Indian Community
Lac Courte Oreilles Band of Lake Superior, Chippewa Indians of Wisconsin
Lac du Flambeau Band of Lake Superior, Chippewa Indians of Wisconsin
Lac Vieux Desert Band of Lake Superior, Chippewa Indians
Lower Brule Sioux Tribe
Northern Arapaho Tribe
Northern Cheyenne Tribe
Oglala Sioux Tribe
Red Cliff Band of Lake Superior, Chippewa Indians
Santee Sioux Nation
Sisseton-Wahpeton Oyate of the Lake Traverse Reservation
Sokaogon Chippewa (Mole Lake), Community of Wisconsin
Spirit Lake Tribal Council
St. Croix Chippewa Indians of Wisconsin
Standing Rock Sioux
Three Affiliated Tribes
Turtle Mountain Band of Chippewa
Wahpekute Tribe
Winnebago Tribe
Yankton Sioux Tribe

8. DISTRIBUTION LIST

Elected Officials

The Honorable Amy Klobuchar
United States Senate

The Honorable Al Franken
United States Senate

The Honorable James L. Oberstar
United States House of Representatives

The Honorable Tim Pawlenty
Governor of Minnesota

United States Senate and House of Representatives Committees

Appropriations Committees

The Honorable Byron Dorgan
Chairman
Subcommittee on Energy and Water **Development**
Committee on Appropriations
United States Senate

The Honorable Peter J. Visclosky
Chairman
Subcommittee on Energy and Water Development, and Related Agencies
Committee on Appropriations
United States House of Representatives

The Honorable **Robert Bennett**
Ranking Member
Subcommittee on Energy and Water **Development**
Committee on Appropriations
United States Senate

The Honorable **Rodney P. Frelinghuysen**
Ranking Member
Subcommittee on Energy and Water Development, and Related Agencies
Committee on Appropriations
United States House of Representatives

Authorizing Committees

The Honorable Jeff Bingaman
Chairman
Committee on Energy and Natural Resources
United States Senate

The Honorable Barbara Boxer
Chairman
Committee on Environment and Public Works
United States Senate

The Honorable **Henry A. Waxman**
Chairman
Committee on Energy and Commerce
United States House of Representatives

The Honorable Bart Gordon
Chairman
Committee on Science and Technology
United States House of Representatives

The Honorable **Lisa Murkowski**
Ranking Member
Committee on Energy and Natural Resources
United States Senate

The Honorable James M. Inhofe
Ranking Member
Committee on Environment and Public Works
United States Senate

The Honorable Joe Barton
Ranking Member
Committee on Energy and Commerce
United States House of Representatives

The Honorable Ralph Hall
Ranking Member
Committee on Science and Technology
United States House of Representatives

Native American Tribal Leaders

Mr. Norman Deschampe
Tribal Chairman
Grand Portage Reservation

Ms. Karen Diver
Chairwoman
Fond du Lac Reservation

Mr. Kevin Leecy
Chairman
Bois Forte Reservation

Ms. **Marge Anderson**
Chief Executive
Mille Lacs Band of Ojibwe

Mr. Roger Trudell
Chairperson
Santee Sioux Nation

Mr. Leonard Eller
President, Executive Committee
Flandreau Santee Sioux

Mr. Leon Morin
Chairperson
Turtle Mountain Band of Chippewa

Mr. Peter Defoe
Chairman
Fond du Lac Reservation

Mr. Louis Taylor
Chairperson
Lac Courte Oreilles Band of Lake Superior Chippewa Indians of Wisconsin

Mr. David Merrill
President
St. Croix Chippewa Indians of Wisconsin

Mr. Valentino White, Sr.
Chairperson
Spirit Lake Tribal Council

Mr. Floyd Jourdain
Chairman
Red Lake Band of Chippewa

Ms. **Jean Stacy**
President
Lower Sioux Community

Mr. **Arthur La Rose**
Chairman
Leech Lake Band of Ojibwe

Ms. Erma Vizenor
Chairwoman
White Earth Reservation

Mr. William E. "Gene" Emery
President
Keweenaw Bay Indian Community

Mr. Donald Moore, Sr.
Bad River Band of Lake Superior Chippewa

Mr. Henry St. Germaine, Sr.
President
Lac du Flambeau Band of Lake Superior Chippewa Indians of Wisconsin

Mr. James Williams, Jr.
Chairperson
Lac Vieux Desert Band of Lake Superior Chippewa Indians

Mr. Norman Deschampe
President
Minnesota Chippewa Tribe

Ms. Doreen Hagen
President
Prairie Island Indian Community

Ms. Helen Blue-Redner
Chairperson
Upper Sioux Community

Mrs. Sandra Rachal
Chairperson
Sokaogon Chippewa (Mole Lake) Community of Wisconsin

Ms. Ann Larsen
Chairperson
Lower Sioux Community

Mr. James "JC" Crawford
Chairperson
Sisseton-Wahpeten Oyate of the Lake Traverse Reservation

Mr. Raymond M. DePerry
Chairperson
Red Cliff Band of Lake Superior Chippewa Indians

Mr. Stanley R. Crooks
Chairman
Shakopee Mdewakanton Dakota Community

<u>Federal Agencies</u>

Mr. **Reed Nelson**
Director, Office of Federal Agency Programs
Advisory Council on Historic Preservation

Ms. **Denali Daniels**
Energy Program Manager
Denali Commission

Mr. John (Matthew) Harrington
National Environmental Coordinator
Natural Resources Conservation Service
U.S. Department of Agriculture

Frank Monteferrante, Ph.D.
Economic Development Administration
U.S. Department of Commerce

Mr. Mark Plank
Rural Utilities Service
U.S. Department of Agriculture

Mr. David Reese
USM/**OCAO**/**Occupational** Safety and Environmental Programs
Department of Homeland Security

Mr. **Charles Bien**, AICP
Director, **Environmental Review Division**
U.S. Department of Housing and Urban Development

Mr. Michael T. Chezik
Regional Environmental Officer
U.S. Department of the Interior

Ms. **Susan Bromm**
Director, Office of Federal Activities
U.S. Environmental Protection Agency

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Director, Office of Environmental Policy and Compliance
U.S. Department of the Interior

Ms. Camille Mittelholtz
Environmental Team Leader
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U.S. Department of Transportation

Ms. Marthea Rountree
Staff Level Contact
Office of Federal Activities
U.S. Environmental Protection Agency

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NEPA Implementation Office of Enforcement and Compliance Assurance
U.S. Environmental Protection Agency

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Federal Highway Administration

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National Science Foundation

Ms. **Amanda Ratliff**
Regional Environmental Officer
DHS/FEMA Region V

Mr. Steve Kokkinakis
NOAA Program Planning and Integration
U.S. Department of Commerce

Mr. **Mark Matusiak**
Civil Works Policy and Policy Compliance Division
Office of Water Project Review

Mr. Joe Carbone
Forest Service**,** U.S. Department of Agriculture
Ecosystem Management Coordination

Mr. **Ed Pfister**
Environmental Program Manager
U.S. Department of Health and Human Services

National Nongovernmental Organizations

Mr. **Frank M. Stewart**
President
American Association of Blacks in Energy

Mr. Randy Rawson
President
American Boiler Manufacturers Association

Mr. **Thomas H. Adams**
Executive Director
American Coal Ash Association

Ms. Pamela A. Lacey
Senior Managing Counsel
American Gas Association

Mr. **Harry Ng**
General Counsel
American Petroleum Institute

Ms. Joy Ditto
Director of Legislative Affairs
American Public Power Association

Mr. Richard M. Loughery
Director, Environmental Activities
Edison Electric Institute

Ms. Barbara Bauman Tyran
Director, Washington Relations
Electric Power Research Institute

Mr. Fred Krupp
President
National Headquarters
Environmental Defense **Fund**

Mr. Derek Stack
Executive Director, Great Lakes United

Mr. Tom Goldtooth
Executive Director
Indigenous Environmental Network

Mr. Robert A. Beck
Executive Vice President
National Coal Council

Ms. Jacqueline **Pata**
Executive Director
National Congress of American Indians

Mr. Jim Lyon
Senior Vice President for Conservation
National Wildlife Federation

Ms. **Karen Bennett**
Vice President, Environmental Affairs
National Mining Association

Mr. Rae Cronmiller
Environmental Counsel
National Rural Electric Cooperative Association

Mr. David Hawkins
Director, Climate Center
Washington Office
Natural Resources Defense Council

Dr. Allen Hershkowitz
Senior Scientist
New York Urban Program
Natural Resources Defense Council

Mr. Thomas Cassidy
Director of Federal Programs
The Nature Conservancy

Mr. Barry K. Worthington
Executive Director
United States Energy Association

Mr. **David Alberswerth**
Senior Energy Policy Advisor
Policy Department
The Wilderness Society

Mr. Scott C. Yaich, Ph.D.
Director of Conservation Programs
Ducks Unlimited, Inc.

Mr. John Shelk
President, CEO
Electric Power Supply Association

Mr. Erich Pica
Director of Economic Programs
Friends of the Earth

Mr. Steve Moyer
Vice President for Governmental Affiars
Trout Unlimited

Ms. Anna Aurilio
Director, Washington **DC** Office
Environment America

Mr. Ed Hopkins
Director of the Environmental Quality Program
Sierra Club

State Elected Officials

Senator Ellen R. Anderson

Representative Tom Anzelc

Representative David Dill

Representative Kent Eken

Senator Dennis R. Frederickson

Representative Tom Hackbarth

Representative Bill Hilty

Representative Margaret Anderson Kelliher

Senator Larry Pogemiller

Senator Julie A. Rosen

Representative Tom Rukavina

Senator Tom Saxhaug

Representative Marty Seifert

Senator David H. Senjem

Senator Yvonne Prettner Solon

Senator David J. Tomassoni

Representative Torrey Westrom

Representative Anthony Sertich

Representative Loren Solberg

Federal Agencies – Regional Offices

Mr. **Ralph Augustin**
Project Manager
U.S. Army Corps of Engineers

Ms**. Lauren H. O'Donnell**
Director
Federal Energy Regulatory Commission
Division of Gas – Environment and Engineering

Ms. Tamara Cameron
U.S. Army Corps of Engineers
St. Paul District Office

Mr. Trent Wickman, P.E.
Air Resource Specialist
U.S. Forest Service
Superior National Forest

Mr. James Sanders
Forest Supervisor
Superior National Forest

Mr. Tony Sullins
Field Supervisor
Twin Cities Ecological Services Field Office
U.S. Fish and Wildlife Service

Kelly Urbanek **and Mr. William Baer**
U.S. Army Corps of Engineers
Bemidji Regulatory Office

Ms. Cheryl Martin
Federal Highway Administration
Minnesota Division

Ms. Andrea Stacy
National Park Service
Air Resources Division

State Agencies (Not including EQB Technical Representative Agencies)

Bill Blazar
MN Chamber of Commerce

Shelly Burman
Minnesota Pollution Control Agency

Marshall Cole
Permit Engineer
Minnesota Pollution Control Agency, Rochester Office

Paul Eger
MPCA Commissioner

Ms. Bonita Eliason
Supervisor
Minnesota Department of Natural Resources
Natural Heritage and Nongame Research Program

Mr. Daniel J. Erickson
Mn/DOT District 1-Deluth

Mr. Dennis Gimmestad
Review and Compliance Officer
Minnesota Historical Society

Dave Hart
Iron Range Resources

Erika Herr
Mining Hydrologist
Minnesota Department of Natural Resources

Mark Holsten
DNR Commissioner
DNR Information Center

Jim Japs
DNR Permit Supervisor
DNR Waters

Christopher Kavanaugh
Fisheries Biologist
Minnesota Department of Natural Resources

Commissioner Sandy Layman
IRR Commissioner

Laurie Martinson
DNR Deputy Commissioner
DNR Information Center

Mike Peloquin
Regional Hydrologist
Minnesota Department of Natural Resources

Jim Sellner
Senior Engineer
Minnesota Department of Natural Resources

Brandon Smith
Minnesota Pollution Control Agency

Don Smith
Permit Supervisor
Minnesota Pollution Control Agency

Jeff Smith
MPCA Section Lead
Minnesota Pollution Control Agency

Marya White
MN DOC

J. David Thornton
MPCA Deputy Commissioner
Minnesota Pollution Control Agency

Marty Vadis
Director
Minnesota Department of Natural Resources

<u>Regional and Local Officials and Agencies</u>

Mayor James A. Lawson
Mayor of Taconite

Lauri Camilli
City Clerk, Taconite

Mayor Marlene Pospeck
Mayor of Hoyt Lakes

Commissioner Karen Burthwick
Itasca County Commissioner

Commissioner Lori Dowling
Itasca County Commissioner

Commissioner Rusty Eichorn
Itasca County Commissioner

Commissioner Dennis Fink
St. Louis County Commissioner

Commissioner Mike Forsman
St. Louis County Commissioner

Commissioner **Chris Dahlberg**
St. Louis County Commissioner

Commissioner Mark Mandich
Itasca County Commissioner

Diane Weber
Interim President
Itasca Economic Development Corporation

Commissioner Catherine McLynn
Itasca County Commissioner

Commissioner Keith Nelson
St. Louis County Commissioner

Commissioner Steven O’Neil
St. Louis County Commissioner

Commissioner Steve Raukar
St. Louis County Commissioner

Commissioner Peg Sweeney
St. Louis County Commissioner

Curt Anttila
Economic Development Coordinator, East Range Joint Powers Board

Dave Christy
Itasca County Engineer

Ron Dicklich
Range Association of Municipalities and Schools

Mayor Ron Hardy
Mayor of Cohasset

Mayor William Hendricks
Mayor of Nashwauk

Mayor David Lotti
Mayor of Marble

Mayor Deb Trboyevich
Mayor of Bovey

Jack Muhar
Itasca County Attorney

Mayor Dale Adams
Mayor of Grand Rapids

Mayor Mike Antonovich
Mayor of Coleraine

Native American Tribal Organizations

Mr. Curtis Gagnon
Trust Lands Administrator
Grand Portage Reservation

Mr. Wayne Dupuis
Environmental Program Manager
Fond du Lac Reservation

Mr. James Merhar
Chairman
Iron Range Area Council for Native Americans

Ms. Gina **Papasadora**
Tribal Historic Preservation Officer
Leech Lake Band of Ojibwe

Mr. Mike Triplett
Planner
White Earth Reservation

Mr. Tom McCauley
Tribal Historic Preservation Officer
White Earth Reservation

Mr. Joe Day
Executive Director
Minnesota Indian Affairs Council

Mr. Brady Grant
Tribal Historic Preservation Officer
Turtle Mountain Band of Chippewa

Mr. Conrad Fisher
Northern Cheyenne Tribe

Mr. Darrell Youpee
Historic Preservation Officer
Fort Peck Assiniboine and Sioux Tribes

Mr. Dennis Gill
Wahpekute Tribe

Ms. Kathryn (Jodi) Beaulieu
Tribal Secretary
Red Lake Band of Chippewa

Ms. Pamela Halverson
Tribal Historic Preservation Officer
Lower Sioux Community

Ms. Rosemary Berens
Tribal Historic Preservation Officer
Bois Forte Band (Nett Lake) of the Minnesota Chippewa Tribe

Ms. Natalie Weyaus
Tribal Historic Preservation Officer
Mille Lacs Band of Ojibwe

Mr. **Darren Vogt**
Environmental Director
1854 Treaty Authority

Mr. Leonard Wabasha
Director, Cultural Resources Department
Shakopee Mdewakanton Dakota Community

Mr. Jim Jones
Cultural Resource Specialist
Minnesota Indian Affairs Council

Mr. Chuck Meyer
Red Lake Nation

Ms. Cora Jones
Santee Sioux Nation

Mr. David Smith
Tribal Historian
Winnebago Tribe

Ms. Dianne Desrosiers
Tribal Historic Preservation Officer
Sisseton Wahpeton Oyate

Ms. Donna Petersen
Acting Tribal Historic Preservation Officer
Cheyenne River Sioux Tribe

Ms. Gina Lemon
Tribal Historic Preservation Officer
Leech Lake Band of Ojibwe

Mr. John Bechen
Flandreau Santee Sioux

Ms. Kitty Wells
Crow Creek Sioux Tribe

Mr. Perry Brady
Three Affiliated Tribes

Mr. Tim Mentz
Tribal Historic Preservation Officer
Standing Rock Sioux

Mr. William Littleghost
Cultural Committee
Spirit Lake

Ms. Elisse Aune
Mille Lacs Band of Ojibwe

Ms. JoAnn White
Historic Preservation Officer
Northern Arapaho Tribe

Ms. Joyce Whiting
Historic Preservation Officer
Oglala Sioux Tribe

Ms. Monica Whitedirt
Northern Cheyenne Tribe

Mr. Scott Jones
Cultural Resources Director
Lower Brule Sioux Tribe

Ms. Vicki Raske
Tribal Historic Preservation Officer
Grand Portage Reservation

Mr. William Weddell
EDA Director
Yankton Sioux Tribe

Regional Nongovernmental Organizations and Governmental Associations

Mr. Christopher Childs
Chair, Clean Air Committee
Sierra Club

Ms. **Rebecca Baumann**
Executive Director
The Minnesota Project

Doug Learmont
Coordinator
Western Mesabi Mine Planning Board

Ms. **Deanna White**
Program Director
Clean Water Action Alliance, Midwest Regional Office

Mr. Bob Simonson
Supervisor
Arbo Township

John Grahek
Local No. 589

Mr. William Grant
Izaak Walton League of America, Midwest Office

Ms. Erin Jordahl-Redlin
Energy Campaign Coordinator
Clean Water Action Alliance of Minnesota

Ms. Rosie Loeffler-Kemp
Clean Water Action Alliance of Minnesota

Mr. Walt Petrusic
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Disclosure Statement

Environmental Impact Statement
Mesaba Energy Project
DOE / EIS-0382

CEQ Regulations at 40CFR 1506.5(c), which have been adopted by the DOE (10CFR 1021), require contractors who will prepare an EIS to execute a disclosure specifying that they have no financial or other interest in the outcome of the project. The term "financial interest or other interest in the outcome of the project" for the purposes of this disclosure is defined in the March 23, 1981, guidance "Forty Most Asked Questions Concerning CEQ's National Environmental Policy Act Regulations," 46 FR 18026-18038 at question 17a and b.

"Financial interest or other interest in the outcome of the project" includes "any financial benefit such as a promise of future construction or design work in the project, as well as indirect benefits the contractor is aware of (e.g., if the project would aid proposals sponsored by the firm's other clients)." See 46 FR 18026-18031.

In accordance with these requirements, the entity signing below hereby certifies as follows: (check either (a) or (b) and list items being disclosed if (b) is checked).

Financial Interest:

(a) X Has no past, present, or currently planned financial interest in the outcome of the project.

(b) Has the following financial interest in the outcome of the project and hereby agrees to mitigate to the extent necessary to preclude a conflict prior to award of this contract:

1.

2.

3.

Contractual Interest:

(a) X Has no past, present, or currently planned contractual interest in the outcome of the project.

(b) Has the following contractual interest in the outcome of the project and hereby agrees to mitigate to the extent necessary to preclude a conflict prior to award of this contract:

1.

2.

3.

Organizational Interest:

(a) X Has no past, present, or currently planned organizational interest in the outcome of the project.

(b) Has the following organizational interest in the outcome of the project and hereby agrees to mitigate to the extent necessary to preclude a conflict prior to award of this contract:

1.

2.

3.

Other Interest:

(a) X Has no past, present, or currently planned other interest in the outcome of the project.

(b) Has the following other interest in the outcome of the project and hereby agrees to mitigate to the extent necessary to preclude a conflict prior to award of this contract:

1.

2.

3.

Certified by:

March 15, 2007

Signature Date

Frederick J. Carey, President

Name & Title (Printed)

Potomac-Hudson Engineering, Inc.

Company