7(f)

DATE OF REPORT: June 4, 1998

LCMR Work Program

I. Project Title: COMPLETION OF STATEWIDE LAND USE UPDATE - CONTINUATION

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Legal Citation: ML 95 Chp. 220, Sec.19, Subd. 7(F)

		Amount Budgeted
Total Biennial Budget	$ LCMR:	380,000
	$ AMC Contribution:	20,000
	$ Total:	400,000

Appropriation Language: This appropriation is from the future resources fund to the director of the Office of Strategic and Long Range Planning, in cooperation with the Board of Water and Soil Resources, for an agreement with the Association of Minnesota Counties for the third and final biennium to complete the update of the Land Use Map of Minnesota, complete conversion of the data to computer format, and make the data available to users. Data compatibility requirements in Subdivision 15 apply to this appropriation.

II. PROJECT SUMMARY

Completion of the project will create a very detailed land use/cover data base for the entire State of Minnesota. The data will be collected from satellite imagery and aerial photography. The information the map will contain, when completed, is best shown by examining the land use/cover classification key. A copy of this is attached. Putting the data in computer format will allow use of the information in resource management programs, comprehensive planning, water planning programs, environmental assessment, and economic development simulations. The project will also develop state of the art data entry capabilities in greater Minnesota. This includes the development of institutions, techniques and training of people to be available to convert local government derived information into computer format. The data will be made available to users through LMIC, local water planning, and the Association of Minnesota Counties. The link through the Association of Minnesota Counties and local water planning will allow the design of effective update programs and allow extensive use of the information by the state and local units of government.

III. SIX MONTH WORK PROGRAM UPDATE SUMMARY

The project is slightly behind schedule in the interpretation of new information. The conversion of existing maps has been completed. The project was not able to begin serious work until late October, 1995 because Minnesota Planning did not release the pass through dollars until that time. This meant that a summer of using student workers was lost and credibility problems resulted with the project participants. The project has secured a one year extension which will allow for the completion of a quality project.

A. Data Conversion of Existing Maps

A data conversion process has been developed and data conversion has been completed at the Alexandria Technical College, with a student work force starting work in December, 1995. As of February 1, 1997 all maps have been approved.

Changes in procedures and equipment are shown in V.A.,B., and C.

B. Complete Interpretation and Data Conversion

Cass County has been picked as the pilot county for perfecting the mapping using the new technology. Satellite images have been acquired, field checking, and mapping are underway. NAPP photography has been loaned to the project from the Borchert Map Library at the University. Cass County is actively involved and has transferred their completed forest data to Winnipeg, and county personnel have been assigned to assist in error checking. The protocol of transferring completed data to LMIC has been developed jointly through the use of pilot data. MnDOT digitized road data has also been transferred to Winnipeg to assist in the transportation classification. The attached table, Order of Priority and Status Matrix shows status of current progress. All interpretation will be completed in the first six months of the 1998 State fiscal year.

IV. STATEMENT OF OBJECTIVES

A. Data Conversion of Existing Maps

Data conversion of 217 existing maps and development of data entry capabilities in greater Minnesota using the new data entry process developed by the project.

B. Complete Interpretation and Data Entry

Completion of land use/cover interpretation of the remaining 550 USGS quadrangle maps in the forested area of Minnesota.

The Manitoba Remote Sensing Centre will conduct this work.

C. Distribution of Maps

The maps will be made available through the Science Museum of Minnesota as part of the Minnesota exhibit as well as through local water planning the Association of Minnesota Counties and IISAC.

Timeline for completion of objectives

	7/95	1/96	6/96	1/97	6/97
Objective A		1	65	209	217
Objective B		0	30	40	80
Objective C			<----------	----------	----->

The completion of Objective A is measured by the data conversion of the 217 existing maps.
The completion of Objective B is measured by the percent completion of interpreting and data entering the 550 USGS quadrangle maps.

V. OBJECTIVES / OUTCOMES

A. Data Conversion of Existing Maps

1. Activity: Complete data conversion of 217 USGS quadrangle maps and development of data entry capability in Greater Minnesota.

a. Context: The entering into computer format of these maps will complete data entry of southeastern Minnesota, counties surrounding the Twin Cities Metropolitan area and the transition area of central Minnesota. Data entry is coordinated by Widseth Smith Nolting Company in partnership with the Alexandria Technical College GIS program students.

b. Methods Data conversion will consist of a six step process. The process has been changed due to availability of new software closely linked to curriculum course work.

(1) Trace over red and light pencil lines to improve the quality of the scan.
(2) Scan Maps- Use full size scanner to provide a seamless image.
(3) Scans brought into Auto Cad using CAD Overlay ESP and plotted.
(4) Screen Digitize scanned image into vector format.
(5) Label polygons and remove raster image.
(6) Use ARC-CAD to clean and build topology.

Graphic data structure will be produced in ARC INFO coverage to the following specifications:
(1) Each coverage will have a polygon topology.
(2) Every polygon will be assigned one label.
(3) Each label point will be located away from the polygon edges as near the center of the polygon as is practical.
(4) The coverage will contain no nodal errors.

c. Materials: Total software, hardware, and materials are itemized below.

Software: $2000.00 (Foto Touch, Dr. Halo, ENVISIONIT, CAD-ESP)
Hardware: $4000.00 (1 computer with at least 8 MEG RAM and 320 MEG hard drive.)
Total cost: $6000.00 equipment and software to be depreciated on a 3 year basis. Cost to project is $4000.00. Equipment to stay with Widseth Smith Nolting.
Materials: acetate, bluelines, copying. $1000.00

d. Budget:

	Amount Budgeted	Balance 8/11/97
Student labor and supervision:	$93,000.00	~~$24,814~~ ($8,000)
Equipment/software/ materials:	$ 5,000.00	~~$ 0~~
Total Biennial LCMR Budget:	$98,000.00	~~$24,814~~ ($8,000)
LCMR Balance:	$ 0.00	($8,000)

e. Timeline: Start December 1, 1995 complete April, 1997.

f. Work Program Update: All data conversion has been completed. Costs are $8,000.00 over estimates. Reasons for this are. (1) number of polygons entered is more then estimates primarily because polygons were digitized down to 0.5 acre rather than the two acre resolution from which estimates were built. (2) Lags in LMIC error checking resulted in borrowing of money for payroll. This is not a large amount of money and savings resulting in acquiring satellite imagery more then makeup for slightly increased costs in data entry.

The data entry process developed under this work program item has now been commercialized in Alexandria by the students through an agreement with the Alexandria Technical College. These services are being offered to several local governments.

B. Complete Interpretation and Data Conversion

1. Activity: Completion of land use/cover interpretation of the remaining forested area of Minnesota, which is equivalent to 550 USGS quadrangle sheets, and conversion of that data to computer format.

a. Context: This part of the project will complete the land use/cover interpretation for the remainder of rural Minnesota and convert the data to computer format.

b. Methods: The Manitoba Remote Sensing Centre will carry out this work. This Centre is the most advanced facility in North America to undertake this type of work. Part of their charge will be to train Minnesota organizations to maintain the data bases and update in the future. The map product will be at a 30 meter resolution and have an accuracy of approximately 95%. The process will use a multi-sampling approach which include satellite imagery, topographic maps, NAPP aerial photography, and other supporting data. Most interpretation will be done automatically with manual intervention for urbanized features and continual error checking for each section of land utilizing NAPP photography.

Digital data will be delivered for this part of the state in pixel resolution of 30 meters. Geometric correction will be co ted and the mapping would be warped to the U.T.M. grid system. Data will be delivered in non overlapping block areas from each satellite image.
There are discussions underway to share LANDSAT TM imagery and interpretation techniques with the Resource Assessment Unit of the Department of Natural Resources, College of Natural Resources, the Department of Natural Resources and the Alexandria Technical College. Neither DNR nor the College of Forestry has shown interest in sharing data.

c. Materials:
NAPP photography will be supplied by the Department of Natural Resources and the University of Minnesota. USGS quadrangle maps will be supplied to the project through a variety of sources (University of Minnesota-College of Natural Resources, Department of Natural Resources, Land Management Information Center)

d. Budget:

Manitoba Remote Sensing Centre	Amount Budgeted	Balance 6/4/98
Map Completion of 34,000 square miles	$276,000 Canadian	~~$119,808 US~~ $0
10 LANDSAT TM images	$ 35,000 Canadian	~~$ 28,621 US~~ $14,000
Sub Total	$320,000 Canadian	~~$148,429 US~~ $14,000
	($250,000 US)	($10,500 US)
Exchange rate provided an additional		$13,500
Support, communication and travel	$ 24,000	$ ~~24,000 US~~ $0
Total Biennial LCMR Budget:	$274,000	~~$148,429 US~~ $16,000

LCMR Balance: The reason for the balance is that payment is based on product delivered, so there is a float absorbed by contractors for work in progress.

e. Timelines: Start July 1, 1995 complete ~~September 30, 1997~~ June 30, 1998.

f. Work Program Update: The $16,000 balance is being transferred to the distribution of maps. III. C. This will allow the project to (1) produce a new statewide land use map and distribute them through the Science Museum of Minnesota and AMC, and (2) combine other data sets with land use in a joint project with the Department of Natural Resources.

C. Distribution of Maps

1. Activity: Maps will be made available through the Science Museum of Minnesota as part of the Minnesota Exhibit.

a. Context: Distribution of maps resulting from this project will make it possible for the general public to view and acquire land use/cover maps of Minnesota and parts of Minnesota.

b. Methods: A computer storing land use data and other resource information will be hooked to a printer in the public display area of the museum. With the help of museum volunteers, the public will be able to look at a map of their area of interest and print it while they wait, pay a small charge and receive their map. ~~Both the Land Management Information Center and Widseth Smith Nolting have expressed interest in donating equipment and software for this exhibit.~~ In addition, the information generated through this proje ill be available to local governments and others through the Board of Water and Soil Resources, the Association of Minnesota Counties and ~~HSAC~~ the Department of Natural Resources. The project, in a joint venture with the Department of Natural Resources, will print and distribute up to 7,500 copies of a complete land use/cover map.

c. Materials: Donated ~~or lending of~~ 7,500 land use/cover maps equipment, software and space.

d. Budget: (1) Design of display and production of ~~pilot prints~~. ~~$8,000~~ $10,000
the land use map and combine eight data sets from:
DNR, Bemidji State University, College of Natural Resources (U of M), Olmsted County, International Coalition, Metropolitan Council, Manitoba Remote Sensing Centre, and Camp Ripley.

(2) Printing 7,500 maps	$10,000
(3) Coordination	$ 4,000
Total Biennial LCMR Budget:	$ 8,000
Work Program Change:	$16,000
LCMR Balance:	$24,000
Projected Balance:	$0

e. Timelines: Start July 1, 1996 complete ~~December 3, 1997~~ June 30, 1998.

~~f. Work program update:~~

VI. Evaluation

The project will be complete when there is a land use data base available in each county for local water and comprehensive land use planning purposes and a master file is stored in the Land Management Information Center that is constantly updated through the normal administrative processes of local government and the application of state of the art remote sensing technology.

VII. Context within the Field

This project will complete the largest state land use mapping effort in the United States and will bring to Minnesota the state of the art automated interpretation technology from Canada.

VIII. Budget Context

The Association of Minnesota Counties currently has no land use inventory program. The Association of Minnesota Counties has spent no money on this program in the two years preceding June 30, 1995. Discussions are underway with additional cooperators which may result in additional funds being available to enhance the project. The LCMR will be notified if any of these discussions come to fruition.

1. The Association of Minnesota Counties will administer the project on a contractual basis and provide support services. The contractor will be responsible for administering the project and coordinating a Land Use Project Steering Committee and a technical work group.

a. Land Use Project Steering Committee will provide direction on policy issues that arise during the project's two year timeframe. The technical work group will address the technical aspects and issues that arise during the project.

The Steering Committee will be chaired by a representative of the Association of Minnesota Counties, and the vice chair will be a representative of the Board of Water and Soil Resources. The Committee secretary will be the Executive Director of the Intergovernmental Information Systems Advisory Council. Committee staff will be Association of Minnesota Counties staff and the project consultant.

Other organizations serving on the Committee include: Minnesota Association of Assessing Officers, Minnesota Association of County Surveyors, Minnesota Association of Planning and Zoning Administrators, the Minnesota Counties Computer Cooperative , Minnesota County Auditors Association, Minnesota County Engineers Association, Minnesota County Recorders Association, Land Management Information Center, Board of Water and Soil Resources, and the Intergovernmental Information Systems Advisory Council.

The Technical Work Group will consist of three members of the Steering Committee plus representatives of the following organizations: Center for Urban and Regional Affairs-University of Minnesota, Department of Natural Resources, Pollution Control Agency, U.S. Soil Conservation Service, Land Management Information Center, Board of Water and Soil Resources, and the Alexandria Technical College.

IX. Dissemination

The information will be disseminated through Board of Water and Soil Resources via the local water planning program, Land Management Information Center, the Association of Minnesota Counties programs, Department of Natural Resources through regional data networks, and others when possible.

X. Time

If production begins in July, 1995, this project can be completed by June 30, 1997. However, there are no cost implications if the project runs beyond this date. The project will be completed by December 31,1997.

XI. Cooperation

The project manager will contract with MetaDynamics for contract administration. The contract administrator will spend 1/3 to 2/5 time on the project.

Major cooperators: Association of Minnesota Counties; Widseth Smith Nolting, Inc.; MetaDynamics, Inc.; Manitoba Remote Sensing Centre; Alexandria Technical College GIS Program; Department of Natural Resources; Land Management Information Center and the Science Museum of Minnesota, United States Forest Service, John Borchert Map Library (U of M).

XII. Reporting Requirements

Semi annual six-month work program update reports will be submitted not later than January 1, 1996; July 1, 1996; January 1, 1997; and a final six-month work program update and final report by June 30, 1997.

XIII. Required Attachments

1. Qualifications

2. Project Staffing Summary