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## Memorandum

**To:** Kevin Pylka, Jim Scott  
**From:** Pat Sheehy  
**Subject:** Traffic Information  
**Date:** February 8, 2012  
**Project:** NorthMet Project  
**c:** John Borovsky

This document is based on the original technical memorandum “Requested Traffic Information” dated October 30, 2007. The purpose of this document is to provide updated information on traffic levels at the NorthMet Project (Project) for the Dunka Road and other private roads including roads at the Tailings Basin, haul roads at the Mine Site, trains transporting ore from the Mine Site to the Plant Site, and delivery of supplies and transporting products.

### Dunka Road Traffic

Traffic levels were estimated for vehicles that will travel on the Dunka Road to and from the Area 1 Shop and the Area 2 Shop (Figure 1). Vehicles will travel to and from the Area 2 Shop because this is where the mine and railroad operations will be based, and it is from the Area 2 Shop that large multi-passenger sport utility vehicles (SUVs) will shuttle the employees to and from the Mine Site.

Travel on the Dunka Road to and from the Area 2 Shop will include automobile, light truck and SUV traffic as supervisors and technical staff travel to and from the Mine Site and SUVs transport employees to and from the Mine Site. Vehicles that will travel on the Dunka Road to and from the Area 1 Shop and the Plant Site will include light trucks and automobiles, SUVs, fuel trucks, supply and waste trucks, and haul trucks needing maintenance. These vehicle types will be used to estimate the emissions of dust to the air from traffic on the Dunka Road.

The estimate of total daily roundtrips for light vehicles and SUVs using Dunka Road is shown in Table 1, and includes:

- Traffic on segments A, B, and C, which are unpaved roads, will consist of automobile, light truck, and SUVs going to and from the Mine Site. The estimated total daily number of one-way trips is

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74 per segment. Light trucks and SUVs are expected to travel at speeds in the range of 30 to 45 miles per hour.

- Traffic on segment D, a short unpaved road, essentially the entrance to the Area 2 Shop from the paved segment H and the unpaved segment C, will include those vehicles traveling from the Plant Site to the Mine Site, workers traveling to and from the Area 2 Shop from segment H, and the SUVs traveling between the Area 2 Shop and the Mine Site. The estimated number of daily one-way trips is 256 for road segment D.
- Traffic on segments E and F, which are unpaved roads, will result from staff traveling in light trucks and automobiles from the Plant Site to the Mine Site. The number of daily one-way trips is estimated at 6 for each segment.
- Traffic on segment H, which is a paved road, will consist of workers driving their personal vehicles to the Area 2 Shop. The estimated number of daily one-way trips is 182 (91 trips to the Area 2 Shop, 91 trips away from the Area 2 shops) for this road segment.

**Table 1 Road Segment Distances and Light Vehicle and SUV Annual Vehicle Miles Traveled (VMT) on Dunka Road and Private Roads**

Road Segment	Distance (miles)	Max Hourly Trips	Max Daily Trips	Hourly VMT	Annual VMT	Daily VMT
A	0.80	23	74	18.4	21,613	59.2
B	4.48	23	74	103.0	121,005	331.5
C	1.93	23	74	44.3	52,069	142.6
D	0.15	64	256	9.4	13,792	37.8
E	0.72	3	6	2.2	1,581	4.3
F	0.37	3	6	1.1	810	2.2
H	2.11	93	182	196.2	140,167	384.0

Three round trips by a fuel tanker will be required each day to deliver fuel to the Mine Site, based on estimated fuel usage. These tankers will have a loaded weight of 40 tons. The tankers will travel from County Highway 666 to the Mine Site via road segments H, C, B, and A. These trucks will be expected to travel at speeds in the range of 25 to 40 miles per hour.

Thirteen delivery days per month by two supply tankers and one pumper truck will be required to deliver emulsion and ANFO to the Mine Site. These tankers and pumper trucks will have a loaded weight of 40 tons and 23 tons, respectively when on the access roads. The pumper truck will have a loaded weight of

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38 tons when pumping product at the blast pattern. The tankers will travel from County Highway 666 to the Mine Site via road segments H, C, B, and A. These trucks will be expected to travel at speeds in the range of 25 to 40 miles per hour.

Lime will be transported from the Plant Site to the Waste Water Treatment Facility (WWTF) at the Mine Site. Sludge will be transported from the WWTF to the Plant Site for disposal. Transport of lime and sludge will require over-the-road trucks with a 20-ton payload and 40-ton loaded weight. In the air emission calculations, a conservative assumption was made that separate trucks will be used for transporting lime and sludge, for a combined total travel of seven round-trips per day. In addition, two trucks per day will transport brine from the Plant Site Waste Water Treatment Plant (WWTP) to the Mine Site WWTF, so there will be a total of nine round trips per day. These trucks will travel on segments, A, B, C, D, E, and F. The trucks are expected to travel at speeds in the range of 25 to 40 miles per hour.

Haul trucks at the Mine Site will need to travel to the Area 1 Shop for maintenance. Based on anticipated maintenance intervals, a maximum of one truck per day will travel from the Mine Site to the Area 1 Shop. Total annual one-way trips are estimated at 44. The route will include road segments A, B, C, H, I, and J (road segments A, B, C, and J are unpaved, segments H and I are paved roads). The haul trucks have a maximum speed on level ground of 35 miles per hour. Speeds will be lower depending on road grade, curves, speed limits, mechanical condition of the truck, and weather conditions.

### **Haul Trucks at Mine Site**

The proposed haul truck fleet for transporting ore and waste rock is nine trucks with a capacity of 240 tons. An additional two trucks with 100-ton capacity will be used for construction and miscellaneous purposes. For air emission estimating purposes, the annual vehicle miles traveled (VMT) for the haul trucks has been estimated based on annual projected ore, waste rock, and overburden hauling rates. The annual VMT varies from 61,400 to 979,000 miles per year with an average of 754,100 miles per year<sup>1</sup>.

The proposed haul trucks to be used at the Mine Site have a maximum speed on flat grades of 34 miles per hour, loaded. The speed on grades, sharp curves, and areas with speed limits will be lower. Based on the Mine Year 20 Layout for the Project, the length of the roads outside the pits, roads in the pits, and on stockpiles total is 15.3 miles.

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<sup>1</sup>From Mine Site SDEIS Emission Inventory Spreadsheet Version 5.0; January 17, 2012.

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## Ore Trains

Each ore train will consist of 16 cars with a capacity of 100 tons each for a total train capacity of 1,600 tons. Twenty-two trains per day at 1,600 tons per train equals 35,200 tons of ore transported, which will accommodate the production rate at the processing plant of 32,000 tons per day, with some spare capacity.

The approximate distance by rail from the Rail Transfer Hopper at the Mine Site to the Primary Crusher at the Plant Site is 9.5 miles. The total daily miles for the trains will be 9.5 miles/trip X 2 trip/roundtrip X 22 roundtrips/day = 418 miles/day. Train speed is expected to be between 15 and 25 miles per hour.

## Tailings Basin Traffic

Traffic levels were estimated for vehicles that will travel on roads at the Tailings Basin (Figure 2). All roads are unpaved. Vehicle types will include light trucks, construction trucks, and WWTP trucks. These vehicle types will be used to estimate the emissions of dust to the air from traffic at the Tailings Basin.

Light truck traffic will travel in a loop around Cell 1E and Cell 2E at the perimeter of the beaches. The estimated total hourly miles is 63.2 and the total annual miles is 43,046. The trucks are expected to travel at speeds in the range 30 to 45 miles per hour.

Trucks that will be used to haul material needed for construction of the buttresses and dams will have a 60-ton payload and 110-ton loaded weight. The route will include road segments TBI, TBJ, TBN, TBW, TBWW, and HMR1. The trucks are expected to travel at speeds in the range of 15 to 42 miles per hour. Table 2 provides information regarding construction truck VMT.

**Table 2 Road Segment Distances and Construction Truck VMT at the Tailings Basin**

Road Segment	Distance (miles)	Max Hourly Trips	Max Daily Trips	Hourly VMT	Annual VMT	Daily VMT
TBWW	0.60	80	402	48.2	26,471	482.4
HMR1	1.01	72	358	72.4	44,559	724.0
TBI	2.50	98	982	245.3	493,898	2,455
TBJ	3.67	60	600	220.4	240,339	2,204.5
TBN	2.53	95	946	239.3	48,486	2,393.1
TBW	1.55	87	870	158.8	11,697	1,587.6

Trucks that will be used to haul bentonite to be used in the Tailings Basin will have a 60-ton payload and 110-ton loaded weight. The route will include road segment TBJ. The number of daily one-way trips was

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estimated at 84 for this road segment. The trucks are expected to travel at speeds in the range of 15 to 42 miles per hour.

### Process Consumables Shipping

Raw materials that will be consumed by the Beneficiation Plant process will be transported by rail and truck as shown in Table 3 (excerpted from Table 4-9 of the *NorthMet Project Project Description, Version 3*, September 13, 2011, with minor edits). The table summarizes the Beneficiation Plant consumables, including the quantities needed per year, the mode of transport, and the frequency of transport per month.

**Table 3 Beneficiation Plant Consumables (excerpted from Table 4-9 of the *NorthMet Project Project Description, Version 3*, dated September 13, 2011)**

Consumable	Quantity	Mode of Delivery
Grinding Media (metal alloy grinding rods and balls)	15,600 t/yr	Rail (13 rail cars/ mo)
Xanthate Flotation Collector	1,170 t/yr	Truck (2-3 trucks/mo)
Flotation Frother (MIBC)	1,007 t/yr	Tank truck (2-3 trucks/mo)
Flotation Activators (copper sulfate)	592 t/yr	Truck (1-2 trucks/mo)
Flocculant (MagnaFlox 10)	16.5 t/yr	Truck (1 truck/2 mo)
Gangue Depressant (CMC)	1,072 t/yr	Truck (2-3 trucks/mo)
pH Modifier (hydrated lime)	10,274 t/yr	Tank Truck (1-2 trucks/day)

Raw materials (tons per year; tpy) that will be consumed by the Hydrometallurgical Plant process will be transported by rail (tanker) and truck (freight and tanker truck) as shown in Table 4. The table summarizes the Hydrometallurgical Plant consumables, including the quantities needed per year, the mode of transport and the frequency of transport per month.

**Table 4 Hydrometallurgical Plant Consumables**

Consumable	Quantity	Mode of Delivery
Sulfuric acid	138 t/y	Rail (2 tank cars/y)
Hydrochloric acid	1,485 t/y	Rail (2 tank cars/mo)
Liquid Sulfur Dioxide	1,254 t/y	Rail (2 tank cars/mo)
Sodium Hydrosulfide	334 t/y	Tank Truck (< 1 truck/mo)
Limestone	87,341 t/y	Rail (1 100-car train/week from April to October)
Lime	5,181 t/y	Bulk Truck (22 trucks/mo)
Magnesium Hydroxide	3,674 t/y	Rail (3 tank cars/mo)

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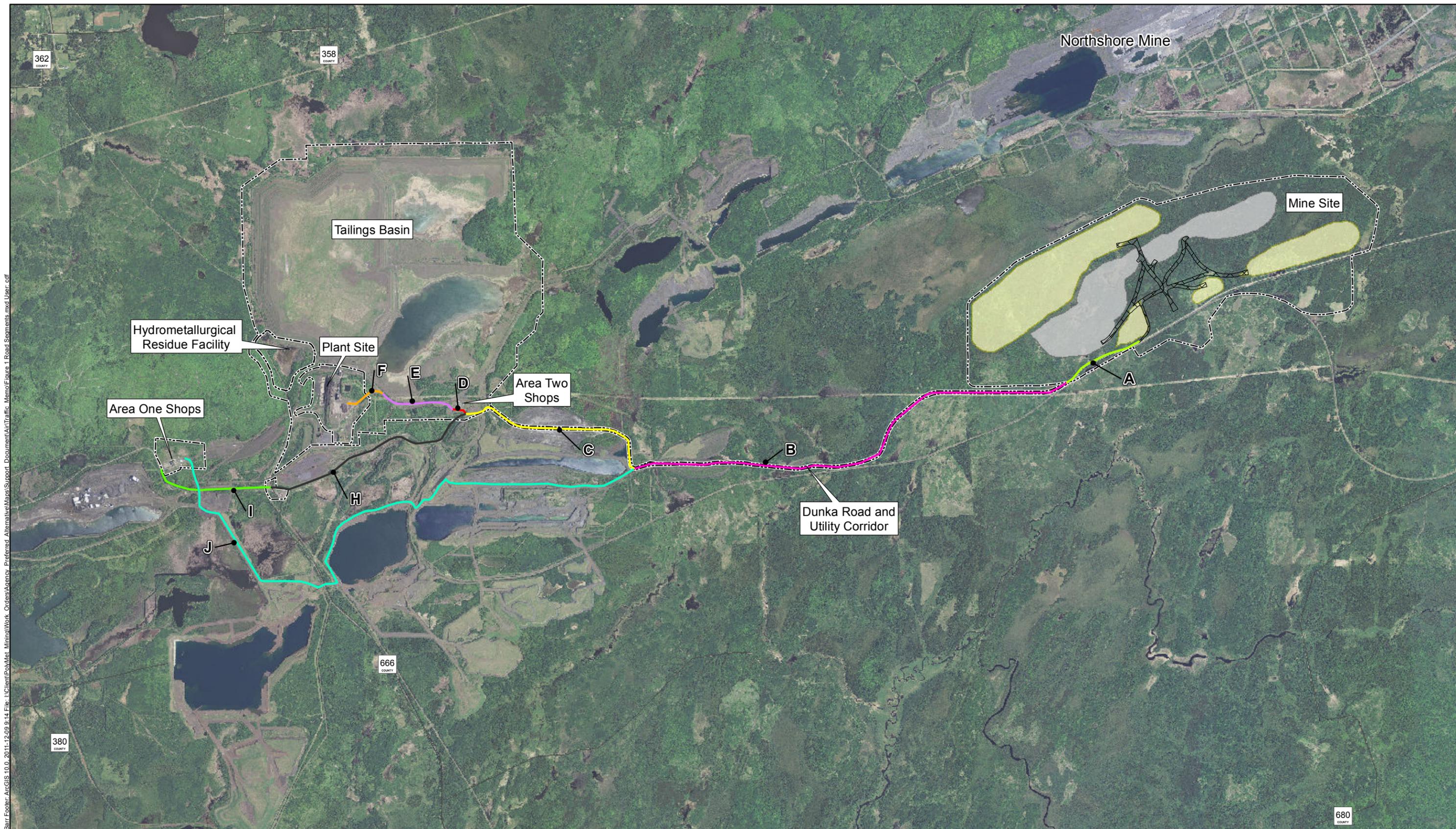
<b>Consumable</b>	<b>Quantity</b>	<b>Mode of Delivery</b>
Caustic (NaOH)	64 t/y	Tank Truck (1 load/mo)
Flocculant (MagnaFloc 342)	26 t/y	Freight
Flocculant (MagnaFloc 351)	179 t/y	Freight
Nitrogen (used in Hydrometallurgical Plant) <sup>1</sup>	19,113 t/y	NA

<sup>1</sup> Nitrogen used in the Hydrometallurgical Plant would be produced as a byproduct in the Oxygen Plant and no shipping or storage would be required.

## **Product Shipping**

Product will be shipped off-site using trains and/or trucks. If the maximum quantity is shipped by rail, it will require a 100-car train once per month and a 30-car train four times per month. The maximum quantity that may be shipped by truck will require two to three 40-ton trucks every day and one 40-ton truck every 18 days. However, depending on the products produced, a combination of trains and trucks will likely be used to ship the products off-site; rail is the preferred transportation option except for the product transported by one truck every 18 days.

## Figures



Barr Footer: ArcGIS 10.0 2011-12-09 9:14 File: I:\Client\PolMet\_Mining\Work\_Orders\Agency\_Prefered\_Alternative\MapSupport\_Document\AirTraffic\_Memo\Figure 1 Road Segments.mxd User: cdf

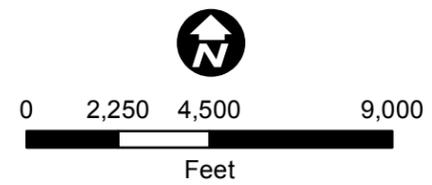


Figure 1  
 DUNKA AND OTHER  
 ROAD SEGMENTS  
 NorthMet Project  
 PolyMet Mining Inc.  
 Hoyt Lakes, MN

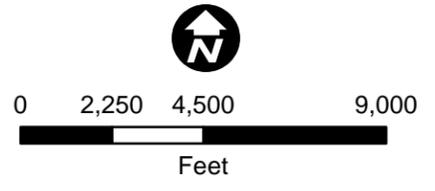
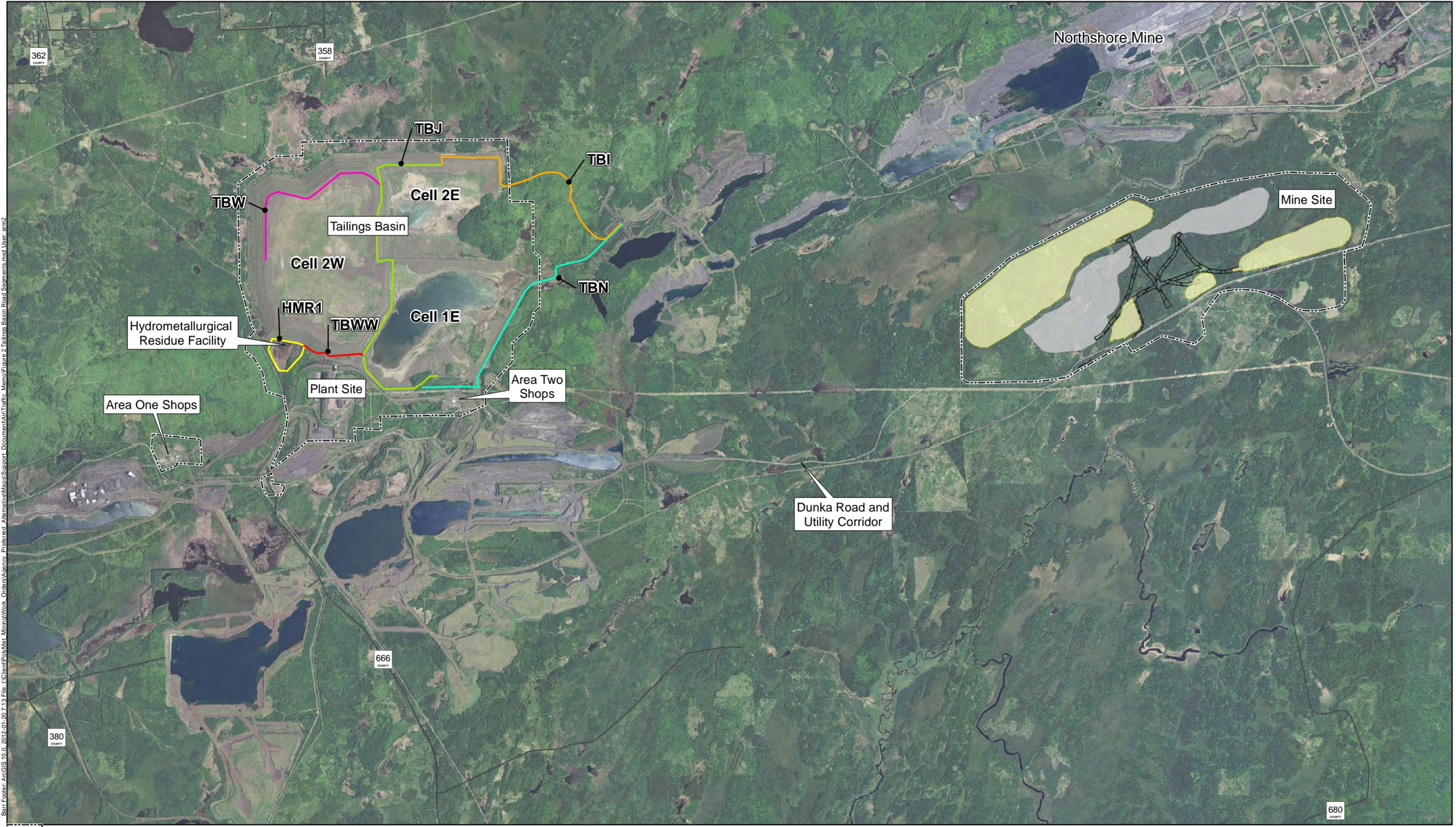


Figure 2  
 TAILINGS BASIN  
 ROAD SEGMENTS  
 NorthMet Project  
 PolyMet Mining Inc.  
 Hoyt Lakes, MN

Barr Footer: ArcGIS 10.0, 2012-01-20 7:13 File: I:\Client\PolMet\_Mining\Work\_Orders\Agency\_Preference\_Alternative\MapSupport\_Document\AirTraffic\_Memo\Figure 2 Tailings Basin Road Segments.mxd User: am2