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LCMR AGRICULTURAL LAND PRESERVATION MODEL

Todd County Planning & Zoning
in conjunction with
Todd County GIS & Land Services

TODD COUNTY
MINNESOTA

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September 29, 2003

Bob Patton
Agricultural Development Division
Minnesota Department of Agriculture
90 West Plato Boulevard
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Mr. Patton:

Todd County is pleased to send you the final report on its development of an Agricultural Land Preservation Model, as funded by the Legislative Commission on Minnesota Resources and the Minnesota Department of Agriculture.

We have enjoyed working on this project and feel that it gives us a valuable tool to use in making land use decisions and considering options for land preservation programs. It is our hope that the MDA and counties throughout Minnesota will find the study to be useful to them as they seek to develop programs and policies that preserve agricultural lands.

I thank you for your assistance throughout the project and look forward to any future opportunities to work with MDA that might arise out of this project or other projects. Please do not hesitate to contact me if you have any questions or require additional information.

Sincerely,

Ben Oleson, Administrator
Todd County Planning and Zoning

TODD COUNTY

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Funding and Grant Support Provided by:
MN Legislative Commission on Minnesota Resources
Minnesota Department of Agriculture

Introduction

In recent years, Todd County has experienced significant growth in the inherent conflicts between rural and urban land uses. With its many beautiful lakes, easy access from the Twin Cities, St. Cloud and Fargo-Moorhead metropolitan areas and relatively low-density of development, Todd County is quickly becoming a desired destination for those seeking a more rural lifestyle, affordable lakeshore homes, hunting cabins, or a place to retire. While this growth brings many benefits to the county, it has also created new challenges as it encroaches further on the county's agricultural and rural-based culture.

In November 2001, Todd County applied for a grant of up to $50,000 being offered by the Minnesota Department of Agriculture (MDA) using funds appropriated by the Legislative Commission on Minnesota Resources (LCMR). In offering the grant, the LCMR and MDAs goal was to "implement an agricultural land preservation program and demonstrate tools in a Greater Minnesota county." To accomplish this goal, Todd County proposed to develop a program for preserving agricultural lands in Todd County and other counties throughout the state. Its chief purpose was to develop a GIS-based system for identifying and prioritizing lands to be preserved for agricultural use in Todd County. The grant, entitled "A Comprehensive GIS-based Model for Agricultural Preservation," was officially awarded to Todd County in May 2002.

The primary tool in the grant project was the creation of a comprehensive *parcel-based* GIS database. Creating the database at the parcel level—the level at which most land use decisions are made—would not only provide more accurate information to county officials and other land use decision-makers but also help to make implementation of agricultural preservation policies more effective. Public participation was also a key element of the proposal, as local input would be needed to tailor the model to the unique characteristics of Todd County and help identify which factors would determine the agricultural lands most suitable for preservation.

Project Description and Objectives

The purpose of "A Comprehensive GIS-based Model for Agricultural Preservation" is to develop a model for identifying and prioritizing lands to be preserved for agricultural use in Todd County. In carrying out this purpose, an emphasis was placed on developing a tool that could be used to prevent and better resolve the growing conflicts between urban and rural land uses. As such, the model was developed with the intent of assisting Todd County and other Minnesota counties who wish to take a well-informed, comprehensive approach to agricultural preservation and other land use planning and decision making.

The primary tool in the proposed project is the creation of a comprehensive *parcel-based* GIS database. This database, which includes environmental, cultural and economic features that impact agricultural, residential and recreational development, has aided the county in assembling and analyzing a large amount of data so that it can be more easily understood and presented to decision-makers in the county. A primary feature of the

database generated is that it incorporates individual parcels into the model—since individual parcels are the level at which most land use decisions are made. Having data at the parcel level provides several benefits. First, the size of a parcel of land and the parcels surrounding it is a valuable piece of information in determining where agricultural uses are most likely—e.g. large parcels are more suitable for farming than small parcels. Second, once the land in an area is identified and prioritized for agricultural uses, the parcel layer provides the ownership information that can help in implementing whatever strategy is employed to preserve and protect that land. Further, a parcel layer helps county officials and other land use decision-makers to make a more accurate assessment of the suitability of a parcel to a particular land use. This in turn will help in determining the impacts particular land use patterns will have on the preservation of the county's agricultural lands and other surrounding parcels of property.

Much of the information, expertise and equipment needed to create such a database already existed in Todd County at the start of the project. The county has a strong and experienced GIS Department that has acquired and developed an extensive atlas of the county's natural resource characteristics, public infrastructure, existing land uses and many other features. Many of these features applied to the proposed project—including soil and slope characteristics, the location of water bodies, existing buildings, political boundaries, watersheds and feedlots, and the availability of public infrastructure and services throughout the county. This expertise of the Todd County GIS Department and the mapping work they had already completed was an invaluable resource throughout the project.

In order to make the available information more useful in planning applications however, it was necessary to be able to identify individual parcels and tracts of land where particular features exist. The combination of features unique to each parcel of land can then be used to determine where agricultural uses are most appropriate and where more intensive development is best suited. For instance, a 40-acre parcel located on productive agricultural soils far away from concentrations of residences may be more appropriate for agricultural preservation than a 10-acre parcel with steep slopes adjacent to a residential subdivision.

At the outset of the project, only one township in Todd County had a digitized parcel layer. Parcel maps for twenty-three townships existed only in the form of paper-copy half-section maps—many of which were more than 20 years old. The remaining four townships in the county did not have any parcel mapping at all. The lack of a comprehensive and current digitized parcel layer was seen as a hindrance to the ability of county planners and other county officials to determine specific parcels and tracts of land that should be targeted for agricultural preservation.

Project Goals

To accomplish the outcome required by the MDA and LCMR, staff at the Todd County Planning & Zoning and GIS departments identified five main goals. These were:

1. The model developed must be able to incorporate as many factors affecting agricultural land suitability as possible, without becoming overly burdensome;
2. The model must be relatively easy to understand so that it can be effectively and easily explained to a wide variety of audiences;
3. The model must be relatively easy to duplicate in other counties, recognizing that there are widely differing resources and expertise available to each individual county;
4. The model must be flexible enough to allow each individual county to fit the model to their own definitions of what makes agricultural land most suitable for preservation, and;
5. The model must be able to improve the ability of county staff to illustrate complex data sets to county decision-makers and the public.

Work Plan

To accomplish the goals of the project, staff at the Todd County Planning & Zoning and GIS departments identified a work plan that included the following elements:

1. Work on the development of a digital parcel layer for Todd County;
2. Research existing agricultural land preservation models already developed in other areas and determine how the Todd County model will be structured;
3. Identify a data "wish list" to include all relevant factors that would contribute to an understanding of the suitability of land for agricultural purposes;
4. Determine availability of data on the "wish list"—which data was already present, which data could be reasonably obtained, and which data was simply not available or feasible to use in a GIS-based model;
5. Choose which data to include in the model and how it will be organized and weighted;
6. Input all data into the model and run several versions to show outcomes under different scenarios;
7. Obtain public input on the various scenarios and what changes, if any, would need to be made.

- **Begin the development of a digital parcel layer for Todd County**
  One of the first decisions that needed to be made in the development of a digitized parcel layer was to determine the level of accuracy that would be sought. The quickest and least expensive choice would have been to develop a "rough" map of parcels in the county. Such a map would essentially be equivalent to the level of detail in a plat book or in a half-section map. The obvious advantage would be the ability to map the entire county in a relatively short amount of time with little need for fieldwork. While such a "rough" map would have limited usefulness in very detailed analyses, it could still provide one way to bring parcels into the analysis of

agricultural land preservation models. Counties with very limited resources and/or little GIS expertise may find this to be the best option.

In consultation with the Todd County GIS & Land Services Department and other county offices however, it was determined that the effort to develop a much more accurate parcel layer would be well worthwhile. Besides yielding much more accurate data for the development of an agricultural land preservation model, a spatially accurate parcel layer could provide significant benefits to a number of county offices—including the County Surveyor, Planning & Zoning, Assessor, Public Works, Recorder, Sheriff, and the Soil & Water Conservation District. With so many possible uses, it was clear that it would be best in the long term to have as detailed a parcel map as possible.

To develop an accurate parcel map, it was first necessary for staff in the GIS & Land Services Department to obtain accurate coordinates of section corners in the field. This required investigation into section corner certificates at the County Recorder's Office, which varied widely in their availability and quality. Working with the Minnesota Department of Transportation (MnDOT), GIS staff also was able to develop a geodetic control network that further improved the accuracy of the section corner coordinates. Further research was required to obtain accurate legal descriptions of all properties in Todd County so that each individual parcel could be digitized accurately.

The actual digitizing of parcels was accomplished using AutoCad software to initially create an accurate representation of the parcel and then converting it into an ArcView shapefile. Approximately eight of the twenty-eight townships in Todd County were completed during this project. Work to complete a parcel map layer for all twenty-eight townships continues and is expected to take 3-5 years.

- **Research existing agricultural land preservation models already developed in other areas of the country and determine how the Todd County model will be structured**

From the start of the project, staff in the Todd County Planning & Zoning office began researching a number of land preservation models that have been developed in other areas to assist in developing its own model. Many of these models were directly related to agricultural land preservation, although several were being used for broader land use planning applications. Some of the most established models were found in Wisconsin, Pennsylvania, California, Maryland, and Ontario. Eventually, the program developed at the University of Wisconsin was determined to most closely match what this project sought to accomplish.

Contact was made in May 2002 with Mr. Douglas Miskowiak of the Univeristy of Wisconsin-Madison, Land Information & Computer Graphics Facility. Discussions between Planning & Zoning and Mr. Miskowiak further confirmed the applicability of the project to Todd County. In June, Mr. Miskowiak was invited to make a

presentation to a group of Todd County employees, and public officials, including representatives from the P&Z and GIS offices, the Soil and Water Conservation District, and the Todd County Board of Commissioners, Planning Commission and Board of Adjustment. His presentation covered the process that his organization went through with public officials and citizens of Dane County, WI to identify the county's best agricultural lands and help create tools to preserve these lands as the county develops.

- **Identify a data "wish list" to include all relevant factors that would contribute to an understanding of the suitability of land for agricultural purposes**

  After assembling the data used in other land preservation models and consulting with staff at the local Natural Resources Conservation Service (NRCS), the Soil & Water Conservation District (SWCD), and the GIS Department, the Planning & Zoning Department developed a "wish" list of data. This list included anything that would benefit the identification of the quality and availability of agricultural land. A listing of the data in this wish list includes:

DESIRABLE FEATURES	POSSIBLE DATA SOURCES
Productive soil	Prime farmland, Soil Capability Class (I - VIII), Soil type, Soil yield
Large acreage	Total acres, tillable acres, forested acres, pastured acres, adjacent tillable acres
Minimal land use conflicts	Distance to city, distance to residential cluster, current land use, current zoning, comp plan zoning
Not environmentally sensitive	Slope, wetlands, floodplain, sensitive groundwater, depth to groundwater, depth to saturated soil, groundwater availability, proximity to surface water, waters on TMDL list
Minimal inputs	Soil type (will it hold water), well drained (is it drained)
Naturally suitable for farming	Low slope, road frontage type, low traffic, few field rocks, close to agricultural services and markets
Agriculturally useful	Suitable for manure application, farm program enrollment (CRP, RIM, etc...), adjacent to other agricultural land
Current agricultural use	Farm program enrollment (CRP, RIM, etc...), currently tilled/feedlot/pasture/commercial forestry, currently draintiled/irrigated
Others	Adequate acreage for manure application w/in township (based on available cultivated acres and number of animal units in each township)

- **Determine availability of data on the "wish list"—which data was already present, which data could be reasonably obtained, and which data was simply not available or feasible to use in a GIS-based model**

  After the data "wish" list was developed, it was turned over to the GIS department to determine which data was already available and which data could reasonably be collected. Obviously, some of the data items on the "wish" list were not available and were not feasible to collect. After reviewing the list, GIS spent several months assembling what data it could and preparing it for use in the model. Working with the P&Z Office, a final listing of available data that would be used in the model was developed.

- **Choose which data to include in the model and how it will be organized and weighted**

  In this project, staff in the Todd County GIS and Planning & Zoning Offices decided to use a "raster" method to create the model. This method essentially places a grid over the entire county with each cell representing 30 square meters. Each cell takes a value from the underlying data sets (soil quality, distance from water, etc…) and creates a score for that cell. This type of model allowed the county to prioritize each cell of land in terms of its suitability for agricultural uses. It should be noted that the cell size in this method could be any size that a county chooses, although all cells need to be the same size. While it has not yet been done as part of this project, it would be possible to overlay a parcel layer on this grid and aggregate the scores of each cell to create a score for each parcel. Such a scenario would allow individual parcels to be ranked against each other based on their suitability for agricultural use.

  After making the decision on the type of model that would be created, Planning and Zoning staff looked over the available data and began to develop an organizational structure that fit the data into the overall model. Data was grouped into three main categories: Soil suitability, Environmental suitability, and Land Use compatibility. By breaking the data into these three categories, it was possible to make the data more understandable to the various audiences that might make use of the model. For instance, one could look at a piece of land and say that its soils were very suitable for agricultural purposes and it was not in an environmentally sensitive area, but that the surrounding land uses (i.e. a significant concentration of residential housing) made it unsuitable for agricultural uses.

  Data within each of these three categories were also placed into a scoring system of 0-4, with 0 being the lowest suitability for agricultural uses and 4 being the highest. The table below lists the various data that were chosen and how they were scored for the model. After the data was scored on the 0-4 scale, each set of data and each of the three categories was given an overall weight of importance. This allowed distinctions to be made about the overall importance of a particular set of data compared to the others. Two separate weighting scenarios were then created—one that placed greater

importance on the natural suitability of the land for agricultural uses and another that placed greater importance on compatibility with existing land uses.

A third scenario was created where each of the data sets was weighted equally. This was done for to allow a comparison to be made between the results of the two weighted scenarios and one where everything was weighted equally. Recognizing that not all counties may have software capable of weighting the different data sets at this time, it was felt that this comparison would provide a more accurate view of what results they might expect compared to the results of a weighted analysis.

Soil Suitability

- **Land Capability Index**
  6e,s,w; 7s; 8w = 0 pts
  4e,s,w = 1 pt
  3e,s,w = 2 pts
  2e,s,w = 3 pts
  1, 1w = 4 pts
- **Corn Yield (per acre)**
  <50 bushels = 0 pts
  50-74 bushels = 1 pt
  75-99 bushels = 3 pts
  100+ bushels = 4 pts

Environmental Suitability

- **FEMA Floodplains**
  Floodplain = 0 pts
  All other land = 4 pts
- **National Wetland Inventory**
  Type 80, 90 = 0 pts
  Type 3-8 wetlands = 2 pts
  Type 1&2 wetlands = 3 pts
  All other land = 4 pts
- **Water Buffers**
  0-1000 ft DNR lake = 1 pt
  0-300 ft DNR stream = 1 pt
  All other land = 4 pts

Land Use Compatibility

- **Land needed for manure application by Township**
  Less than 10% = 0 pts
  10-24% = 1 pt
  25-49% = 2 pts
  50-74% = 3 pts
  75-100% = 4 pts
- **Parcel size**
  <9.9 acres = 0 pts
  10-19.9 acres = 2 pts
  20-39.9 acres = 3 pts
  40+ acres = 4 pts
- **Proximity of Cities**
  W/in 1 mile = 0 pts
  W/in 2 miles = 3 pts
  >2 miles = 4 pts
- **Proximity of Residences**
  10+ homes in PLS 40 = 0 pts
  6-9 homes in PLS 40 = 1 pt
  3-5 homes in PLS40 = 2 pts
  1-2 homes in PLS 40 = 3 pts
  0 homes in PLS 40 = 4 pts
- **1989 Land Use**
  Urban & Industrial = 0 pts
  Water, Wetlands = 0 pts
  Gravel Pits/Mines = 0 pts
  Farmsteads, Rural Dev = 1 pt
  Forested = 2 pts
  Pasture/Grassland = 3 pts
  Tranitional Ag = 3 pts
  Cultivated Land = 4 pts

It became obvious when determining weights and scores for the various data sets that there are an unlimited variety of weighting schemes that could be developed. This flexibility provides a challenge when trying to gain consensus on the "correct" scheme to put into the model. At the same time however, it provides an excellent opportunity for a county to discuss the various aspects that they feel define their "best" agricultural lands and develop a scheme that addresses their unique circumstances.

- **Input all data into the model and run several versions to show outcomes under different scenarios**

  Using the data compiled for the model and the weights selected under the two scenarios, GIS staff then ran six separate versions of the model. The first three versions were run using just those eight townships where a parcel layer had been completed. These versions took parcel size into account when identifying land suitability for agricultural uses. The remaining three versions were run countywide, with parcel size eliminated from the factors affecting agricultural land suitability.

  ESRI's ArcGIS – ArcView 8.2 with the Spatial Analyst extension was used to run the models under the two weighted scenarios. For the equally-weighted scenario, GIS staff used EPIC Planner software, which is freely available from the Land Management Information Center (LMIC). However, all the weighting was accomplished manually by adding the values into the attribute table of each dataset. Both software programs have the capability to run weighted scenarios using this method.

  The results of these three scenarios showed a number of differences at smaller scale levels. However, when looking at the scale of the county as a whole, broader patterns were found to be consistent regardless of the various models. These results suggest a number of possibilities for how the data can be used in an agricultural land preservation program. For instance, one county may wish to use the model to identify and enroll very specific pieces of land into a land preservation program. In this scenario, individual parcels of land could be scored and prioritized for preservation. At the other end of the spectrum, another county may choose to use the model to develop broader zoning districts encompassing larger areas of land where a high percentage of land is considered to be suitable for agricultural uses. The level of detail for these zoning districts could be as large or small as desired—one county may choose to zone by section while another chooses to zone entire townships.

  Additional information on how the various models were developed and the results are available in the supporting documentation of this report.

- **Obtain public input on the various scenarios and what changes, if any, would need to be made.**

  After each of the versions were run, a public meeting was held to present the results of the model and to take comments on which criteria were chosen, how they were scored and weighted, and how the model might be used by the county. Several comments were received and there was interest in the conceptual idea behind the model and project.

  Suggested uses for the model, both from county staff, the Todd County Planning Commission and those in attendance at the public meeting, centered mostly on changing existing zoning districts to better reflect the findings of the model (both to

preserve agricultural lands as well as allow greater housing densities in areas less suitable for agricultural uses). Given the increasing amount of conflict between agricultural and urban uses in Todd County, it was not surprising to find that residents were looking for better ways to keep these uses separate. Several other possible uses were suggested, including assisting farmers and feedlot operators in locating new facilities, using the model to provide additional information when considering requests for additional homes in agricultural areas, using the model to help update the County's Comprehensive Plan, and targeting various environmental and conservation practices to farms and feedlots already located in sensitive areas.

Todd County intends to continue using the Agricultural Preservation Model in the near future at a number of public meetings. Some of these meetings will be intended to simply explain how the model works and what it is capable of showing. It is hoped that the input received at these meetings will further clarify how the residents, county staff and board members and elected officials see the model being used. Subsequent meetings would be intended to gain inp-ut on the actual application of the model in everyday land use planning decisions—by both public and private entities. Ultimately, Todd County is expecting that the model will help county staff and decision-making bodies as well as private landowners to make much more informed land use decisions.

Conclusion

The primary manner in which this project seeks to further land protection and preservation is by identifying a set of criteria that can be used to determine those lands that are most valuable for long-term agricultural production. Unless decision-makers have access to data affecting suitability for agricultural production or where development pressures are likely to take place, it can be very difficult for them to make informed decisions when faced with applications for rezoning of land or residential uses on agriculturally zoned land. Further, by placing this information into a comprehensive GIS database it becomes possible to illustrate and analyze various land use scenarios more easily and in an easy to understand format. This allows decision-makers to consider several possibilities and the impact that a proposed development might have on other county objectives—such as farmland preservation.

Further, the information necessary for an analysis of farmland preservation options can also be used for many other land use decisions that can have both direct and indirect impacts on agricultural lands. For instance, the data collected can be used with the DIAMaTR model and software developed by the LCMR's "Reinventing Minnesota's Agricultural Land Preservation Programs" project to determine the fiscal impact of proposed developments in both agricultural areas and more urban areas of the county. Using these various tools together can greatly improve the ability of county planners and elected officials to determine where both farm and non-farm development is most appropriate—helping to relieve some of the pressure on agricultural lands and reduce potential conflicts. As part of this project, the MDA's DIAMaTR model was applied in Todd County to help the county see the fiscal impacts of development in different parts of the County. The Region 5 Regional Development Commission in Staples was contracted to collect and assemble the data and run the DIAMaTR model for this project. Todd County intends to review the results of the model (which were completed shortly before the grant period expired) and determine how it can be implemented into the overall goal of agricultural land preservation and more informed land use planning. Results from the DIAMaTR model in Todd County can obtained by contacting the Todd County Planning & Zoning Office (contact information is at the end of this report).

The results of this project can provide a valuable model to other counties in that it lays out a rational framework for prioritizing land use decisions related to farmland preservation (and also for many other land use decisions). This framework can provide a general process for determining the suitability of land for competing land uses as well as a method for prioritizing these uses on individual parcels and/or tracts of land. Within these parameters however, counties always have the freedom to choose which data and criterion are most important to their individual situation and the weight that the overall analysis of this information has on land use decisions.

The framework proposed also provides flexibility in the extent to which a county conducts its analysis. It is assumed that all counties will not have the resources or expertise to create a comprehensive parcel-based GIS database. Such limitations however, need not prevent the county from engaging in a farmland preservation effort consistent with the overall framework of the project. In cases where a county could not

create a parcel database, it could collect information at the county or township level and make individual decisions based on approximate locations of parcels in relation to the environmental, social and economic characteristics identified. Also, if a county did not have GIS capability, it would still be able to use the same basic criteria and framework outlined in this proposal to make decisions on farmland preservation without the benefit of GIS analysis and mapping. The model created in Todd County is not intended as an "all-or-nothing" or rigid model. Rather, it is intended to provide a general framework that allows significant flexibility in the manner and extent to which counties choose to implement it.

For more information:

Additional information on this project can be obtained by contacting:

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LCMR AG PRESERVATION MODEL - PROCESS OVERVIEW

BRIEF OVERVIEW: Six different model scenarios were developed for the LCMR Ag Preservation Model project in order to identify areas within Todd County, Minnesota that are most suited for agricultural land use. A model applied specific weight percentages to each dataset with the total equaling 100. In addition, a 5-level classification was used ranking each 30-meter pixel from 0-lowest to 4-highest suitability for agricultural land use. Parcel mapping information was a key component in this project. Through the efforts of this project, parcel mapping for eight townships were developed out of a total of 28. Three models were run countywide with the nine datasets available for all of Todd County and three models were run with the 10 datasets that covered only those eight townships with parcels mapped.

DATASETS DEVELOPMENT: Ten datasets were used in determining agricultural land use suitability. Below is a description of how each dataset was developed and used in this project.

1) **Manure Application** - The manure application is a model created by the Todd County GIS & Land Services Department to identify the nearest available and necessary acres of cultivated lands required to handle the volume of manure produced by local feedlot operations. The datasets and resulting model was developed using ArcView 3.2 software and three AVENUE scripts. The percent of cultivated land needed based on manure production within each township was used as part of this land preservation model. The manure application is only a model and does not take into account factors such as crop type, permit restrictions, actual management practices, etc.

2) **Proximity to Cities** – A 1-mile and 2-mile buffer shapefile was created in ArcView 3.2 for all cities within 2 miles of Todd County.

3) **Rural Residences by PLS40** - This dataset developed by the Todd County GIS & Land Services Department identifies how many residences are within each Public Land Survey 40 polygon.

4) **1989 Land Use** – This is a statewide dataset produced by The International Coalition in an effort to update Minnesota's 1969 land use inventory. The land use/land cover type is derived principally from 1990 vintage aerial photography. The full metadata report for this dataset can be viewed at http://deli.dnr.state.mn.us/metadata/full/lulcxpy3.html.

5) **Parcel Size** – The parcel boundaries dataset is being developed by Todd County GIS & Land Services. Section corners with certificates on file have been GPS'd with a Trimble ProXR to provide control points for creating parcel boundaries based on plats, surveys, AS400 abbreviated legal descriptions, and recorded deeds. Several model scenarios were run with and without this layer. Parcel size information was not used in any countywide model.

6) **Corn Yield** – Corn yield information is based on the average yields per acre that can be expected under a high level of management. Soils were developed by the USDA – NRCS to meet the countywide SSURGO standards. For more information about the Soil Survey Geographic Data Base, go to the following website: http://www.ftw.nrcs.usda.gov/ssurgo.html.

7) **Land Capability Index** - The land capability index shows, in general, the suitability of soils for most kinds of field crops. Soils were developed by the USDA – NRCS to meet the countywide SSURGO standards. For more information about the Soil Survey Geographic Data Base, go to the following website: http://www.ftw.nrcs.usda.gov/ssurgo.html.

8) **FEMA Floodplains** – Information about floodplain zones A and AE created by the Federal Emergency Management Agency. Note that FEMA advises all users that this dataset may not be complete or spatially accurate.

9) **Water Buffers** – This dataset contains a 300ft buffer around the protected streams and a 1000ft buffer around the protected lakes within Todd County.

10) **NWI** – The US Fish & Wildlife Service created the National Wetland Inventory data in order to classify wetlands for resource assessment. A complete metadata report can be found at http://deli.dnr.state.mn.us/metadata/full/nwixxpy3.html.

WEIGHTING OF VALUES: Several different model scenarios were run based on varying weights for each dataset. The weight value is a percentage of 100 based on the weight given to that dataset. See the table below for more information on dataset weights.

		MODEL 2 W/ PARCELS	MODEL 1 W/ PARCELS	MODEL 3 W/ PARCELS	MODEL 2 W/O PARCELS	MODEL 1 W/O PARCELS	MODEL 3 W/O PARCELS
CATEGORY	*DATASET*	*WEIGHT*	*WEIGHT*	*WEIGHT*	*WEIGHT*	*WEIGHT*	*WEIGHT*
LAND USE COMPATIBILITY							
	MANURE APPLICATION	8.75%	2%	10%	12.25%	2%	11.10%
	PROXIMITY TO CITIES	3.5%	6%	10%	5.25%	6%	11.10%
	RURAL RESIDENCES BY PLS40	3.5%	6%	10%	10.5%	6%	11.10%
	1989 LAND USE	7%	4%	10%	7%	6%	11.10%
	PARCEL SIZE	12.25%	2%	10%			
SOIL SUITABILITY							
	CORN YIELD	22.5%	8%	10%	22.5%	8%	11.10%
	LAND CAPABILITY INDEX	22.5%	32%	10%	22.5%	32%	11.10%
ENVIRONMENTAL SUITABILITY							
	FEMA FLOODPLAINS	5%	13%	10%	5%	13%	11.10%
	WATER BUFFERS	5%	13%	10%	5%	13%	11.10%
	NATIONAL WETLANDS INVENTORY	10%	14%	10%	10%	14%	11.10%
	TOTAL:	100%	100%	100%	100%	100%	99.9%

SOFTWARE USED: ESRI's ArcView 3.2 was used for development of the datasets and adding the additional attribute fields needed for this project. ESRI's ArcGIS – ArcView 8.2 with the Spatial Analyst extension was used to create Models 1 & 2. LMIC's EPIC Planner software was used to create Model 3.

RUNNING THE MODEL: In both software packages, the ArcView shapefiles created for each dataset were converted into raster files based on the specific value field for that model scenario. Neither ArcGIS Spatial Analyst nor EPIC Planner allowed the user to weight datasets based on the rank field. EPIC Planner was used to run the two models with all datasets having equal weights (Model 3 with Parcels and Model 3 without Parcels). The other models were run using Spatial Analyst after fields were added to each dataset containing the weight as a percentage of 100. A cell size of 30 meters was specified before creating each raster. Once a raster file is created for each dataset based on the weight for a particular model, the model can be run in both software packages by adding each dataset together.

COMPARING RESULTS: Each software package handles the resulting raster model a bit differently. EPIC Planner codes each pixel as lowest, low, moderate, high, or highest. Spatial Analyst codes each pixel with the result of adding all dataset values together. Since the weighting was setup as a percentage of 100, 100 is the highest possible value a pixel could have. The models in Spatial Analyst were reclassed into a 5-class system so that the 0 - lowest class contained values from 0 to 20, the 4 – highest class contained values from 80 to 100, etc.

Both software packages allow the user to convert the raster model into a shapefile. Each model was converted into a shapefile so that acres could be calculated and summarized by the 0-4 / lowest-highest rank. The table below shows the percent of acres of land within each model classified by the suitability for agricultural land use.

RANK	MODEL 2 W/ PARCELS	MODEL 1 W/ PARCELS	MODEL 3 W/ PARCELS	MODEL 2 W/O PARCELS	MODEL 1 W/O PARCELS	MODEL 3 W/O PARCELS
0 - lowest suitability	2%	0%	0%	0%	1%	0%
1 - low	4%	5%	2%	7%	5%	2%
2 - moderate	10%	11%	7%	20%	17%	8%
3 - high	34%	31%	34%	34%	34%	36%
4 - highest suitability	50%	52%	57%	38%	44%	54%

LCMR AG PRESERVATION MODEL - PROCESS DETAILS

BRIEF OVERVIEW: Six different model scenarios were developed for the LCMR Ag Preservation Model project in order to identify areas within Todd County, Minnesota that are most suited for agricultural land use. A model applied specific weight percentages to each dataset with the total equaling 100. In addition, a 5-level classification was used ranking each 30-meter pixel from 0-lowest to 4-highest suitability for agricultural land use. Parcel mapping information was a key component in this project. Through the efforts of this project, parcel mapping for eight townships were developed out of a total of 28. Three models were run countywide with the nine datasets available for all of Todd County and three models were run with the 10 datasets that covered only those eight townships with parcels mapped.

DATASETS DEVELOPMENT: Ten datasets were used in determining agricultural land use suitability. Below is a description of how each dataset was developed and used in this project.

1) **Manure Application** - The manure application is a model created by the Todd County GIS & Land Services Department to identify the nearest available and necessary acres of cultivated lands required to handle the volume of manure produced by local feedlot operations. The datasets and resulting model was developed using ArcView 3.2 software and three AVENUE scripts. The percent of cultivated land needed based on manure production within each township was used as part of this land preservation model.

   Datasets Used:

   * Feedlot point shapefile based on April 2002 data as reported to the Todd County Planning & Zoning office. The attribute table included total animal units and unique id fields. Shapefile needs to be permanently sorted in descending order by animal unit.
   * Cultivated lands polygon shapefile created by selecting the land use code 21 polygons from the 1989 International Coalition Land Use/Cover dataset and saving as a new shapefile. This shapefile was spatially unioned with the PLS40 polygons from Mn/DOT 1999 State of Minnesota Basemap so that the maximum polygon size is approximately 40 acres. After the union process, those polygons without the land use code of 21 were deleted and then acres were recalculated. A unique id field was added to the attribute table.
   * A point shapefile representing the centroid of the cultivated lands shapefile. Adding two fields to the cultivated lands polygon shapefile was the basis for this shapefile. One field contained the x-coordinate for the centroid of the polygon and the other field contained the y-coordinate for the centroid of the polygon. An event theme was added in ArcView based on this attribute table. The event theme was then saved as a new shapefile. This new point shapefile needs a unique id field in the attribute table.

   Note that the unique id fields needed in the above datasets were populated using an AVENUE script. Pro-West & Associates, Inc. developed this script (filename uniqueid.ave) for the "Advanced ArcView Tips and Tools Workshop".

   Steps to use data in model:

   * The distance from each feedlot point to the centroid of each cultivated land polygon is required. This can be determined by running an ESRI script that comes with ArcView (View.CalculateDistance under sample scripts in the Help system) using the unique id fields as the point identifier.

* Join the centroid point shapefile attribute table to the cultivated lands polygon attribute table. Add a field called feedID to this table. The feedID field will be calculated during the model execution.
* The manure application model itself is an AVENUE script (filename cultivated.ave) created by BMF for Todd County GIS & Land Services. The script will take the largest feedlot operation based on total animal units and note the id number and number of acres required, assuming 1 acre per animal unit. It will then select those cultivated land polygons within a mile of that feedlot based on the distance to field. It then selects the closest polygon from that selected set that does not have a value in the feedID field – meaning that no other feedlot is using that polygon. The number of acres in the polygon is noted in temporary memory and the feedlot id number is recorded in the feedID field. The script continues to loop through the next closest polygons until enough cultivated land acres are found. The model allows for +/- 5-acre tolerance range. Once enough acres are accumulated, the script moves to the next largest feedlot. If enough cultivated land acres cannot be found within a mile, the script extends the search radius out an additional mile; repeating this step as necessary.

The end product is a cultivated land polygon shapefile that can be displayed where feedID field is greater than 0 – meaning that these cultivated lands are required to apply the manure produced from the feedlots in that study area. Results included a table summarizing the number of acres of cultivated land needed by township. The manure application is only a model and does not take into account factors such as crop type, permit restrictions, actual management practices, etc.
* The summary table containing percent needed by township was permanently joined to the polygon township data from the Mn/DOT 1999 State of Minnesota Basemap.
* A field called rank was added to this shapefile with values based on the percent of cultivated land each township needs for its manure production. Fields were added to the shapefile to contain the weighted values used in each model. See table below:

RANK	MODEL 2 W/PARCELS	MODEL 1 W/PARCELS	MODEL 3 W/PARCELS	MODEL 2 W/O PARCELS	MODEL 1 W/O PARCELS	MODEL 3 W/O PARCELS
	0 = 0	0 = 0	0 = 0	0 = 0	0 = 0	0 = 0
1 = 10-24%	1 = 2.1875	1 = 0.5	1 = 1	1 = 3.0625	1 = 0.5	1 = 1
2 = 25-49%	2 = 4.375	2 = 1	2 = 2	2 = 6.125	2 = 1	2 = 2
3 = 50-74%	3 = 6.5625	3 = 1.5	3 = 3	3 = 9.1875	3 = 1.5	3 = 3
4 = 75-100%	4 = 8.75	4 = 2	4 = 4	4 = 12.25	4 = 2	4 = 4

2) **Proximity to Cities** – A 1-mile and 2-mile buffer shapefile was created in ArcView 3.2 for all cities within 2 miles of Todd County.

Datasets Used:
* City boundaries within Todd County are maintained as part of the Todd County E911 System based on legal descriptions of the parcels involved.
* The boundary for the city of Sauk Centre, which recently annexed new lands on the north side of the city, was created based on a 1992 aerial photo and personal knowledge of the annexed area.
* The boundaries of all other cities used were from MNDOT 1999 State of Minnesota Basemap.

Steps to use data in model:
* The above city shapefiles were merged together.

* Buffers were created in a 1-mile radius and a 2-mile radius around each city.
* This buffer shapefile was spatially unioned with the county boundary shapefile; this way each of the 10 datasets covered the entire extent of Todd County.
* A field called rank was added to this unioned shapefile; the rank values were based on the distance from a city. Fields were added to the shapefile to contain the weighted values used in each model. See table below:

RANK	MODEL 2 W/PARCELS	MODEL 1 W/PARCELS	MODEL 3 W/PARCELS	MODEL 2 W/O PARCELS	MODEL 1 W/O PARCELS	MODEL 3 W/O PARCELS
0 = <1 mile	0 = 0	0 = 0	0 = 0	0 = 0	0 = 0	0 = 0
	1 = 0.875	1 = 1.5	1 = 1	1 = 1.3125	1 = 1.5	1 = 1
	2 = 1.75	2 = 3	2 = 2	2 = 2.625	2 = 3	2 = 2
3 = <2 miles	3 = 2.625	3 = 4.5	3 = 3	3 = 3.9375	3 = 4.5	3 = 3
4 = >2 miles	4 = 3.5	4 = 6	4 = 4	4 = 5.25	4 = 6	4 = 4

3) **Rural Residences by PLS40** - This dataset developed by the Todd County GIS & Land Services Department identifies how many residences are within each Public Land Survey 40 polygon.

Datasets Used:
* Building sites from the Todd County E911 System as of April 2003. Residences within city limits were already assigned addresses and therefore not included as part of the building sites shapefile. Note that for this application this leads to misrepresented data within city limits since there are no points to represent building sites within city limits.
* PLS40 dataset from the Mn/DOT 1999 State of Minnesota Basemap.

Steps to use data in model:
* Sites that were not rural residences but addressed as part of the E911 System such as gravel pits, cemeteries, and boat accesses were deleted from the building sites shapefile.
* An AVENUE script (filename find_dissolve.ave) originally developed by BMF for the US National Park Service was used to count the number of residential points within each PLS40 polygon.
* A field called rank was added to the attribute table of this polygon shapefile. Rank is based on the number of rural residences within the PLS40 polygon. Fields were added to the shapefile to contain the weighted values used in each model. See table below:

RANK	MODEL 2 W/PARCELS	MODEL 1 W/PARCELS	MODEL 3 W/PARCELS	MODEL 2 W/O PARCELS	MODEL 1 W/O PARCELS	MODEL 3 W/O PARCELS
0 = >10 sites	0 = 0	0 = 0	0 = 0	0 = 0	0 = 0	0 = 0
1 = 6-9 sites	1 = 0.875	1 = 1.5	1 = 1	1 = 2.625	1 = 1.5	1 = 1
2 = 3-5 sites	2 = 1.75	2 = 3	2 = 2	2 = 5.25	2 = 3	2 = 2
3 = 1-2 sites	3 = 2.625	3 = 4.5	3 = 3	3 = 7.875	3 = 4.5	3 = 3
4 = 0 sites	4 = 3.5	4 = 6	4 = 4	4 = 10.5	4 = 6	4 = 4

4) **1989 Land Use** – This is a statewide dataset produced in an effort to update Minnesota's 1969 land use inventory. The land use/land cover type is derived principally from 1990 vintage aerial photography.

Datasets Used:

* 1989 Land Use / Land Cover developed by The International Coalition. The full metadata report for this dataset can be viewed at http://deli.dnr.state.mn.us/metadata/full/lulcxpy3.html.

Steps to use data in model:

* A field called rank was added to the attribute table of this polygon shapefile. Rank is based on the land use type. Fields were added to the shapefile to contain the weighted values used in each model. See tables below:

LAND USE CODE	DESCRIPTION
11	Urban & Industrial
12	Farmsteads & Rural Residences
13	Rural Residential Development Complexes
14	Other Rural Development
21	Cultivated Land
22	Pasture Land
23	Transitional Agricultural Land
31	Grassland
32	Grassland - Shrub - Deciduous Tree Complex
33	Grassland - Shrub - Coniferous Tree Complex
41	Deciduous Forest
42	Coniferous Forest
50	Water
61	Wetlands
71	Gravel Pits & Open Mines
72	Bare Rock
73	Exposed Soil, Sandbars, & Sand Dunes
80	Unclassified
99	Outside State or County

RANK	MODEL 2 W/PARCELS	MODEL 1 W/PARCELS	MODEL 3 W/PARCELS	MODEL 2 W/O PARCELS	MODEL 1 W/O PARCELS	MODEL 3 W/O PARCELS
0 = 0, 11, 50, 61, 71, 72, 73, 80, 99	0 = 0	0 = 0	0 = 0	0 = 0	0 = 0	0 = 0
1 = 12, 13, 14	1 = 1.75	1 = 1	1 = 1	1 = 1.75	1 = 1.5	1 = 1
2 = 41, 42	2 = 3.5	2 = 2	2 = 2	2 = 3.5	2 = 3	2 = 2
3 = 22, 23, 31, 32, 33	3 = 5.25	3 = 3	3 = 3	3 = 5.25	3 = 4.5	3 = 3
4 = 21	4 = 7.0	4 = 4	4 = 4	4 = 7.0	4 = 6	4 = 4

5) **Parcel Size** – The parcel boundaries dataset is being developed by Todd County GIS & Land Services. Section corners with certificates on file have been GPS'd with a Trimble ProXR to provide control points for creating parcel boundaries based on plats, surveys, AS400 abbreviated legal descriptions, and recorded deeds. Several model scenarios were run with and without this layer. Parcel size information was not used in any countywide model.

Datasets Used:

* Eight out of the 28 townships in Todd County that had parcel mapping completed as of April 2003.

Steps to use data in model:

* Each of the township parcel shapefiles were merged together into one shapefile.
* Acres were then calculated based on the spatial extent of the parcel polygon, not on the deeded acres recorded in the AS400 tax system.
* This shapefile was spatially unioned with the county boundary shapefile.
* A field called rank was added to the attribute table of this polygon shapefile. Rank is based on the size of the parcel in acres. Fields were added to the shapefile to contain the weighted values used in each model. See table below:

RANK	MODEL 2 W/PARCELS	MODEL 1 W/PARCELS	MODEL 3 W/PARCELS	MODEL 2 W/O PARCELS	MODEL 1 W/O PARCELS	MODEL 3 W/O PARCELS
0 = <9.9 acres	0 = 0	0 = 0	0 = 0			
	1 = 3.0625	1 = 0.5	1 = 1			
2 = 10-19.9 acres	2 = 6.125	2 = 1	2 = 2			
3 = 20-39.9 acres	3 = 9.1875	3 = 1.5	3 = 3			
4 = >40 acres	4 = 12.25	4 = 2	4 = 4			

6) **Corn Yield** – Corn yield information is based on the average yields per acre that can be expected under a high level of management.

Datasets Used:

* Soils were developed by the USDA – NRCS to meet the countywide SSURGO standards. For more information about the Soil Survey Geographic Data Base, go to the following website: http://www.ftw.nrcs.usda.gov/ssurgo.html.

Steps to use data in model:

* A new table was created with 2 fields – soil map unit and corn yield
* Corn yield information was added into this table based on information from the "Land Capability Classes and Yields Per Acre Of Crops and Pasture" table found within the Soil Survey Report for Todd County. Due to the reformatting of the soil databases, it was quicker to type the corn yield information into a new table than trying to find the information in the SSURGO ACCESS Database.
* The corn yield table was joined with the soil polygon shapefile attribute table by the map unit symbol field and saved as a new shapefile.
* A field called rank was added to the attribute table of this polygon shapefile. Rank is based on bushels of corn yield. Fields were added to the shapefile to contain the weighted values used in each model. See table below:

RANK	MODEL 2 W/PARCELS	MODEL 1 W/PARCELS	MODEL 3 W/PARCELS	MODEL 2 W/O PARCELS	MODEL 1 W/O PARCELS	MODEL 3 W/O PARCELS

0 = <50 bushels	0 = 0	0 = 0	0 = 0	0 = 0	0 = 0	0 = 0
1 = 50-74 bushels	1 = 8.4375	1 = 2	1 = 1	1 = 8.4375	1 = 2	1 = 1
	2 = 11.25	2 = 4	2 = 2	2 = 11.25	2 = 4	2 = 2
3 = 75-99 bushels	3 = 16.875	3 = 6	3 = 3	3 = 16.875	3 = 6	3 = 3
4 = >100 bushels	4 = 22.5	4 = 8	4 = 4	4 = 22.5	4 = 8	4 = 4

7) **Land Capability Index** - The land capability index shows, in general, the suitability of soils for most kinds of field crops.

Datasets Used:

* Soils were developed by the USDA – NRCS to meet the countywide SSURGO standards. For more information about the Soil Survey Geographic Data Base, go to the following website: http://www.ftw.nrcs.usda.gov/ssurgo.html.

Steps to use data in model:

* A new table was created with 2 fields – soil map unit and land capability index
* Land capability index information was added into this table based on information from the "Land Capability Classes and Yields Per Acre Of Crops and Pasture" table found within the Soil Survey Report for Todd County. Due to the reformatting of the soil databases, it was quicker to type the land capability index information into a new table than trying to find the information in the SSURGO ACCESS Database.
* The land capability index table was joined with the soil polygon shapefile attribute table by the map unit symbol field and saved as a new shapefile.
* A field called rank was added to the attribute table of this polygon shapefile. Rank is based on the suitability of soils for most kinds of field crops. Fields were added to the shapefile to contain the weighted values used in each model. See tables below:

LAND CAPABILITY INDEX CLASS	DESCRIPTION
(1) Class I	Soils with few limitations that restrict their use
(2) Class II	Soils with moderate limitations that reduce the choice of plants &/or require moderate conservation practices
(3) Class III	Soils with severe limitations that reduce the choice of plants &/or require special conservation practices
(4) Class IV	Soils with severe limitations that reduce the choice of plants &/or require very careful management
(5) Class V	Soils that are not likely to erode but have other limitations, impractical to remove, that limit their use
(6) Class VI	Soils with severe limitations that make them generally unsuitable for cultivation
(7) Class VII	Soils with very severe limitation that make them unsuitable for cultivation
(8) Class VIII	Soils and miscellaneous areas with limitations that nearly preclude their use for commercial crop production

SUBCLASSES	DESCRIPTION
e	Main limitation is risk of erosion
w	Water in or on the soil interferes with plant growth

s	Soil is shallow, droughty, or stony

RANK	MODEL 2 W/PARCELS	MODEL 1 W/PARCELS	MODEL 3 W/PARCELS	MODEL 2 W/O PARCELS	MODEL 1 W/O PARCELS	MODEL 3 W/O PARCELS
0 = 6e, 6s, 6w, 7s, 8w, nodata	0 = 0	0 = 0	0 = 0	0 = 0	0 = 0	0 = 0
1 = 4e, 4s, 4w	1 = 8.4375	1 = 8	1 = 1	1 = 8.4375	1 = 8	1 = 1
2 = 3e, 3s, 3w	2 = 11.25	2 = 16	2 = 2	2 = 11.25	2 = 16	2 = 2
3 = 2e, 2s, 2w	3 = 16.875	3 = 24	3 = 3	3 = 16.875	3 = 24	3 = 3
4 = 1, 1w	4 = 22.5	4 = 32	4 = 4	4 = 22.5	4 = 32	4 = 4

8) **FEMA Floodplains** – Information about floodplain zones A and AE.

Datasets Used:

* Floodplain information created by the Federal Emergency Management Agency. Note that FEMA advises all users that this dataset may not be complete or spatially accurate.

Steps to use data in model:

* The FEMA shapefile was spatially unioned with the county boundary shapefile.
* A field called rank was added to the attribute table of this polygon shapefile. Rank is based as either being in the floodplain or not within the floodplain. Fields were added to the shapefile to contain the weighted values used in each model. See table below:

RANK	MODEL 2 W/PARCELS	MODEL 1 W/PARCELS	MODEL 3 W/PARCELS	MODEL 2 W/O PARCELS	MODEL 1 W/O PARCELS	MODEL 3 W/O PARCELS
0 = fema floodplain	0 = 0	0 = 0	0 = 0	0 = 0	0 = 0	0 = 0
	1 = 1.25	1 = 3.25	1 = 1	1 = 1.25	1 = 3.25	1 = 1
	2 = 2.5	2 = 6.5	2 = 2	2 = 2.5	2 = 6.5	2 = 2
	3 = 3.75	3 = 9.75	3 = 3	3 = 3.75	3 = 9.75	3 = 3
4 = all other land	4 = 5	4 = 13	4 = 4	4 = 5	4 = 13	4 = 4

9) **Water Buffers** – This dataset contains a 300ft buffer around the protected streams and a 1000ft buffer around the protected lakes within Todd County.

Datasets Used:

* Todd County GIS & Land Services developed this dataset based on the MN DNR Protected Wetlands and Water Map revised in 1996.

Steps to use data in model:

* Created a 300ft buffer around DNR Protected Streams.
* Created a 1000ft buffer around DNR Protected Lakes.
* The two buffer shapefiles were merged into one dataset.
* This buffer shapefile was spatially unioned with the Todd County boundary shapefile.
* A field called rank was added to the attribute table of this polygon shapefile. Rank is based as either being in a buffer or not within a buffer. Fields were added to the shapefile to contain the weighted values used in each model. See table below:

RANK	MODEL 2 W/PARCELS	MODEL 1 W/PARCELS	MODEL 3 W/PARCELS	MODEL 2 W/O PARCELS	MODEL 1 W/O PARCELS	MODEL 3 W/O PARCELS
	0 = 0	0 = 0	0 = 0	0 = 0	0 = 0	0 = 0
1 = buffers	1 = 1.25	1 = 3.25	1 = 1	1 = 1.25	1 = 3.25	1 = 1
	2 = 2.5	2 = 6.5	2 = 2	2 = 2.5	2 = 6.5	2 = 2
	3 = 3.75	3 = 9.75	3 = 3	3 = 3.75	3 = 9.75	3 = 3
4 = all other land	4 = 5	4 = 13	4 = 4	4 = 5	4 = 13	4 = 4

10) **NWI** – The US Fish & Wildlife Service created the National Wetland Inventory data in order to classify wetlands for resource assessment. A complete metadata report can be found at http://deli.dnr.state.mn.us/metadata/full/nwixxpy3.html.

Datasets Used:

* NWI data downloaded from the MN DNR Data Deli website.

Steps to use data in model:

* A field called rank was added to the attribute table of this polygon shapefile. Rank is based on the 'circ39' classification schema, which classifies wetlands for agricultural land use suitability. Fields were added to the shapefile to contain the weighted values used in each model. See tables below:

CIRC39 CODE	DESCRIPTION
1	Seasonally flooded basin or flat
2	Wet meadow
3	Shallow marsh
4	Deep marsh
5	Shallow open water
6	Shrub swamp
7	Wooded swamps
8	Bogs
80	Water Regime "K" codes
90	Riverine Systems "R" codes
98	Uplands

RANK	MODEL 2 W/PARCELS	MODEL 1 W/PARCELS	MODEL 3 W/PARCELS	MODEL 2 W/O PARCELS	MODEL 1 W/O PARCELS	MODEL 3 W/O PARCELS
0 = type 80 & 90	0 = 0	0 = 0	0 = 0	0 = 0	0 = 0	0 = 0
	1 = 2.5	1 = 3.5	1 = 1	1 = 2.5	1 = 3.5	1 = 1
2 = type 3-8	2 = 5	2 = 7	2 = 2	2 = 5	2 = 7	2 = 2
3 = type 1 & 2	3 = 7.5	3 = 10.5	3 = 3	3 = 7.5	3 = 10.5	3 = 3
4 = all other land	4 = 10	4 = 14	4 = 4	4 = 10	4 = 14	4 = 4

WEIGHTING OF VALUES: The rank field classifies the main attribute of each dataset into a 0-4 system with zero being least suitable to four being highly suitable for agricultural land use. All members of Planning & Zoning agreed to this ranking system.

Several different model scenarios were run based on varying weights for each dataset. The weight value is a percentage of 100 based on the weight given to that dataset. See the table below for more information on dataset weights.

		MODEL 2 W/ PARCELS	MODEL 1 W/ PARCELS	MODEL 3 W/ PARCELS	MODEL 2 W/O PARCELS	MODEL 1 W/O PARCELS	MODEL 3 W/O PARCELS
CATEGORY	*DATASET*	*WEIGHT*	*WEIGHT*	*WEIGHT*	*WEIGHT*	*WEIGHT*	*WEIGHT*
LAND USE COMPATIBILITY							
	MANURE APPLICATION	8.75%	2%	10%	12.25%	2%	11.10%
	PROXIMITY TO CITIES	3.5%	6%	10%	5.25%	6%	11.10%
	RURAL RESIDENCES BY PLS40	3.5%	6%	10%	10.5%	6%	11.10%
	1989 LAND USE	7%	4%	10%	7%	6%	11.10%
	PARCEL SIZE	12.25%	2%	10%			
SOIL SUITABILITY							
	CORN YIELD	22.5%	8%	10%	22.5%	8%	11.10%
	LAND CAPABILITY INDEX	22.5%	32%	10%	22.5%	32%	11.10%
ENVIRONMENTAL SUITABILITY							
	FEMA FLOODPLAINS	5%	13%	10%	5%	13%	11.10%
	WATER BUFFERS	5%	13%	10%	5%	13%	11.10%
	NATIONAL WETLANDS INVENTORY	10%	14%	10%	10%	14%	11.10%
	TOTAL:	100%	100%	100%	100%	100%	99.9%

SOFTWARE USED: ESRI's ArcView 3.2 was used for development of the datasets and adding the additional attribute fields needed for this project. ESRI's ArcGIS – ArcView 8.2 with the Spatial Analyst extension was used to create Models 1 & 2. LMIC's EPIC Planner software was used to create Model 3.

RUNNING THE MODEL: In both software packages, the ArcView shapefiles created for each dataset were converted into raster files based on the specific value field for that model scenario. This means that if the weight of a dataset changes, a new raster file needed to be created. Neither ArcGIS Spatial Analyst nor EPIC Planner allowed the user to weight datasets based on the rank field. EPIC Planner was used to run the two models with all datasets having equal weights (Model 3 with Parcels and Model 3 without Parcels). The other models were run using Spatial Analyst after fields were added to each dataset containing the weight as a percentage of 100. A cell size of 30 meters was specified before creating each raster. EPIC Planner converts the shapefile into EPPL7 format whereas Spatial Analyst converts the shapefiles into ESRI GRID format. The conversion tends to be quicker in EPIC Planner. However, if there are any slivers or overlapping polygons within the shapefile, EPIC Planner will have difficulties converting the data and may skew the data by creating 'nodata' cells where values do exist.

Once a raster file is created for each dataset based on the weight for a particular model, the model can be run in both software packages by adding each dataset together. In EPIC Planner the user creates an application that specifies which datasets are used and how the dataset is classified on a lowest-to-highest scale. EPIC Planner uses 'considerations' to group datasets together into a preliminary raster and then adds those together into one raster model result. The EPIC Planner 'considerations' were setup to be the same as the data categories in the *"WEIGHTING OF VALUES"* table. Spatial Analyst in ArcGIS 8.2 uses a 'raster calculator' where the user specifies which datasets to add together into one raster model result.

The models were run separately for each township in EPIC Planner. Spatial Analyst processed the data countywide with those townships that do not have parcel data masked out if applicable.

COMPARING RESULTS: Each software package handles the resulting raster model a bit differently. EPIC Planner codes each pixel as lowest, low, moderate, high, or highest. Spatial Analyst codes each pixel with the result of adding all dataset values together. Since the weighting was setup as a percentage of 100, 100 is the highest possible value a pixel could have. The models in Spatial Analyst were reclassed into a 5-class system so that the 0 - lowest class contained values from 0 to 20, the 4 – highest class contained values from 80 to 100, etc.

Both software packages allow the user to convert the raster model into a shapefile. Each model was converted into a shapefile so that acres could be calculated and summarized by the 0-4 / lowest-highest rank. The table below shows the percent of acres of land within each model classified by the suitability for agricultural land use.

RANK	MODEL 2 W/ PARCELS	MODEL 1 W/ PARCELS	MODEL 3 W/ PARCELS	MODEL 2 W/O PARCELS	MODEL 1 W/O PARCELS	MODEL 3 W/O PARCELS
0 - lowest suitability	2%	0%	0%	0%	1%	0%
1 - low	4%	5%	2%	7%	5%	2%
2 - moderate	10%	11%	7%	20%	17%	8%
3 - high	34%	31%	34%	34%	34%	36%
4 - highest suitability	50%	52%	57%	38%	44%	54%

LCMR AG PRESERVATION MODEL - Original Source Data Files

DESCRIPTION	FILENAME	CURRENT	KEY FIELDS
Feedlot / Manure Application	feedapp.shp	feedlot data from 2002	
by percent land used			per_used
Municipalities	muniutm.shp	as of Feb 2003	
distance from			buffer all cities in area by 1 & 2 miles
Building Sites	bldgpts.shp	as of April 2003 - tax data Feb 2003	
rural residences by PLS40			summarize number of points within PLS40
1989 Landuse	landus89.shp		
by land use code			lucode : all values
Birchdale parcels	03parcel.shp	as of April 2003 - tax data Feb 2003	
Burleene parcels	05parcel.shp	as of April 2003 - tax data Feb 2003	
Germania parcels	09parcel.shp	as of April 2003 - tax data Feb 2003	
Grey Eagle parcels	11parcel.shp	as of April 2003 - tax data Feb 2003	
Hartford parcels	12parcel.shp	as of April 2003 - tax data Feb 2003	
Iona parcels	13parcel.shp	as of April 2003 - tax data Feb 2003	
Ward parcels	26parcel.shp	as of April 2003 - tax data Feb 2003	
Wykeham parcels	28parcel.shp	as of April 2003 - tax data Feb 2003	
by size			acres
soils - 1:24000	mn153_a.shp		
by corn yield			
by land capability index			
FEMA floodplains	fema.shp		
in or out of floodplain			
DNR Streams	strmdnr3.shp		
300ft buffer			
Protected Lakes	lakeprot.shp		
1000ft buffer			
National Wetlands Inventory	nwinvtry.shp		
by CIRC39 classification			CIRC39

LCMR AG PRESERVATION MODEL

Project files located under k:\projects\lcmrmodel\ unless otherwise noted.

LAND USE COMPATIBILITY			
DATATYPE	*DESCRIPTION*	*RANK*	*FILENAME(S)*
Manure Application	Percent of township needed for manure application on cultivated land	1 = 10-24% 2 = 25-49% 3 = 50-74% 4 = 75-100%	Shapefile: \shapefile\luse_suit\feedapp.shp Model 1 value grid: \raster\ben1\b_feedap Model 2 value grid: \raster\jim1\j_feedap Model 3 with parcels: \\gis5\EPICplan\ToddCo\(twp)\LCMRflot Model 3 w/o parcels: \\gis5\ EPICplan\ToddCo\(twp)\nopflot Adobe pdf file: \pdf\manure.pdf
Proximity to Cities	Buffered all cities including those in adjacent counties	0 = <1 mile 3 = <2 miles 4 = >2 miles	Shapefile: \shapefile\luse_suit\proxcity.shp Model 1 value grid: \raster\ben1\b_pxcity Model 2 value grid: \raster\jim1\j_pxcity Model 3 with parcels: \\gis5\ EPICplan\ToddCo\(twp)\LCMRcity Model 3 w/o parcels: \\gis5\ EPICplan\ToddCo\(twp)\nopcity Adobe pdf file: \pdf\proxcity.pdf
Rural Residences by PLS 40	Number of rural residences from the 911 system within each PLS 40	0 >10 sites 1 = 6-9 sites 2 = 3-5 sites 3 = 1-2 sites 4 = 0 sites	Shapefile: \shapefile\luse_suit\rr_pls40.shp Model 1 value grid: \raster\ben1\b_rpls40 Model 2 value grid: \raster\jim1\j_rpls40 Model 3 with parcels: \\gis5\ EPICplan\ToddCo\(twp)\LCMRrr40 Model 3 w/o parcels: \\gis5\ EPICplan\ToddCo\(twp)\noprr40 Adobe pdf file: \pdf\ rres_pls40.pdf

1989 Land Use	1989 Land Use / Cover	0 = 0, 11, 50, 61, 71, 72, 73, 80, 99 1 = 12, 13, 14 2 = 41, 42 3 = 22, 23, 31, 32, 33 4 = 21	Shapefile: \shapefile\luse_suit\landus89.shp Model 1 value grid: \raster\ben1\b_land89 Model 2 value grid: \raster\jim1\j_land89 Model 3 with parcels: \\gis5\ EPICplan\ToddCo\(twp)\LCMR89lu Model 3 w/o parcels: \\gis5\ EPICplan\ToddCo\(twp)\nop89lu Adobe pdf file: \pdf\landuse.pdf
Parcel Size	Parcel size in acres for the 8 townships that have digital parcels	0 = <9.9 acres 2 = 10-19.9 acres 3 = 20-39.9 acres 4 = >40 acres	Shapefile: \shapefile\luse_suit\parcel.shp Model 1 value grid: \raster\ben1\b_parcel Model 2 value grid: \raster\jim1\j_parcel Model 3 with parcels: \\gis5\ EPICplan\ToddCo\(twp)\LCMRparc Model 3 w/o parcels: Adobe pdf file: \pdf\parcelsize.pdf

SOIL SUITABILITY			
DATATYPE	*DESCRIPTION*	*RANK*	*FILENAME(S)*
Corn Yield	Based on the Soil Survey digital database tables	0 = <50 bushels 1 = 50-74 bushels 3 = 75-99 bushels 4 = >100 bushels	Shapefile: \shapefile\soil_suit\cornyld.shp Model 1 value grid: \raster\ben1\b_crnyld Model 2 value grid: \raster\jim1\j_crnyld Model 3 with parcels: \\gis5\ EPICplan\ToddCo\(twp)\LCMRcyld Model 3 w/o parcels: \\gis5\ EPICplan\ToddCo\(twp)\nopcyld Adobe pdf file: \pdf\cornyield.pdf
Land Capability Index	Based on the Soil Survey digital database tables	0 = 6e, 6s, 6w, 7s, 8w, nodata 1 = 4e, 4s, 4w 2 = 3e, 3s, 3w 3 = 2e, 2s, 2w 4 = 1, 1w	Shapefile: \shapefile\soil_suit\landcap.shp Model 1 value grid: \raster\ben1\b_lndcap Model 2 value grid: \raster\jim1\j_lndcap Model 3 with parcels: \\gis5\ EPICplan\ToddCo\(twp)\LCMRlci Model 3 w/o parcels: \\gis5\ EPICplan\ToddCo\(twp)\noplci Adobe pdf file: \pdf\landcapindex.pdf

ENVIRONMENTAL COMPATIBILTY			
DATATYPE	*DESCRIPTION*	*RANK*	*FILENAME(S)*
FEMA Floodplain	FEMA Floodplain – not spatially accurate	0 = fema floodplain 4 = all other land	Shapefile: \shapefile\envi_suit\floodr.shp Model 1 value grid: \raster\ben1\b_flood Model 2 value grid: \raster\jim1\j_flood Model 3 with parcels: \\gis5\ EPICplan\ToddCo\(twp)\LCMRfema Model 3 w/o parcels: \\gis5\ EPICplan\ToddCo\(twp)\nopfema Adobe pdf file: \pdf\floodplain.pdf
Water Buffers	300ft buffer around DNR Protected Streams & 1000ft buffer around DNR Protected Lakes	1 = buffers 4 = all other land	Shapefile: \shapefile\envi_suit\buffr.shp Model 1 value grid: \raster\ben1\b_buffer Model 2 value grid: \raster\jim1\j_buffer Model 3 with parcels: \\gis5\ EPICplan\ToddCo\(twp)\LCMRbuff Model 3 w/o parcels: \\gis5\ EPICplan\ToddCo\(twp)\nopbuff Adobe pdf file: \pdf\buffers.pdf
NWI	National Wetlands Inventory	0 = type 80 & 90 2 = type 3 – 8 3 = type 1 & 2 4 = all other land	Shapefile: \shapefile\envi_suit\nwi.shp Model 1 value grid: \raster\ben1\b_nwi Model 2 value grid: \raster\jim1\j_nwi4 Model 3 with parcels: \\gis5\ EPICplan\ToddCo\(twp)\LCMRnwi Model 3 w/o parcels: \\gis5\ EPICplan\ToddCo\(twp)\nopnwi Adobe pdf file: \pdf\nwi.pdf

ANALYSIS MODEL RESULTS ***datasets were added together to create each model***	
DESCRIPTION	*FILENAME(S)*
Model 1 Countywide model without parcel information; Based on Ben's values	Original grid with 0-100 values: \raster\ben1\b_co Grid reclassed into 0-4 classes: \raster\ben1\b_co_r Shapefile of reclassed grid: \shapefiles\results\b_co_r.shp Adobe pdf file: \pdf\ben_county.pdf
Model 2 Countywide model without parcel information; Based on Jim's values	Original grid with 0-100 values: \raster\jim1\j_co Grid reclassed into 0-4 classes: \raster\jim1\j_co_r Shapefile of reclassed grid: \shapefiles\results\j_co_r.shp Adobe pdf file: \pdf\jim_county.pdf
Model 1 Model with parcel information for the 8 townships currently parcel mapped; Based on Ben's values	Original grid with 0-100 values: \raster\ben1\b_twp Grid reclassed into 0-4 classes: \raster\ben1\b_twp_r Shapefile of reclassed grid: \shapefiles\results\b_twp_r.shp Adobe pdf file: \pdf\ben_twp.pdf
Model 2 Model with parcel information for the 8 townships currently parcel mapped; Based on Jim's values	Original grid with 0-100 values: \raster\jim1\j_twp Grid reclassed into 0-4 classes: \raster\jim1\j_twp_r Shapefile of reclassed grid: \shapefiles\results\j_twp_r.shp Adobe pdf file: \pdf\jim_twp.pdf
Model 3 Model with parcel information for the 8 townships currently parcel mapped; evenly weighted in EPIC Planner	Grid by township: \raster\epic\(twp)\lcmragm Shapefile by township: \raster\epic\(twp)\lcmragm.shp Shapefile merged: \shapefile\results\epic.shp Adobe pdf file: \pdf\epic_wparcel.pdf
Model 3 Countywide model without parcel information; evenly weighted in EPIC Planner	Grid by township: Shapefile by township: \raster\epic\(twp)\twpnopar.shp Shapefile merged: \shapefile\results\epic_noparc.shp Adobe pdf file: \pdf\epic_woparcel.pdf

ARCVIEW PROJECT FILES	
DESCRIPTION	*FILENAME*
ArcView 3x project containing all of the above shapefiles. This project used to create all maps & pdf files.	k:\projects\lcmrmodel\working.apr
ArcView 8x project containing all grid files used in Ben's Model 1 countywide and township models.	k:\projects\lcmrmodel\b_model.mxd
ArcView 8x project containing all grid files used in Jim's Model 2 countywide and township models.	k:\projects\lcmrmodel\j_model.mxd

MISCELLANEOUS NOTES:

- All datasets are in UTM NAD 83, Zone 15 coordinate system with meter units.
- Several different model scenarios were run. Ben developed a set of weighted values to apply countywide without parcels and for those 8 townships where parcels have been mapped. Jim developed another set of weighted values to apply to the same extents. EPIC Planner was used to run two evenly weighted models; one with parcel information and one without.
- As part of the LCMR grant process, EPIC Planner was initially used to create the model since this software is free to government agencies. It was decided to use the above-mentioned datasets instead of the statewide data used in the sample ag preservation model provided in EPIC Planner. Note that when converting a shapefile to EPPL raster file, no slivers or overlaps can be present in the shapefile. The advantage of EPIC Planner is that processing time is quick; each model was run by township taking less than 1 minute each to process. The disadvantage is that a large amount of free space on the C drive is needed just to install the software. (Which is why the software was installed and the EPIC models run on Gloria's GIS5 computer.)
- ESRI's Spatial Analyst extension was used in ArcView 8.2 was used to run the other models (model 1 & 2). Neither Spatial Analyst nor EPIC Planner allow users to weigh datasets when running a model. In order to get around this limitation, fields were added into each dataset's shapefile attribute table containing the weighted values for each model. See the Excel spreadsheet \metadata\model_values.xls for more details.

n Model - Criteria Used

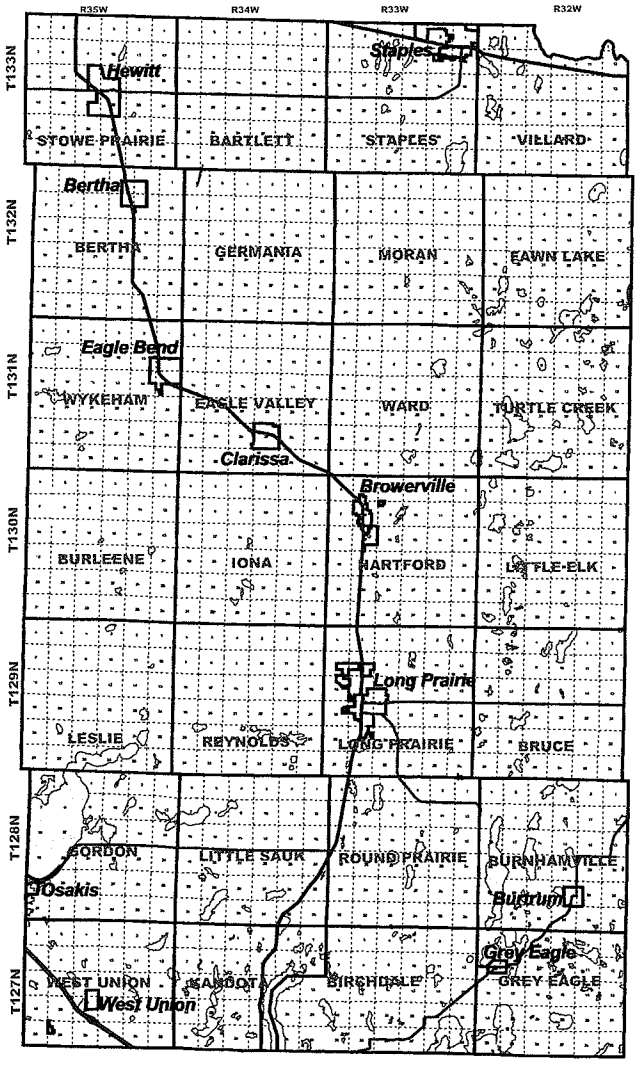
TOWNSHIP MODEL EL 1 W/PARCELS		EPIC TOWNSHIP MODEL MODEL 3 W/PARCELS		JIM COUNTY MODEL MODEL 2 W/O PARCELS		BEN COUNTY MODEL MODEL 1 W/O PARCELS		EPIC COUNTY MODEL MODEL 3 W/O PARCELS	
HT	VALUES	WEIGHT	VALUES	WEIGHT	VALUES	WEIGHT	VALUES	WEIGHT	VALUES
				35%		20%			
10%	0 = 0	10%	0 = 0	35%	0 = 0	10%	0 = 0	11.10%	0 = 0
	1 = 0.5		1 = 1		1 = 3.0625		1 = 0.5		1 = 1
	2 = 1		2 = 2		2 = 6.125		2 = 1		2 = 2
	3 = 1.5		3 = 3		3 = 9.1875		3 = 1.5		3 = 3
	4 = 2		4 = 4		4 = 12.25		4 = 2		4 = 4
30%	0 = 0	10%	0 = 0	15%	0 = 0	30%	0 = 0	11.10%	0 = 0
	1 = 1.5		1 = 1		1 = 1.3125		1 = 1.5		1 = 1
	2 = 3		2 = 2		2 = 2.625		2 = 3		2 = 2
	3 = 4.5		3 = 3		3 = 3.9375		3 = 4.5		3 = 3
	4 = 6		4 = 4		4 = 5.25		4 = 6		4 = 4
30%	0 = 0	10%	0 = 0	30%	0 = 0	30%	0 = 0	11.10%	0 = 0
	1 = 1.5		1 = 1		1 = 2.625		1 = 1.5		1 = 1
	2 = 3		2 = 2		2 = 5.25		2 = 3		2 = 2
	3 = 4.5		3 = 3		3 = 7.875		3 = 4.5		3 = 3
	4 = 6		4 = 4		4 = 10.5		4 = 6		4 = 4
20%	0 = 0	10%	0 = 0	20%	0 = 0	30%	0 = 0	11.10%	0 = 0
	1 = 1		1 = 1		1 = 1.75		1 = 1.5		1 = 1
	2 = 2		2 = 2		2 = 3.5		2 = 3		2 = 2
	3 = 3		3 = 3		3 = 5.25		3 = 4.5		3 = 3
	4 = 4		4 = 4		4 = 7.0		4 = 6		4 = 4
10%	0 = 0	10%	0 = 0						
	1 = 0.5		1 = 1						
	2 = 1		2 = 2						
	3 = 1.5		3 = 3						
	4 = 2		4 = 4						
				45%		40%			
20%	0 = 0	10%	0 = 0	50%	0 = 0	20%	0 = 0	11.10%	0 = 0
	1 = 2		1 = 1		1 = 8.4375		1 = 2		1 = 1
	2 = 4		2 = 2		2 = 11.25		2 = 4		2 = 2
	3 = 6		3 = 3		3 = 16.875		3 = 6		3 = 3
	4 = 8		4 = 4		4 = 22.5		4 = 8		4 = 4
80%	0 = 0	10%	0 = 0	50%	0 = 0	80%	0 = 0	11.10%	0 = 0
	1 = 8		1 = 1		1 = 8.4375		1 = 8		1 = 1
	2 = 16		2 = 2		2 = 11.25		2 = 16		2 = 2
	3 = 24		3 = 3		3 = 16.875		3 = 24		3 = 3
	4 = 32		4 = 4		4 = 22.5		4 = 32		4 = 4
				20%		40%			
33%	0 = 0	10%	0 = 0	25%	0 = 0	33%	0 = 0	11.10%	0 = 0
	1 = 3.25		1 = 1		1 = 1.25		1 = 3.25		1 = 1
	2 = 6.5		2 = 2		2 = 2.5		2 = 6.5		2 = 2
	3 = 9.75		3 = 3		3 = 3.75		3 = 9.75		3 = 3
	4 = 13		4 = 4		4 = 5		4 = 13		4 = 4
33%	0 = 0	10%	0 = 0	25%	0 = 0	33%	0 = 0	11.10%	0 = 0
	1 = 3.25		1 = 1		1 = 1.25		1 = 3.25		1 = 1
	2 = 6.5		2 = 2		2 = 2.5		2 = 6.5		2 = 2
	3 = 9.75		3 = 3		3 = 3.75		3 = 9.75		3 = 3
	4 = 13		4 = 4		4 = 5		4 = 13		4 = 4
34%	0 = 0	10%	0 = 0	50%	0 = 0	34%	0 = 0	11.10%	0 = 0
	1 = 3.5		1 = 1		1 = 2.5		1 = 3.5		1 = 1
	2 = 7		2 = 2		2 = 5		2 = 7		2 = 2
	3 = 10.5		3 = 3		3 = 7.5		3 = 10.5		3 = 3
	4 = 14		4 = 4		4 = 10		4 = 14		4 = 4

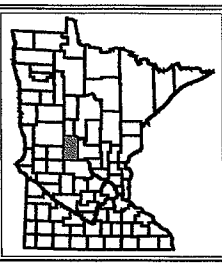
			JIM TOWNSHIP MODEL		BEN TOWNSHIP MODEL		EP
			MODEL 2 W/PARCELS		MODEL 1 W/PARCELS		MO
CATEGORY	DATASET	RANK	WEIGHT	VALUES	WEIGHT	VALUES	WE
LAND USE COMPATIBILITY	OVERALL WEIGHT:		35%		20%		
	MANURE APPLICATION	1 = 10-24%	25%	0 = 0	10%	0 = 0	
		2 = 25-49%		1 = 2.1875		1 = 0.5	
		3 = 50-74%		2 = 4.375		2 = 1	
		4 = 75-100%		3 = 6.5625		3 = 1.5	
				4 = 8.75		4 = 2	
	PROXIMITY TO CITIES	0 = <1 mile	10%	0 = 0	30%	0 = 0	
		3 = <2 miles		1 = 0.875		1 = 1.5	
		4 = >2 miles		2 = 1.75		2 = 3	
				3 = 2.625		3 = 4.5	
				4 = 3.5		4 = 6	
	RURAL RESIDENCES BY PLS40	0 = >10 sites	10%	0 = 0	30%	0 = 0	
		1 = 6-9 sites		1 = 0.875		1 = 1.5	
		2 = 3-5 sites		2 = 1.75		2 = 3	
		3 = 1-2 sites		3 = 2.625		3 = 4.5	
		4 = 0 sites		4 = 3.5		4 = 6	
	1989 LAND USE	0 = 0, 11, 50, 61, 71, 72, 73, 80, 99	20%	0 = 0	20%	0 = 0	
		1 = 12, 13, 14		1 = 1.75		1 = 1	
		2 = 41, 42		2 = 3.5		2 = 2	
		3 = 22, 23, 31, 32, 33		3 = 5.25		3 = 3	
		4 = 21		4 = 7.0		4 = 4	
	PARCEL SIZE	0 = <9.9 acres	35%	0 = 0	10%	0 = 0	
		2 = 10-19.9 acres		1 = 3.0625		1 = 0.5	
		3 = 20-39.9 acres		2 = 6.125		2 = 1	
		4 = >40 acres		3 = 9.1875		3 = 1.5	
				4 = 12.25		4 = 2	
SOIL SUITABILITY	OVERALL WEIGHT:		45%		40%		
	CORN YIELD	0 = <50 bushels	50%	0 = 0	20%	0 = 0	
		1 = 50-74 bushels		1 = 8.4375		1 = 2	
		3 = 75-99 bushels		2 = 11.25		2 = 4	
		4 = >100 bushels		3 = 16.875		3 = 6	
				4 = 22.5		4 = 8	
	LAND CAPABILITY INDEX	0 = 6e, 6s, 6w, 7s, 8w, nodata	50%	0 = 0	80%	0 = 0	
		1 = 4e, 4s, 4w		1 = 8.4375		1 = 8	
		2 = 3e, 3s, 3w		2 = 11.25		2 = 16	
		3 = 2e, 2s, 2w		3 = 16.875		3 = 24	
		4 = 1, 1w		4 = 22.5		4 = 32	
ENVIRONMENTAL SUITABILITY	OVERALL WEIGHT:		20%		40%		
	FEMA FLOODPLAINS	0 = fema floodplain	25%	0 = 0	33%	0 = 0	
		4 = all other land		1 = 1.25		1 = 3.25	
				2 = 2.5		2 = 6.5	
				3 = 3.75		3 = 9.75	
				4 = 5		4 = 13	
	WATER BUFFERS	1 = buffers	25%	0 = 0	33%	0 = 0	
		4 = all other land		1 = 1.25		1 = 3.25	
				2 = 2.5		2 = 6.5	
				3 = 3.75		3 = 9.75	
				4 = 5		4 = 13	
	NATIONAL WETLANDS INVENTORY	0 = type 80 & 90	50%	0 = 0	34%	0 = 0	
		2 = type 3-8		1 = 2.5		1 = 3.5	
		3 = type 1 & 2		2 = 5		2 = 7	
		4 = all other land		3 = 7.5		3 = 10.5	
				4 = 10		4 = 14	

MODEL INFORMATION & REFERENCE MAP

Description: This map is a locational reference for the other dataset maps used in the 5 models created.

Ten datasets were used to help determine suitability for agricultural land preservation within Todd County. Each dataset was converted into 30 meter squares; each square or pixel was ranked from 0 to 4 based on the datasets' attributes. Each of the following datasets were weighted as a percent of 100.





Map Produced for:
Todd County Planning & Zoning
AG Land Preservation Project

Map Created by:
Todd County GIS & Land Services
215 1st Ave S - Suite 202
Long Prairie, MN 56347
320-732-4248

August 2003

AG LAND PRESERVATION MODEL

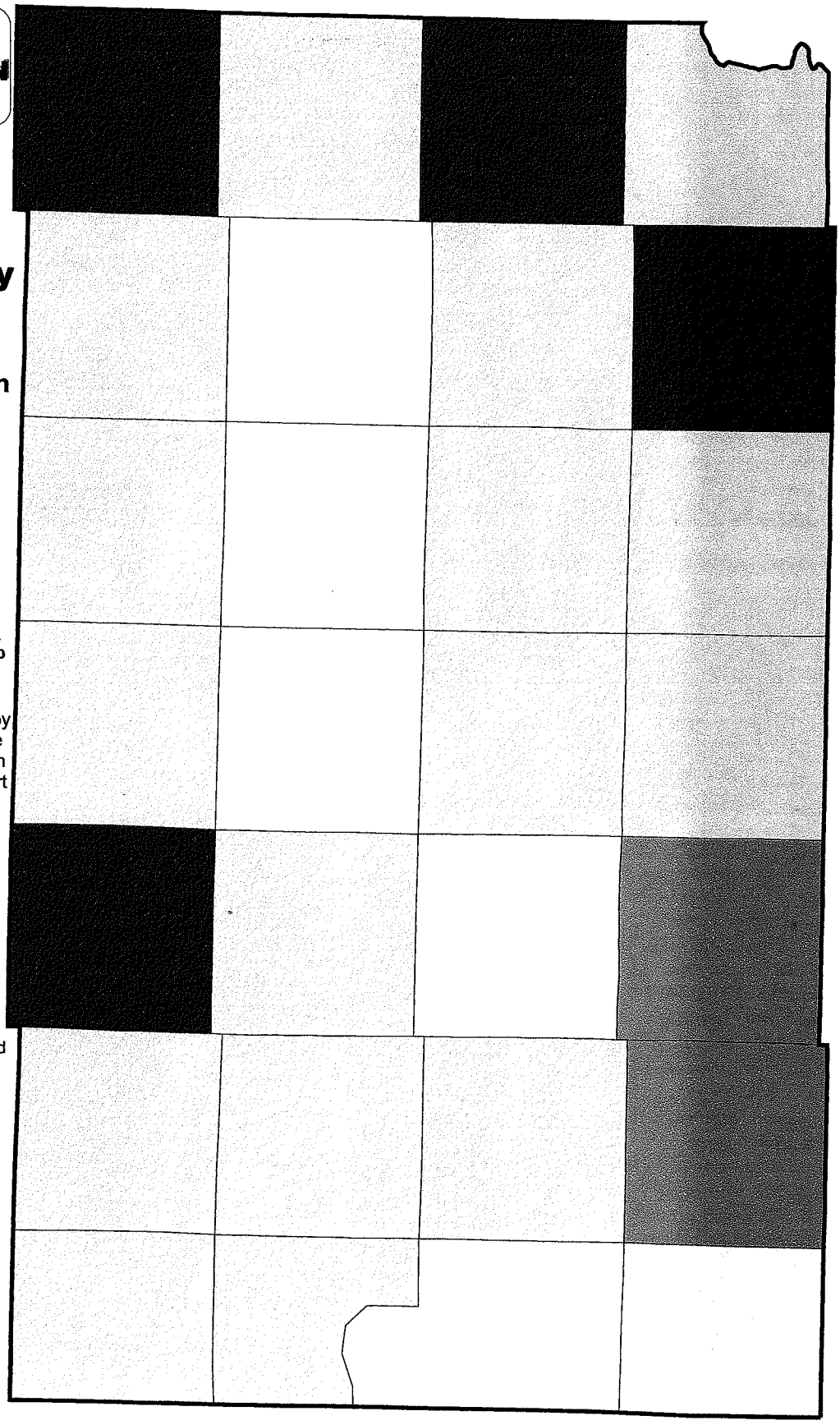
Land Use Compatibility

Need for manure application by township

(percent of township needed)

Feedapp.shp

- 1 = 10-24%
- 2 = 25-49%
- 3 = 50-74%
- 4 = 75-100%



Map Resources:
This dataset summarizes by township the percent of the cultivated lands within each township needed to support existing feedlots.
The manure application model is intended to identify those cultivated lands that are needed by feedlot operations in order to spread the manure. It is assumed that 1 acre of cultivated land is needed per animal unit.

4 indicates areas most suited for agricultural land use.

0 indicates least suitability for agricultural land use.

TODD COUNTY
MINNESOTA
Todd County GIS & Land Services
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Long Prairie, MN 56347
320-732-4248
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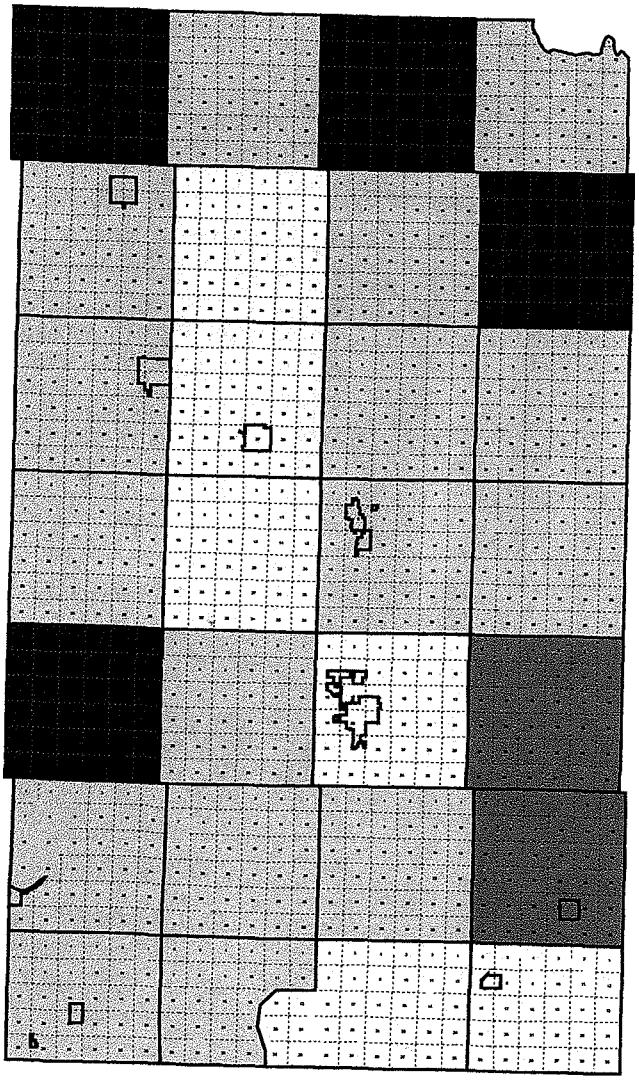
The Todd County GIS & Land Services department has made every effort to provide the most up-to-date information available in this publication and cannot be held responsible for any unforeseen errors or omissions.

MANURE APPLICATION

Description: Percent of township needed for manure application on cultivated lands; based on the number of animal units per feedlot in 2002 and cultivated lands from the 1989 land use information.

Ranking System based on percent of cultivated acres needed for manure application within each township.

- **0 : nodata**
- **1 : 10-24%**
- **2 : 25-49%**
- **3 : 50-74%**
- **4 : 75-100%**



TOTAL WEIGHT OF DATASET:

MODEL 1 - BY COUNTY:	2%
MODEL 1 - BY TOWNSHIP:	2%
MODEL 2 - BY COUNTY:	12.25%
MODEL 2 - BY TOWNSHIP:	8.75%
MODEL 3 - WITH PARCELS:	10%
MODEL 3 - WITHOUT PARCELS:	11.1%

AG LAND PRESERVATION MODEL

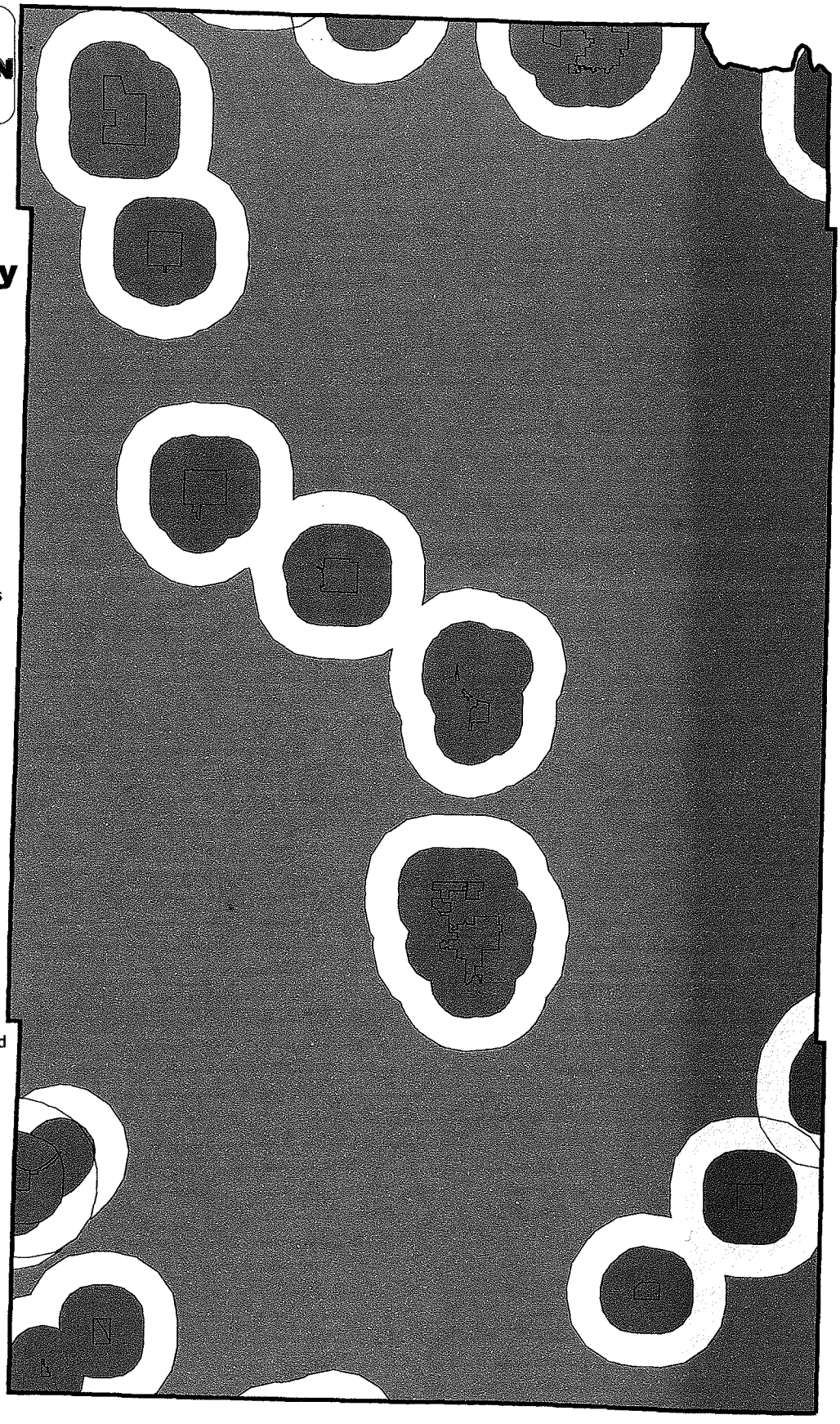
Land Use Compatibility

Proximity to Cities

Proxcity.shp

- 0 = < 1 mile
- 3 = < 2 miles
- 4 = > 2 miles

Map Resources:
The municipal boundaries within Todd County were developed for the Todd County 911 System. Municipal boundaries outside Todd County were taken from the 1999 MN Basemap developed by MNDot.



4 indicates areas most suited for agricultural land use.

0 indicates least suitability for agricultural land use.

TODD COUNTY
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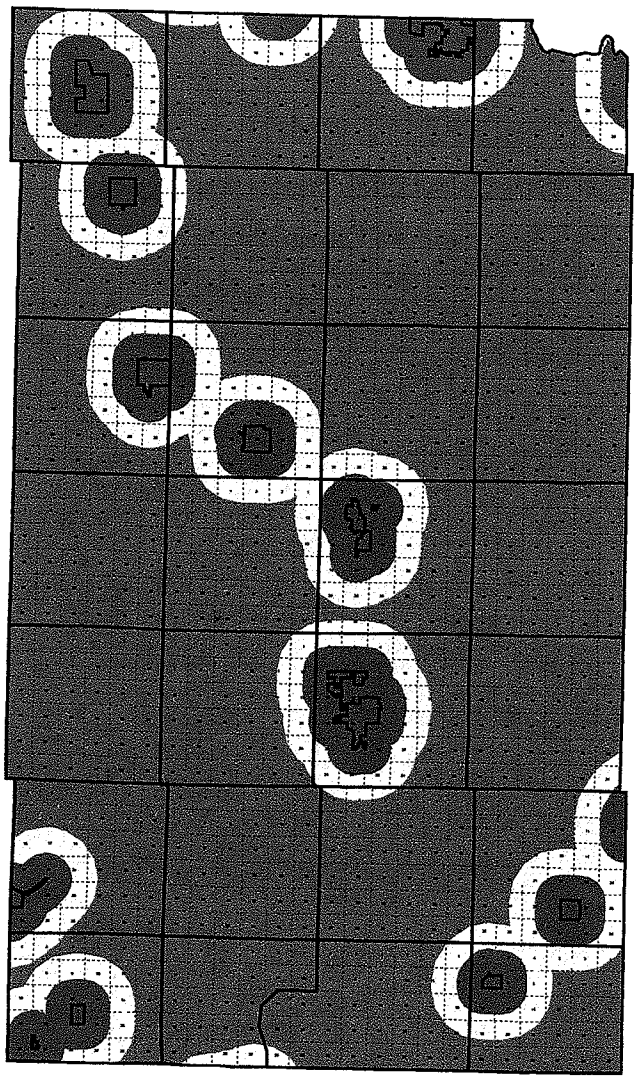
PROXIMITY TO CITIES

Description: Buffered all cities including those in adjacent counties if the 1 mile or 2 mile buffer effected Todd County.

Ranking System based on distance from city.

- **0 : <1 mile**
- **1 : nodata**
- **2 : nodata**
- **3 : <2 miles**
- **4 : >2 miles**



TOTAL WEIGHT OF DATASET:

MODEL 1 - BY COUNTY:	6%
MODEL 1 - BY TOWNSHIP:	6%
MODEL 2 - BY COUNTY:	5.25%
MODEL 2 - BY TOWNSHIP:	4.3%
MODEL 3 - WITH PARCELS:	10%
MODEL 3 - WITHOUT PARCELS:	11.1%

AG LAND PRESERVATION MODEL

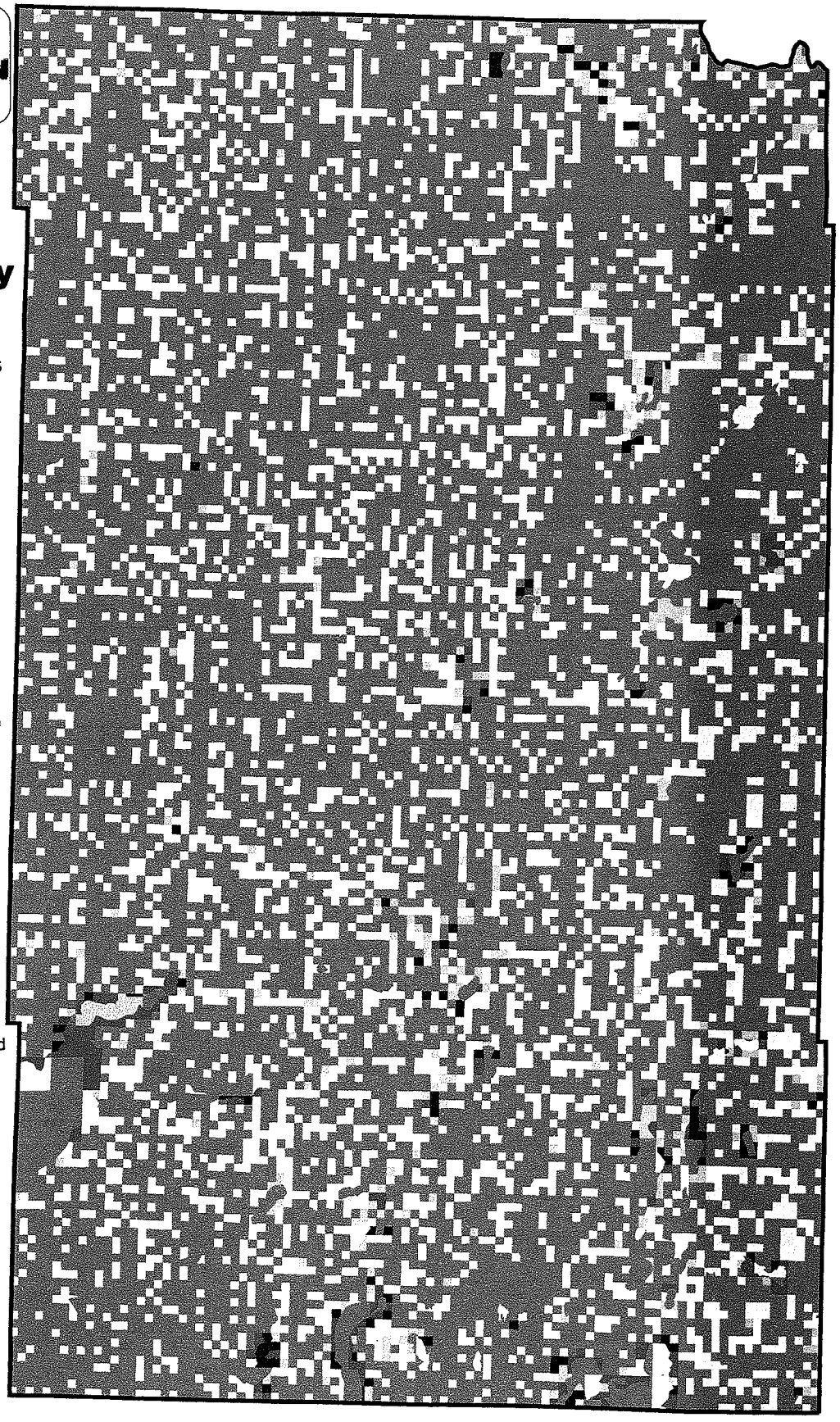
Land Use Compatibility

Rural Residences by PLS 40's

Rr_pls40.shp

- 0 = > 10 sites
- 1 = 6 - 9 sites
- 2 = 3 - 5 sites
- 3 = 1 - 2 sites
- 4 = 0 sites

Map Resources:
Used the PLS 40 dataset developed by MNDot and the building sites from the Todd County 911 System to determine the number of rural residences within each PLS 40 polygon.



4 indicates areas most suited for agricultural land use.

0 indicates least suitability for agricultural land use.

TODD COUNTY
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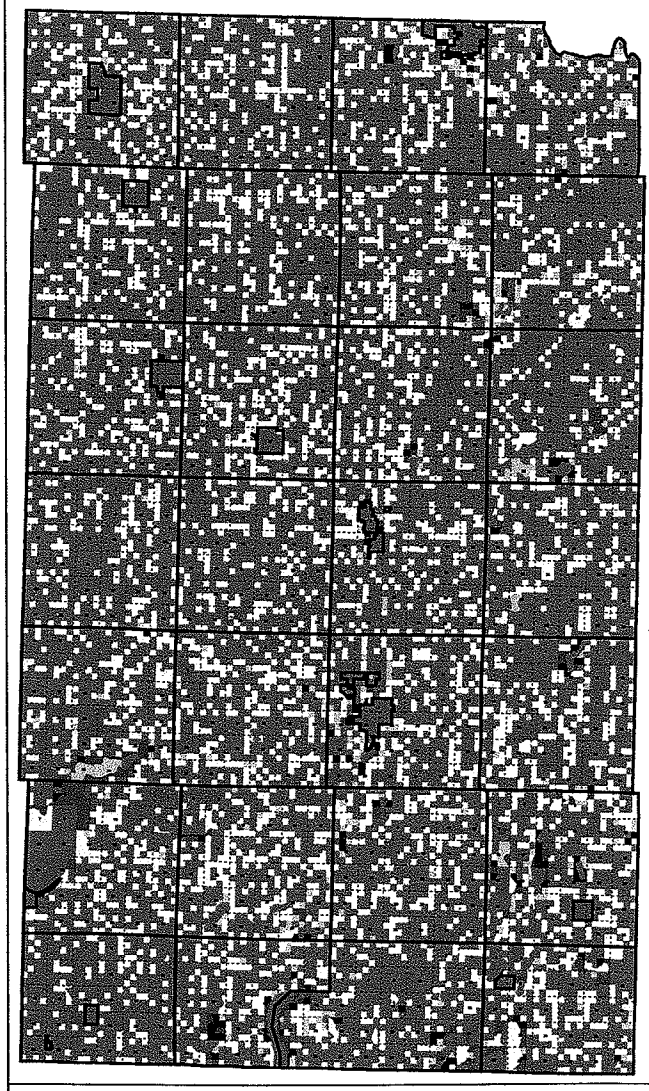
RURAL RESIDENCES BY PLS40

Description: Number of rural residences within each Public Land Survey 40 or government lot; based on May 2003 building site information from the E911 System.

Ranking System based on number of sites within PLS 40.

- **0 : >10 sites**
- **1 : 6-9 sites**
- **2 : 3-5 sites**
- **3 : 1-2 sites**
- **4 : 0 sites**



TOTAL WEIGHT OF DATASET:

MODEL 1 - BY COUNTY:	6%
MODEL 1 - BY TOWNSHIP:	6%
MODEL 2 - BY COUNTY:	10.5%
MODEL 2 - BY TOWNSHIP:	3.5%
MODEL 3 - WITH PARCELS:	10%
MODEL 3 - WITHOUT PARCELS:	11.1%

AG LAND PRESERVATION MODEL

Land Use Compatibility

89 Land Use

Landus89.shp

- 0 = 0, 11, 50, 61, 71, 72, 73, 80, 99
- 1 = 12, 13, 14
- 2 = 41, 42
- 3 = 22, 23, 31, 32, 33
- 4 = 21

Map Resources:
1989 Land Cover from The International Coalition Land Use/Cover

4 indicates areas most suited for agricultural land use.

0 indicates least suitability for agricultural land use.

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1989 LAND USE

Description: 1989 Land Use / Land Cover from the International Coalition.

Ranking System based on the land use codes.

- **0 : (11) urban & industrial, (50) water, (61) wetlands, (71-73, 80, & 99) miscellaneous**
- **1 : (12-14) farmsteads, rural residential, & other rural developments**
- **2 : (41&42) forest**
- **3 : (22) pasture land, (23) transitional ag land, (31-33) grasslands & grass-shrub-tree complex**
- **4 : (21) cultivated land**

TOTAL WEIGHT OF DATASET:

MODEL 1 - BY COUNTY:	6%
MODEL 1 - BY TOWNSHIP:	4%
MODEL 2 - BY COUNTY:	7%
MODEL 2 - BY TOWNSHIP:	7%
MODEL 3 - WITH PARCELS:	10%
MODEL 3 - WITHOUT PARCELS:	11.1%

AG LAND PRESERVATION MODEL

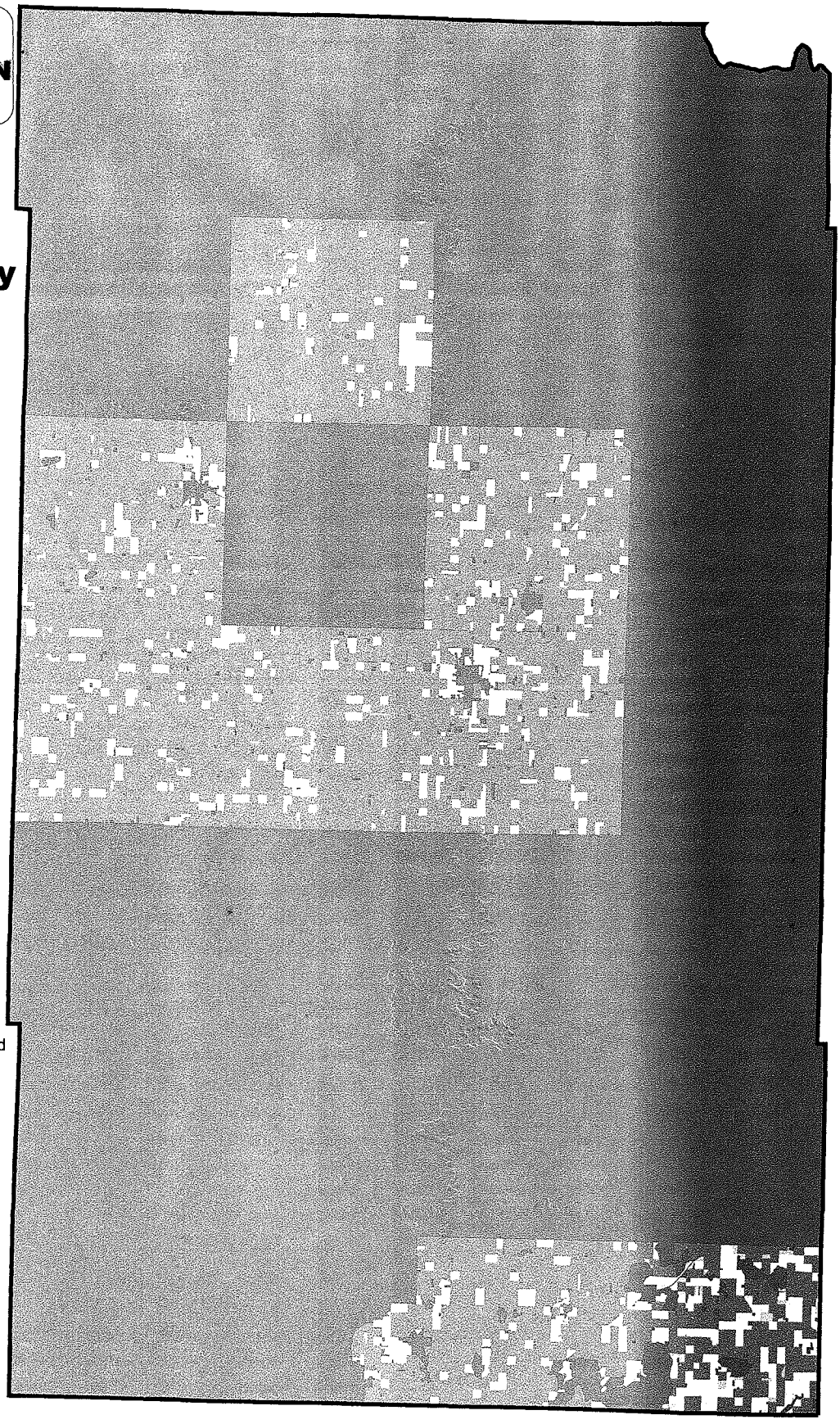
Land Use Compatibility

Parcel Size

Parcels.shp

- 0 = < 9.9 acres
- 2 = 10 - 19.9
- 3 = 20 - 39.9
- 4 = > 40 acres

Map Resources:
Todd County has a digital parcel layer for 8 of the 28 townships in the county. Parcels were drawn based on the legal description.



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0 indicates least suitability for agricultural land use.

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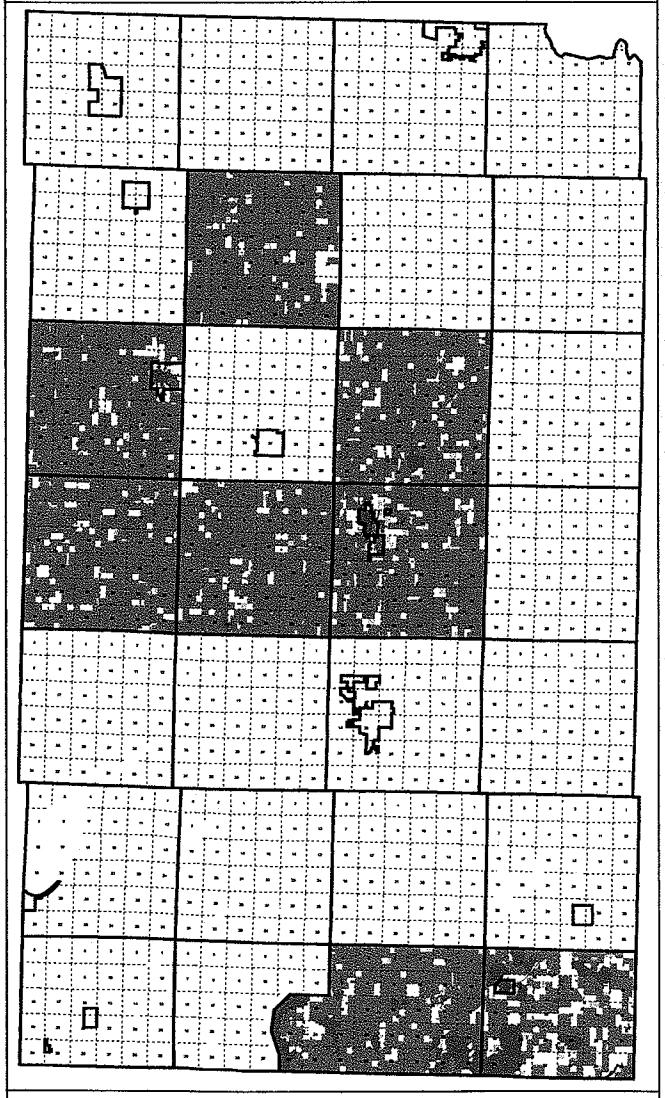
PARCEL SIZE

Description: Parcel size based on the digital parcel mapping completed for 8 townships within Todd County.

Ranking System based on parcel size in acres.

- **0 : <9.9 acres**
- **1 : nodata**
- **2 : 10-19.9 acres**
- **3 : 20-39.9 acres**
- **4 : >40 acres**



TOTAL WEIGHT OF DATASET:

MODEL 1 - BY COUNTY:	0%
MODEL 1 - BY TOWNSHIP:	2%
MODEL 2 - BY COUNTY:	0%
MODEL 2 - BY TOWNSHIP:	12.25%
MODEL 3 - WITH PARCELS:	10%
MODEL 3 - WITHOUT PARCELS:	0%

AG LAND PRESERVATION MODEL

Soil Suitability

Corn Yield

Cornyld.shp

- 0 = < 50 bushels
- 1 = 50 - 74
- 3 = 75 - 99
- 4 = > 100 bushels

Map Resources:
Used the corn yield attribute data to display Todd County soils developed by the NRCS

4 indicates areas most suited for agricultural land use.

0 indicates least suitability for agricultural land use.

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CORN YIELD

Description: Corn yield based on the USDA NRCS Soil Survey report tables.

Ranking System based on bushels of corn yield per soil type.

- **0 : <50 bushels**
- **1 : 50-74 bushels**
- **2 : nodata**
- **3 : 75-99 bushels**
- **4 : >100 bushels**

TOTAL WEIGHT OF DATASET:

MODEL 1 - BY COUNTY:	8%
MODEL 1 - BY TOWNSHIP:	8%
MODEL 2 - BY COUNTY:	22.5%
MODEL 2 - BY TOWNSHIP:	22.5%
MODEL 3 - WITH PARCELS:	10%
MODEL 3 - WITHOUT PARCELS:	11.1%

AG LAND PRESERVATION MODEL

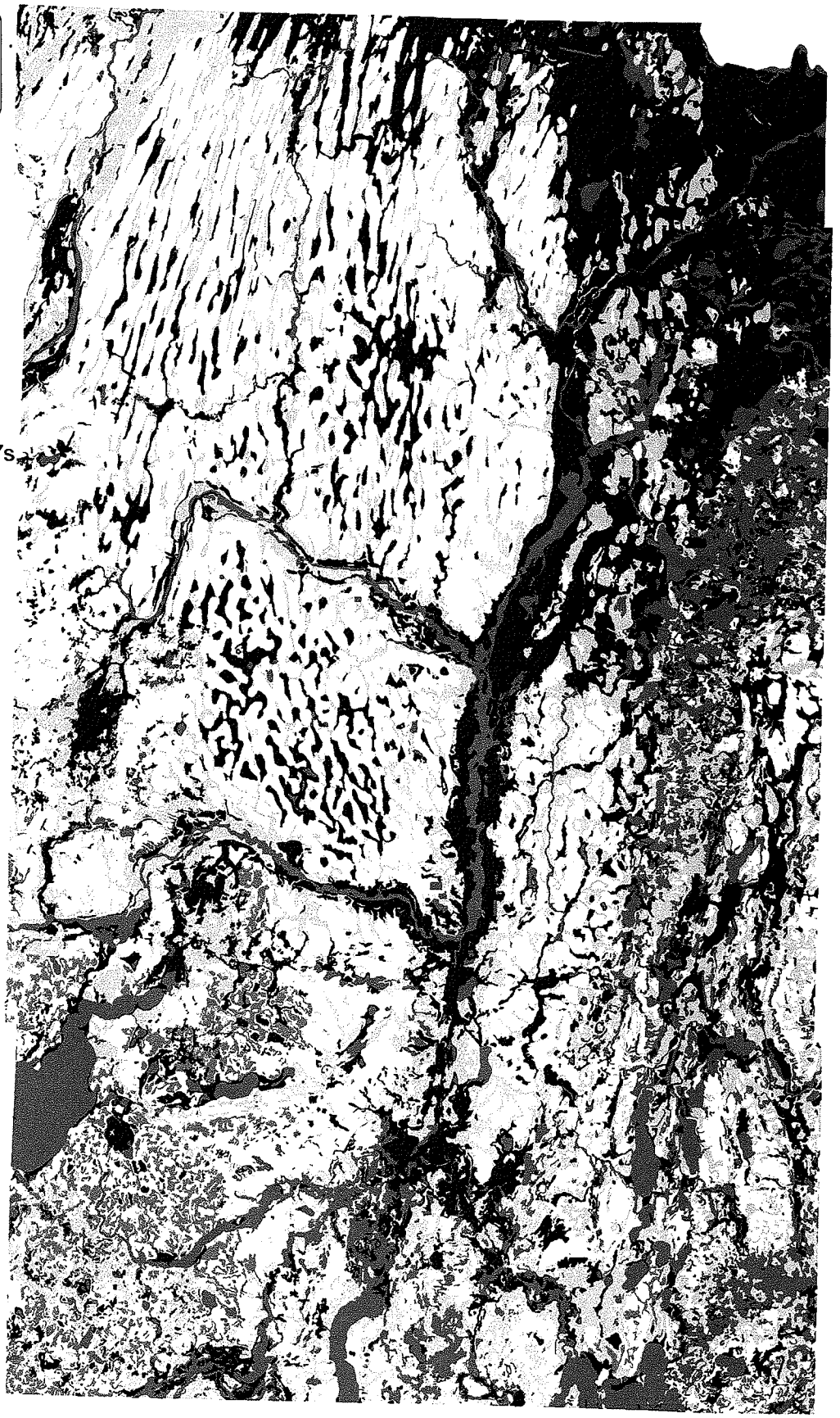
Soil Suitability

Land Capability Index

Landcap.shp

- 0 = 6e, 6s, 6w, 7s, 8w, nodata
- 1 = 4e, 4s, 4w
- 2 = 3e, 3s, 3w
- 3 = 2e, 2s, 2w
- 4 = 1, 1w

Map Resources:
Used the land capability index attribute data to display Todd County soils developed by the NRCS.



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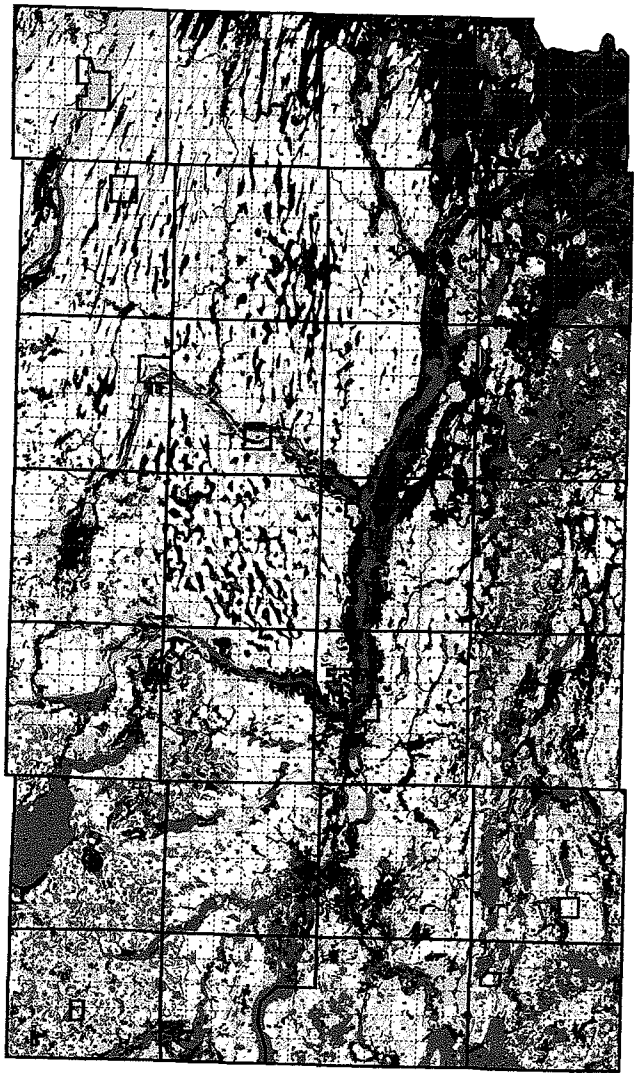
LAND CAPABILITY INDEX

Description: Land capability index based on the USDA NRCS Soil Survey report tables.

Ranking System based on the suitability of soils for most kinds of field crops.

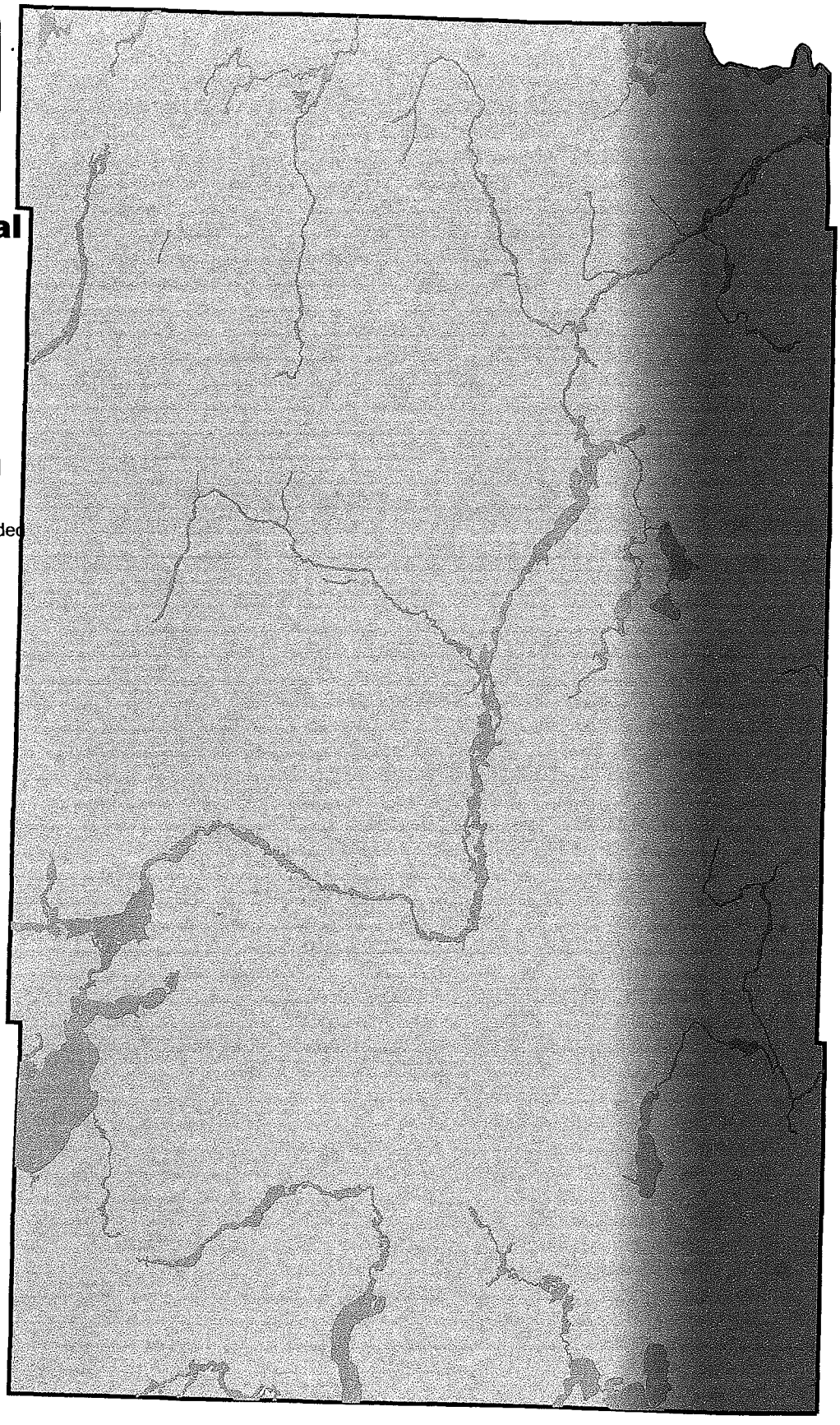
- **0 : Class VI, VII, VIII soils which are unsuitable for cultivation**
- **1 : Class IV soils which have very severe limitations**
- **2 : Class III soils which have severe limitations**
- **3 : Class II soils which have moderate limitations**
- **4 : Class I soils which have few limitation to restrict use for cultivation**



TOTAL WEIGHT OF DATASET:

MODEL 1 - BY COUNTY:	32%
MODEL 1 - BY TOWNSHIP:	32%
MODEL 2 - BY COUNTY:	22.5%
MODEL 2 - BY TOWNSHIP:	22.5%
MODEL 3 - WITH PARCELS:	10%
MODEL 3 - WITHOUT PARCELS:	11.1%

AG LAND PRESERVATION MODEL



Environmental Suitability

FEMA Floodplains

nwi.shp

0 = floodplain
4 = all other land

Map Resources:
Floodplain information provided by FEMA.
Note that FEMA Floodplains may not be complete or spatially accurate.

4 indicates areas most suited for agricultural land use.

0 indicates least suitability for agricultural land use.

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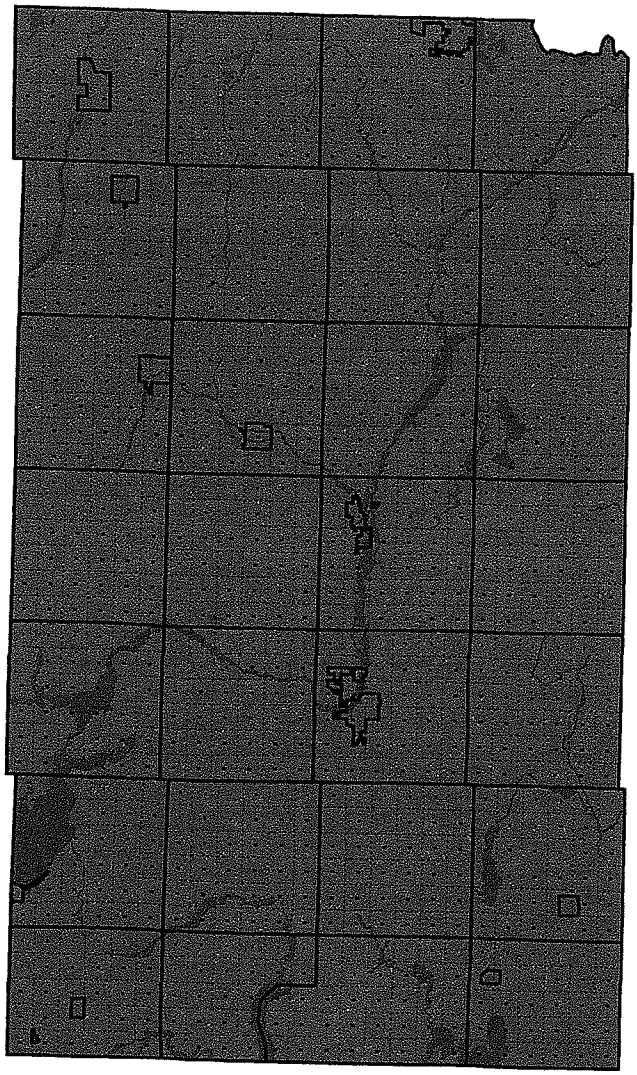
FEMA FLOODPLAINS

Description: Floodplain information from the Federal Emergency Management Agency .

Ranking System based on whether an area is or is not in a floodplain.

- **0 : FEMA floodplain**
- **1 : nodata**
- **2 : nodata**
- **3 : nodata**
- **4 : all other land**



TOTAL WEIGHT OF DATASET:

MODEL 1 - BY COUNTY:	13%
MODEL 1 - BY TOWNSHIP:	13%
MODEL 2 - BY COUNTY:	5%
MODEL 2 - BY TOWNSHIP:	5%
MODEL 3 - WITH PARCELS:	10%
MODEL 3 - WITHOUT PARCELS:	11.1%

AG LAND PRESERVATION MODEL

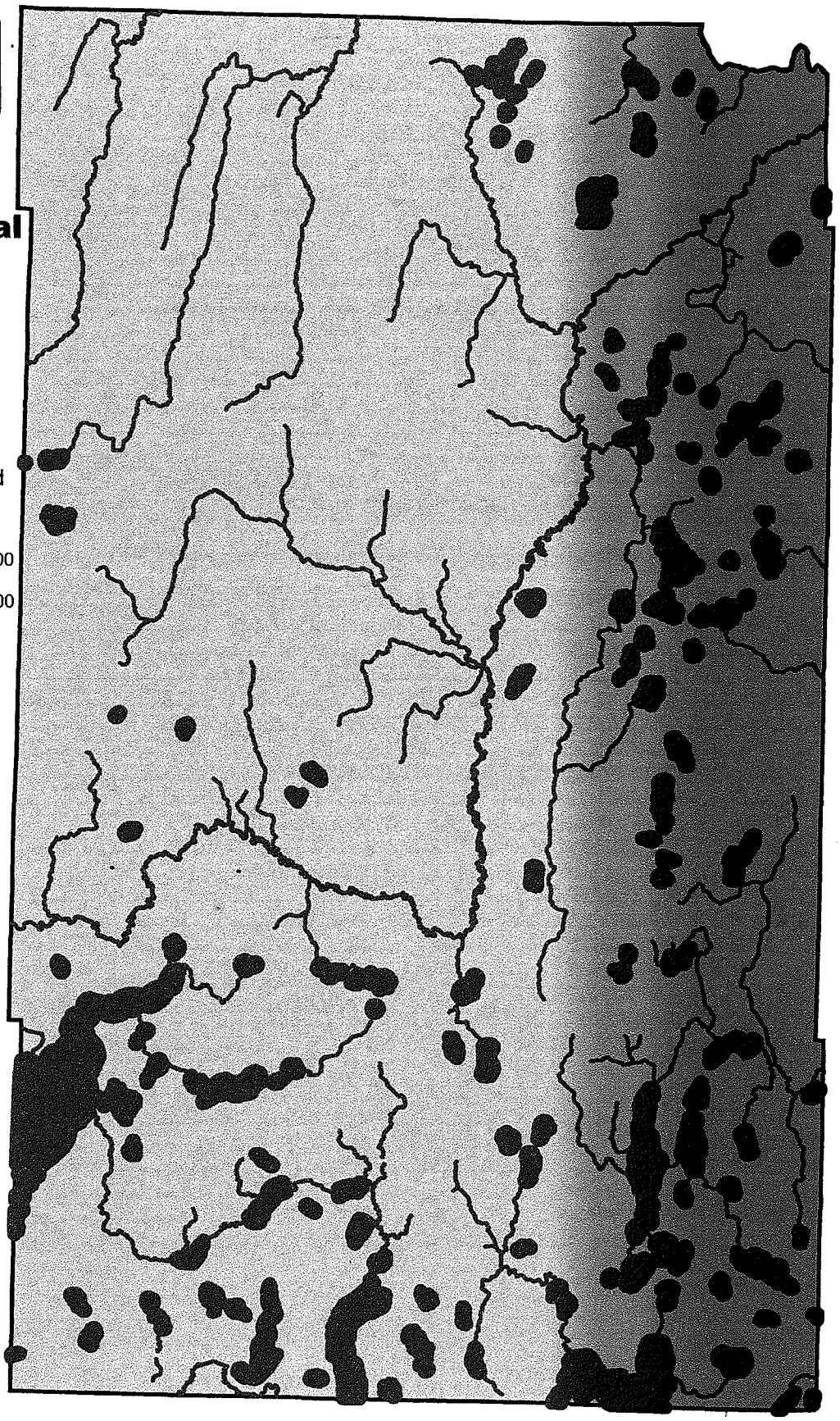
Environmental Suitability

Water Buffers

buffers.shp

1 = water buffer
4 = all other land

Map Resources:
This dataset consists of a 300 foot buffer around DNR protected streams and a 1000 foot buffer around DNR protected lakes.



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0 indicates least suitability for agricultural land use.

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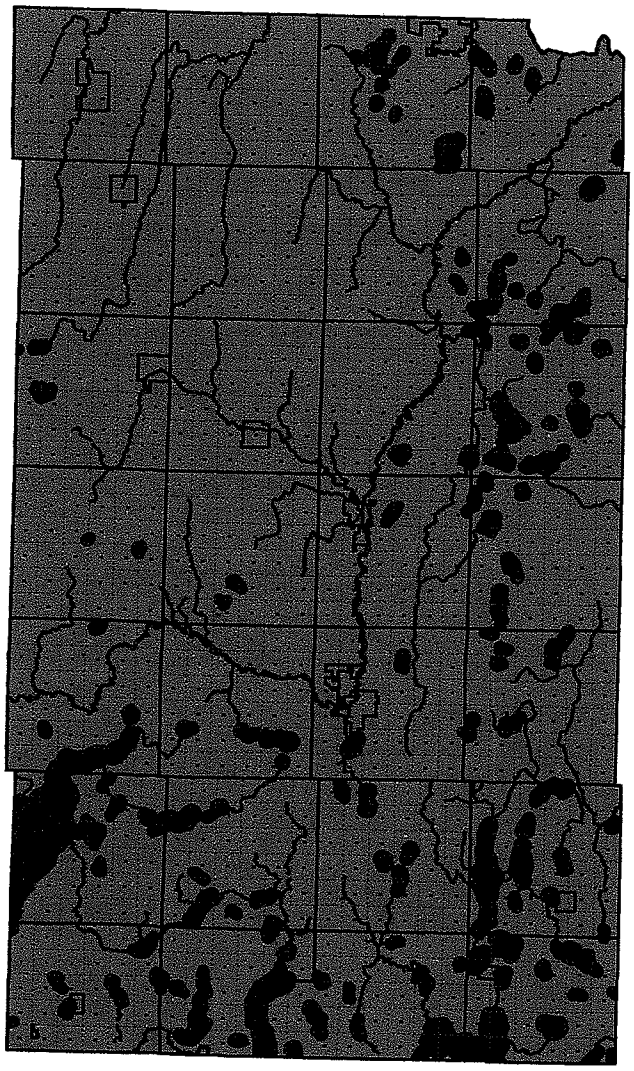
WATER BUFFERS

Description: 300ft buffer around DNR Protected Streams and 1000ft buffer around DNR Protected Lakes.

Ranking System based on whether an area is or is not within a water body buffer.

- **0 : nodata**
- **1 : water body buffer**
- **2 : nodata**
- **3 : nodata**
- **4 : all other land**



TOTAL WEIGHT OF DATASET:

MODEL 1 - BY COUNTY:	13%
MODEL 1 - BY TOWNSHIP:	13%
MODEL 2 - BY COUNTY:	5%
MODEL 2 - BY TOWNSHIP:	5%
MODEL 3 - WITH PARCELS:	10%
MODEL 3 - WITHOUT PARCELS:	11.1%

AG LAND PRESERVATION MODEL

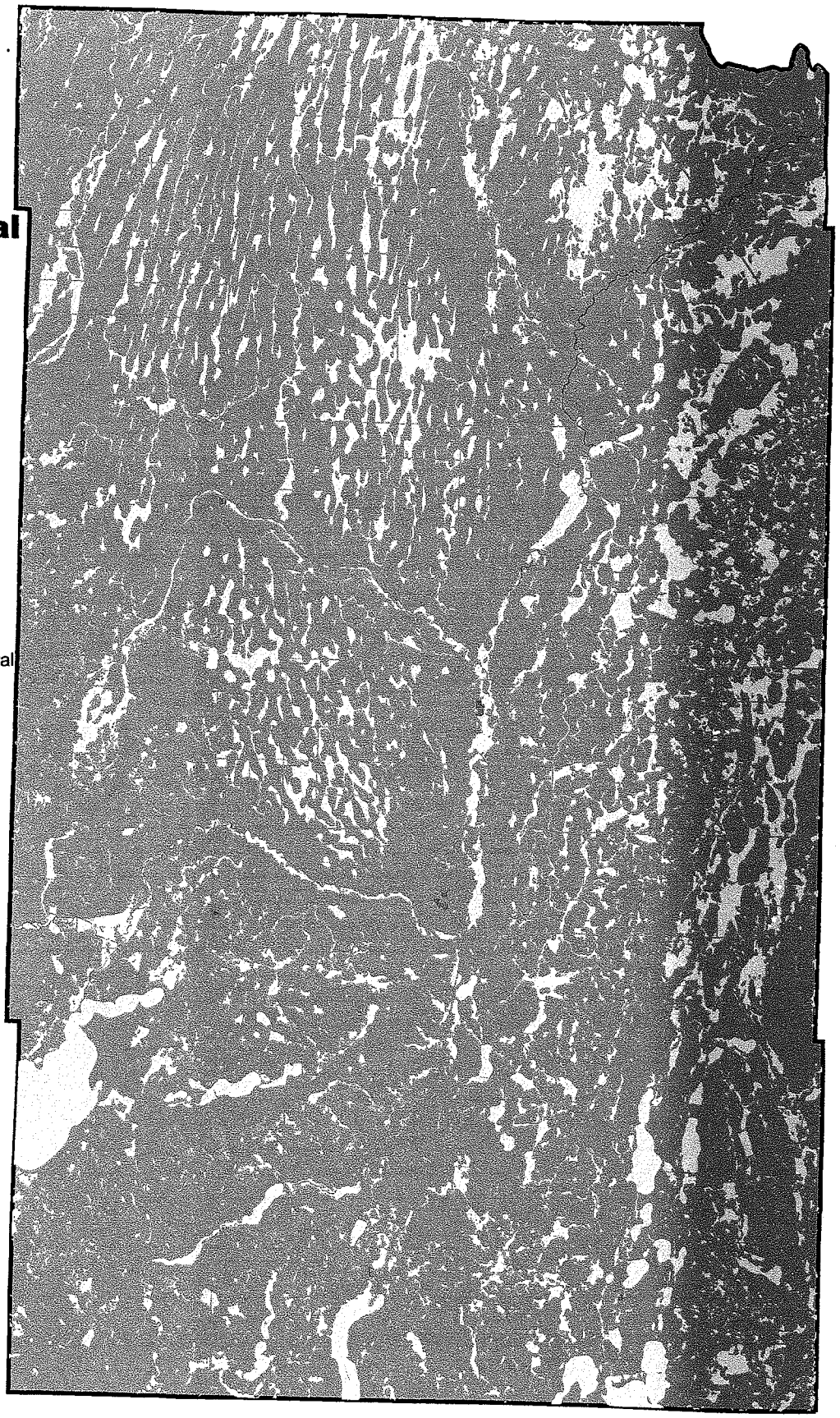
Environmental Suitability

National Wetland Inventory

nwi.shp

- 0 = type 80 & 90
- 2 = type 3 - 8
- 3 = type 1 & 2
- 4 = all other land

Map Resources:
The National Wetland Inventory CIRC39 classification was ranked for its suitability for agricultural land use.



4 indicates areas most suited for agricultural land use.

0 indicates least suitability for agricultural land use.

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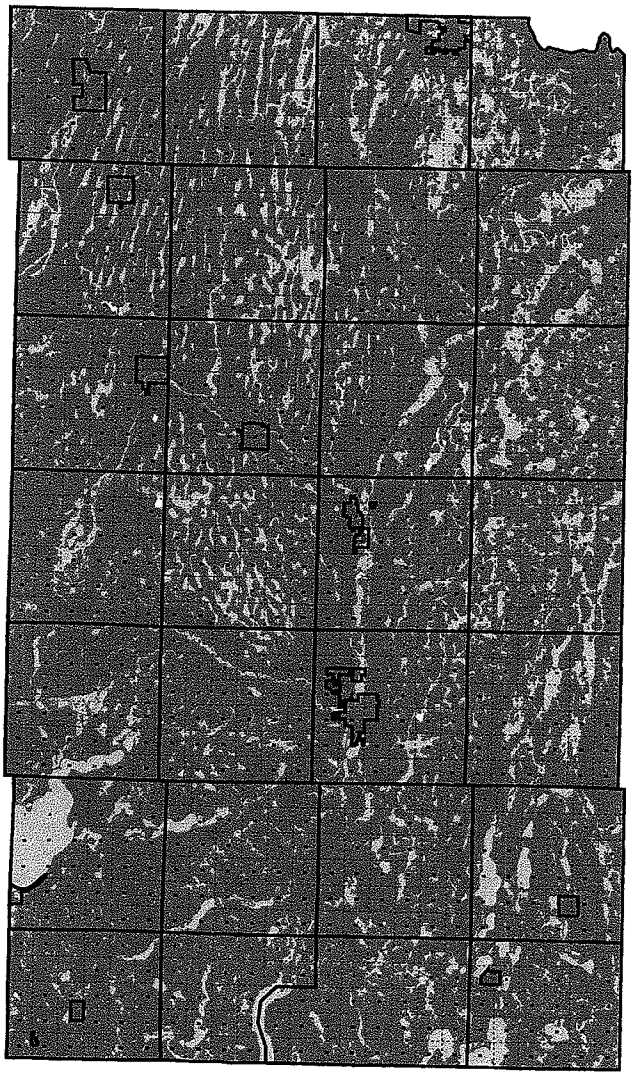
NATIONAL WETLANDS INVENTORY

Description: The National Wetlands Inventory has been developed by the US Fish & Wildlife Service in order to classify wetlands for resource assessment.

Ranking System is based on the Circular 39 classification codes.

- **0 : Type 80 & 90 which are open water and riverine systems**
- **1 : nodata**
- **2 : Type 3-8 which includes shallow & deep marshes, shallow ponds, shrub & wooded swamps, and bogs**
- **3 : Type 1&2 which are seasonally flooded basin and wet meadows**
- **4 : all other land**



TOTAL WEIGHT OF DATASET:

MODEL 1 - BY COUNTY:	14%
MODEL 1 - BY TOWNSHIP:	14%
MODEL 2 - BY COUNTY:	10%
MODEL 2 - BY TOWNSHIP:	10%
MODEL 3 - WITH PARCELS:	10%
MODEL 3 - WITHOUT PARCELS:	11.1%

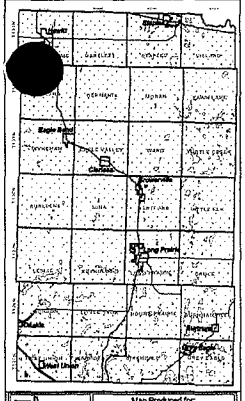
AGRICULTURAL LAND PRESE

MODEL INFORMATION

Description: This map is a locational reference for the other dataset maps used in the 6 models created.

Ten datasets were used to help determine suitability for agricultural land preservation within Todd County. Each dataset was converted into 30 meter squares; each square or pixel was ranked from 0 to 4 based on the datasets' attributes. Each of the following datasets were weighted as a percent of 100.

TODD COUNTY, MINNESOTA



Map Produced for:
Todd County Planning & Zoning
AG Land Preservation Project

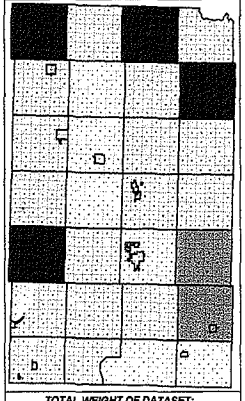
Map Created by:
Todd County GIS & Land Services
215 1st Ave S - Suite 202
Long Prairie, MN 56347
320-732-4246

MANURE APPLICATION

Description: Percent of township needed for manure application on cultivated lands; based on the number of animal units per feedlot in 2002 and cultivated lands from the 1989 land use information.

Ranking System based on percent of cultivated acres needed for manure application within each township.

- 0 : nodata
- 1 : 10-24%
- 2 : 25-49%
- 3 : 50-74%
- 4 : 75-100%



TOTAL WEIGHT OF DATASET:

MODEL 1 - BY COUNTY:	2%
MODEL 1 - BY TOWNSHIP:	2%
MODEL 2 - BY COUNTY:	12.25%
MODEL 2 - BY TOWNSHIP:	8.75%
MODEL 3 - WITH PARCELS:	10%
MODEL 3 - WITHOUT PARCELS:	11.1%

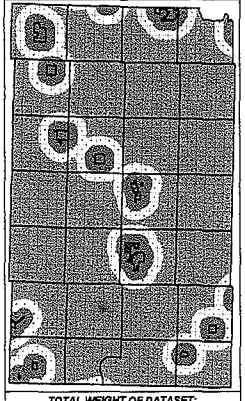
+

PROXIMITY TO CITIES

Description: Buffered all cities including those in adjacent counties if the 1 mile or 2 mile buffer effected Todd County.

Ranking System based on distance from city.

- 0 : <1 mile
- 1 : nodata
- 2 : nodata
- 3 : <2 miles
- 4 : >2 miles



TOTAL WEIGHT OF DATASET:

MODEL 1 - BY COUNTY:	6%
MODEL 1 - BY TOWNSHIP:	6%
MODEL 2 - BY COUNTY:	5.25%
MODEL 2 - BY TOWNSHIP:	4.3%
MODEL 3 - WITH PARCELS:	10%
MODEL 3 - WITHOUT PARCELS:	11.1%

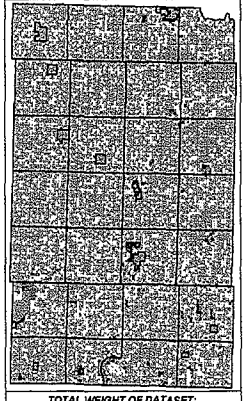
+

RURAL RESIDENCES BY PLS40

Description: Number of rural residences within each Public Land Survey 40 or government lot; based on May 2003 building site information from the E911 System.

Ranking System based on number of sites within PLS 40.

- 0 : >10 sites
- 1 : 6-9 sites
- 2 : 3-5 sites
- 3 : 1-2 sites
- 4 : 0 sites



TOTAL WEIGHT OF DATASET:

MODEL 1 - BY COUNTY:	6%
MODEL 1 - BY TOWNSHIP:	6%
MODEL 2 - BY COUNTY:	10.5%
MODEL 2 - BY TOWNSHIP:	3.5%
MODEL 3 - WITH PARCELS:	10%
MODEL 3 - WITHOUT PARCELS:	11.1%

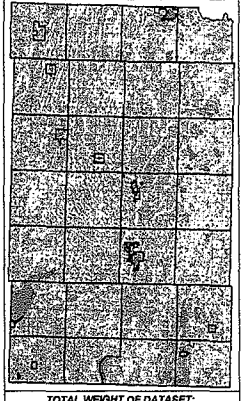
+

1989 LAND USE

Description: 1989 Land Use / Land Cover from the International Coalition.

Ranking System based on the land use codes.

- 0 : (11) urban & industrial, (50) water, (81) wetlands, (71-73, 80, & 90) miscellaneous
- 1 : (12-14) farmsteads, rural residential, & other rural developments
- 2 : (41&42) forest
- 3 : (23) pasture land, (22) transitional ag land, (31-33) grasslands & grass-shrub-tree complex
- 4 : (21) cultivated land



TOTAL WEIGHT OF DATASET:

MODEL 1 - BY COUNTY:	6%
MODEL 1 - BY TOWNSHIP:	4%
MODEL 2 - BY COUNTY:	7%
MODEL 2 - BY TOWNSHIP:	7%
MODEL 3 - WITH PARCELS:	10%
MODEL 3 - WITHOUT PARCELS:	11.1%

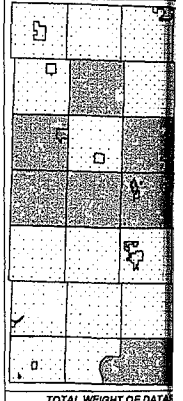
+

PARCEL SIZ

Description: Parcel size based on p parcel mapping completed for 8 town within Todd County.

Ranking System based on parcel size

- 0 : <9.9 acres
- 1 : nodata
- 2 : 10-19.9 acres
- 3 : 20-39.9 acres
- 4 : >40 acres



TOTAL WEIGHT OF DATA

MODEL 1 - BY COUNTY:	
MODEL 1 - BY TOWNSHIP:	
MODEL 2 - BY COUNTY:	
MODEL 2 - BY TOWNSHIP:	
MODEL 3 - WITH PARCELS:	
MODEL 3 - WITHOUT PARCELS:	

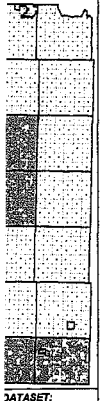
:RVATION MODEL FORMULA

SIZE

d on the digital 8 townships

el size in acres.

es
acres
acres
es



DATASET:

	0%
	2%
	0%
	12.25%
S:	10%
CELS:	0%

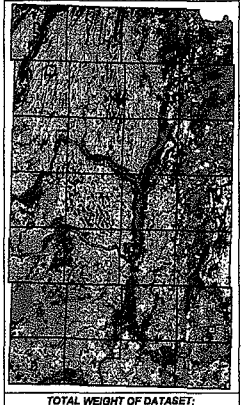
+

CORN YIELD

Description: Corn yield based on the USDA NRCS Soil Survey report tables.

Ranking System based on bushels of corn yield per soil type.

- 0 : <50 bushels
- 1 : 50-74 bushels
- 2 : nodata
- 3 : 75-99 bushels
- 4 : >100 bushels



TOTAL WEIGHT OF DATASET:

MODEL 1 - BY COUNTY:	8%
MODEL 1 - BY TOWNSHIP:	8%
MODEL 2 - BY COUNTY:	22.5%
MODEL 2 - BY TOWNSHIP:	22.5%
MODEL 3 - WITH PARCELS:	10%
MODEL 3 - WITHOUT PARCELS:	11.1%

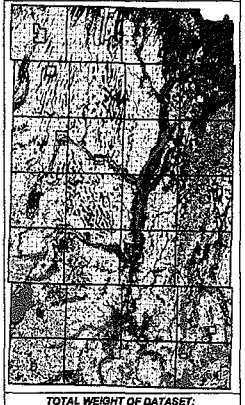
+

LAND CAPABILITY INDEX

Description: Land capability index based on the USDA NRCS Soil Survey report tables.

Ranking System based on the suitability of soils for most kinds of field crops.

- 0 : Class VI, VII, VIII soils which are unsuitable for cultivation
- 1 : Class IV soils which have very severe limitations
- 2 : Class III soils which have severe limitations
- 3 : Class II soils which have moderate limitations
- 4 : Class I soils which have few limitation to restrict use for cultivation



TOTAL WEIGHT OF DATASET:

MODEL 1 - BY COUNTY:	32%
MODEL 1 - BY TOWNSHIP:	32%
MODEL 2 - BY COUNTY:	22.5%
MODEL 2 - BY TOWNSHIP:	22.5%
MODEL 3 - WITH PARCELS:	10%
MODEL 3 - WITHOUT PARCELS:	11.1%

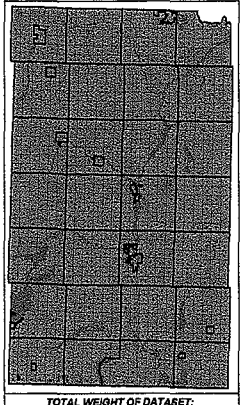
+

FEMA FLOODPLAINS

Description: Floodplain information from the Federal Emergency Management Agency .

Ranking System based on whether an area is or is not in a floodplain.

- 0 : FEMA floodplain
- 1 : nodata
- 2 : nodata
- 3 : nodata
- 4 : all other land



TOTAL WEIGHT OF DATASET:

MODEL 1 - BY COUNTY:	13%
MODEL 1 - BY TOWNSHIP:	13%
MODEL 2 - BY COUNTY:	5%
MODEL 2 - BY TOWNSHIP:	5%
MODEL 3 - WITH PARCELS:	10%
MODEL 3 - WITHOUT PARCELS:	11.1%

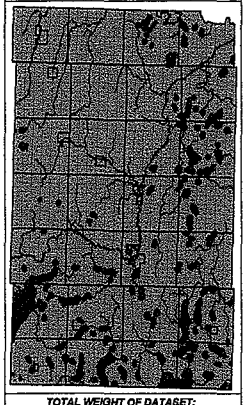
+

WATER BUFFERS

Description: 300ft buffer around DNR Protected Streams and 1000ft buffer around DNR Protected Lakes.

Ranking System based on whether an area is or is not within a water body buffer.

- 0 : nodata
- 1 : water body buffer
- 2 : nodata
- 3 : nodata
- 4 : all other land



TOTAL WEIGHT OF DATASET:

MODEL 1 - BY COUNTY:	13%
MODEL 1 - BY TOWNSHIP:	13%
MODEL 2 - BY COUNTY:	5%
MODEL 2 - BY TOWNSHIP:	5%
MODEL 3 - WITH PARCELS:	10%
MODEL 3 - WITHOUT PARCELS:	11.1%

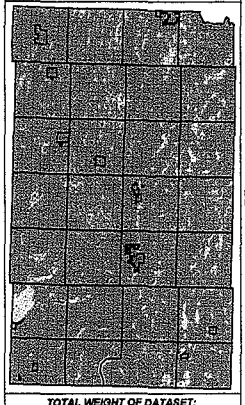
+

NATIONAL WETLANDS INVENTORY

Description: The National Wetlands Inventory has been developed by the US Fish & Wildlife Service in order to classify wetlands for resource assessment.

Ranking System is based on the Circular 39 classification codes.

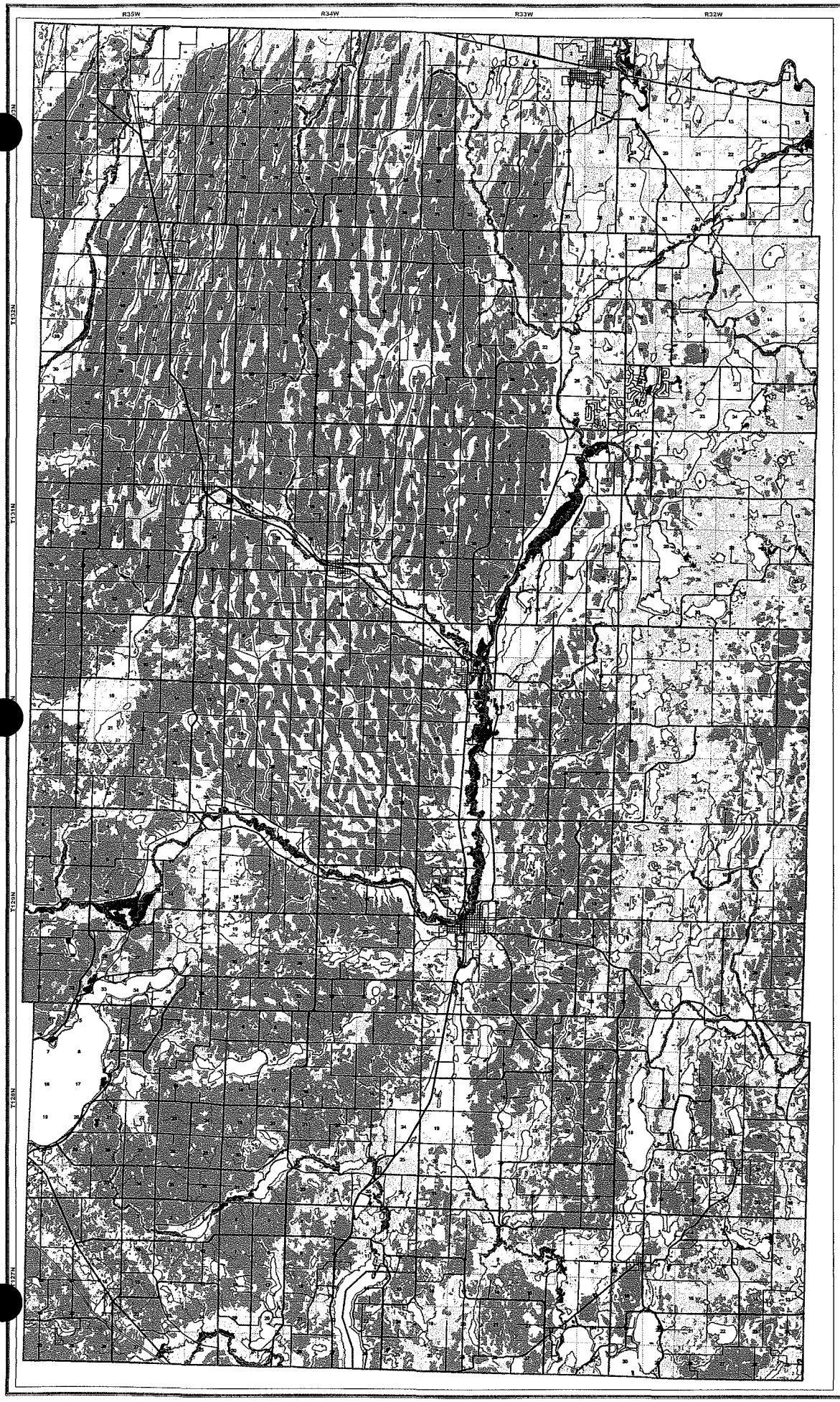
- 0 : Type 5 & 6 which are open water and riverine systems
- 1 : nodata
- 2 : Type 3-4 which includes shallow & deep marshes, shallow ponds, shrub & wooded swamps, and bogs
- 3 : Type 1&2 which are seasonally flooded basin and wet meadows
- 4 : all other land



TOTAL WEIGHT OF DATASET:

MODEL 1 - BY COUNTY:	14%
MODEL 1 - BY TOWNSHIP:	14%
MODEL 2 - BY COUNTY:	10%
MODEL 2 - BY TOWNSHIP:	10%
MODEL 3 - WITH PARCELS:	10%
MODEL 3 - WITHOUT PARCELS:	11.1%

=



AGRICULTURAL LAND PRESERVATION MODEL 1

Todd County

LEGEND:

- Township
- Municipality

Road Network

- Interstate
- US-Paved
- State Highway
- CSAH-Paved
- CSAH-Gravel
- County Road-Paved
- County Road-Gravel
- TWP-Paved
- TWP-Gravel
- TWP-Min. Maint.
- Municipal
- Private
- Section Lines
- Lakes & Wetlands
- Rivers & Streams

AG Land Suitability Results

Suitability Code	Total Acres	Percent
0 : lowest	3584	1
1 : low	34197	5
2 : moderate	104193	17
3 : high	209976	34
4 : highest	274402	44
Total:	626354	101

0 0.5 1 2 3 Miles

Model based on the following information:

LAND USE COMPATIBILITY (20%)	
Dataset:	Weight:
Manure Application	10%
Proximity to Cities	30%
Rural Residences by PLS40	30%
1989 Land Use	30%

SOIL SUITABILITY (40%)	
Dataset:	Weight:
Corn Yield	20%
Land Capability Index	80%

ENVIRONMENTAL SUITABILITY (40%)	
Dataset:	Weight:
FEMA floodplains	33%
Water Buffers	33%
NWI	34%

Map Produced for:
Todd County Planning & Zoning
AG Land Preservation Project

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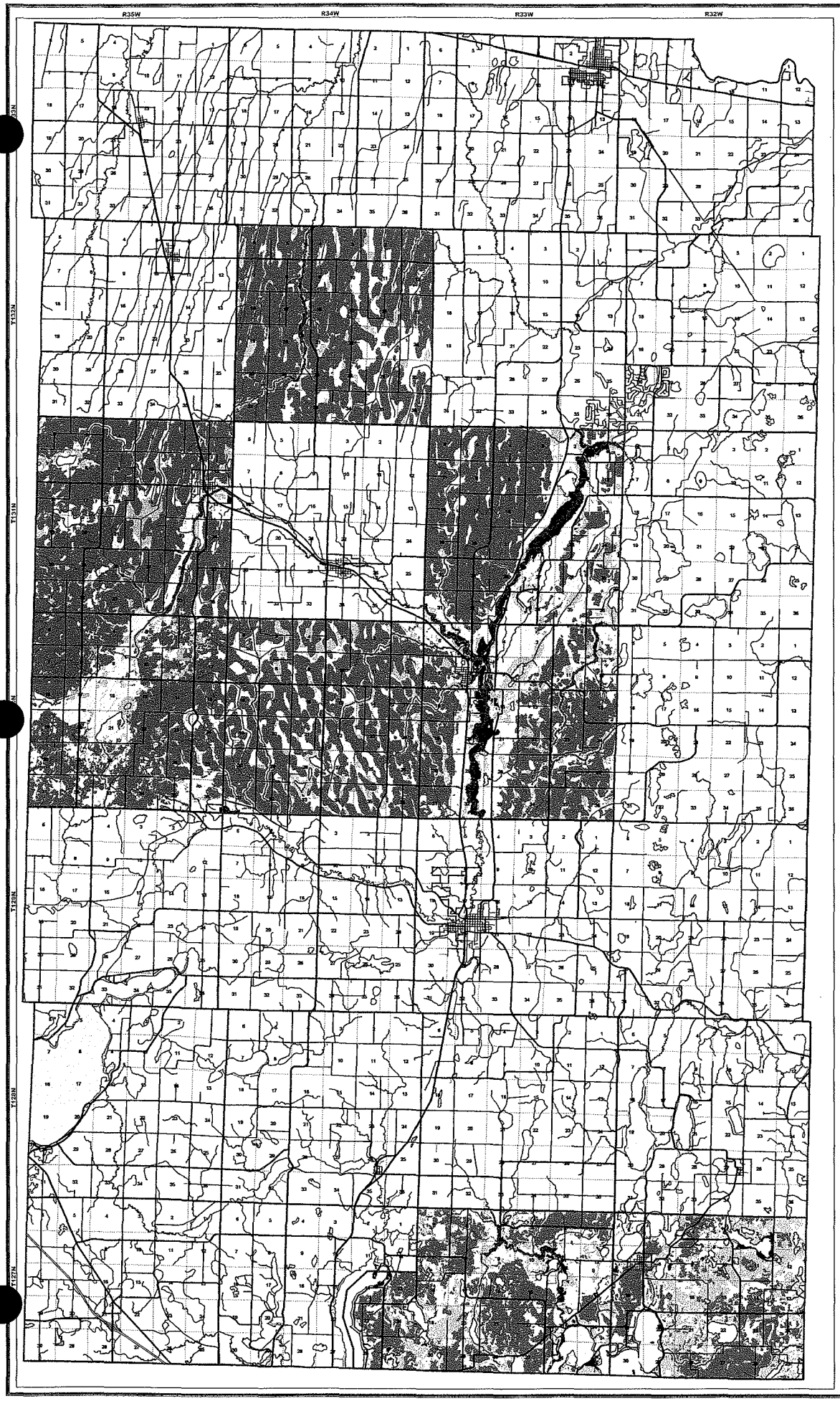
August 2003



AGRICULTURAL LAND PRESERVATION MODEL 1

Townships: Using Parcel Boundary Information where Completed

LEGEND:

- Township
- Municipality

Road Network
- Interstate
- US-Paved
- State Highway
- CSAH-Paved
- CSAH-Gravel
- County Road-Paved
- County Road-Gravel
- TWP-Paved
- TWP-Gravel
- TWP-Min. Maint.
- Municipal
- Private
- Section Lines
- Lakes & Wetlands
- Rivers & Streams

AG Land Suitability Results

Suitability Code	Total Acres	Percent
0 : lowest	237	0
1 : low	9454	5
2 : moderate	20149	11
3 : high	56101	31
4 : highest	94662	52
Total:	180603	99

0 1 2 3 Miles

Model based on the following information:

LAND USE COMPATIBILITY (20%)	
Dataset:	Weight:
Manure Application	10%
Proximity to Cities	30%
Rural Residences by PLS40	30%
1989 Land Use	20%
Parcel Size	10%

SOIL SUITABILITY (40%)	
Dataset:	Weight:
Corn Yield	20%
Land Capability Index	80%

ENVIRONMENTAL SUITABILITY (40%)	
Dataset:	Weight:
FEMA floodplains	33%
Water Buffers	33%
NWI	34%

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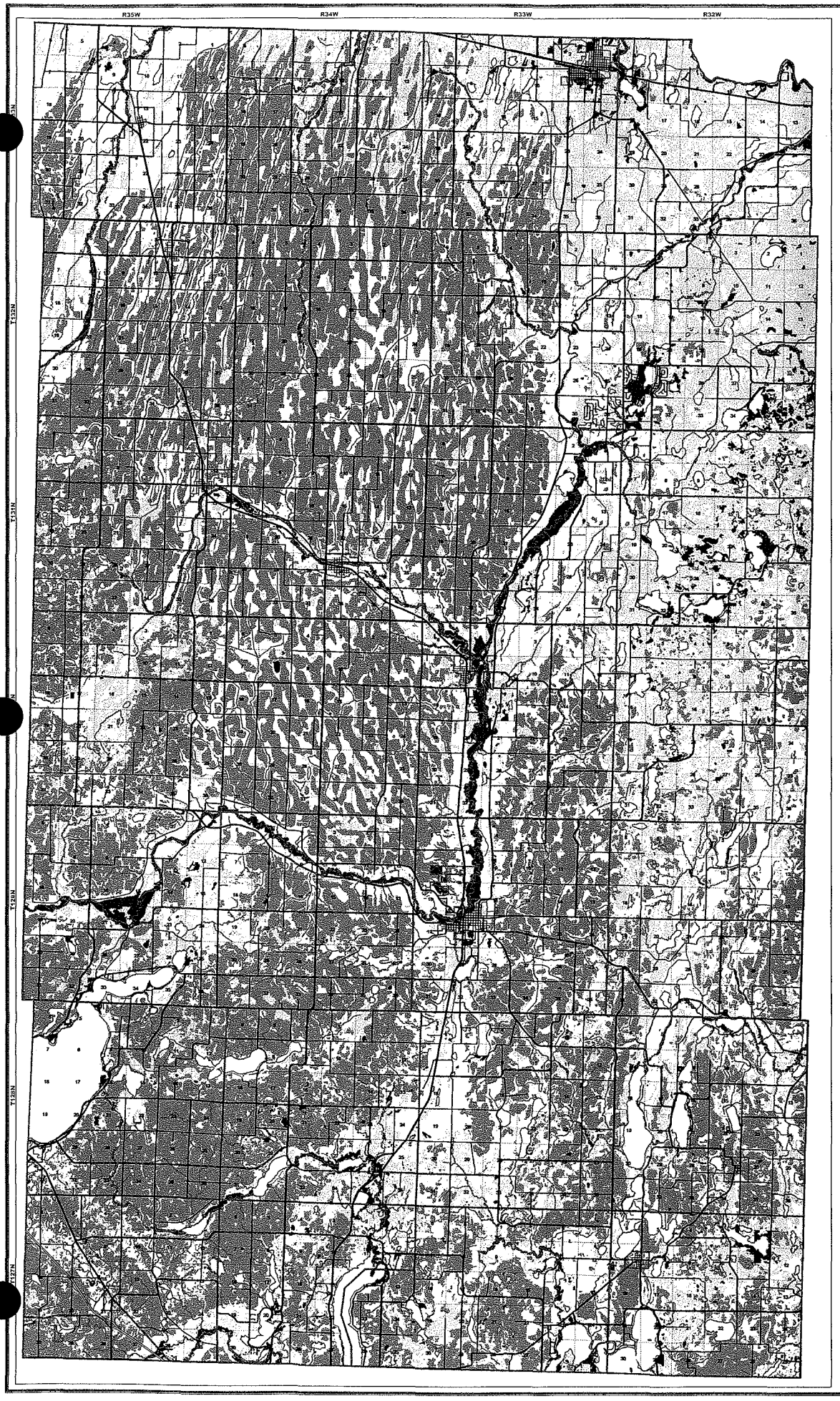

AGRICULTURAL LAND PRESERVATION MODEL 2

Todd County

LEGEND:

- Township
- Municipality

Road Network
- Interstate
- US-Paved
- State Highway
- CSAH-Paved
- CSAH-Gravel
- County Road-Paved
- County Road-Gravel
- TWP-Paved
- TWP-Gravel
- TWP-Min. Maint.
- Municipal
- Private
- Section Lines
- Lakes & Wetlands
- Rivers & Streams

AG Land Suitability Results

Suitability Code	Total Acres	Percent
0 : lowest	1571	0
1 : low	43140	7
2 : moderate	126712	20
3 : high	215956	34
4 : highest	238980	38
Total:	626359	99

1 0 1 2 3 Miles

Model based on the following information:

LAND USE COMPATIBILITY (35%)	
Dataset:	Weight:
Manure Application	35%
Proximity to Cities	15%
Rural Residences by PLS40	30%
1989 Land Use	20%

SOIL SUITABILITY (45%)	
Dataset:	Weight:
Corn Yield	50%
Land Capability Index	50%

ENVIRONMENTAL SUITABILITY (20%)	
Dataset:	Weight:
FEMA floodplains	25%
Water Buffers	25%
NWI	50%

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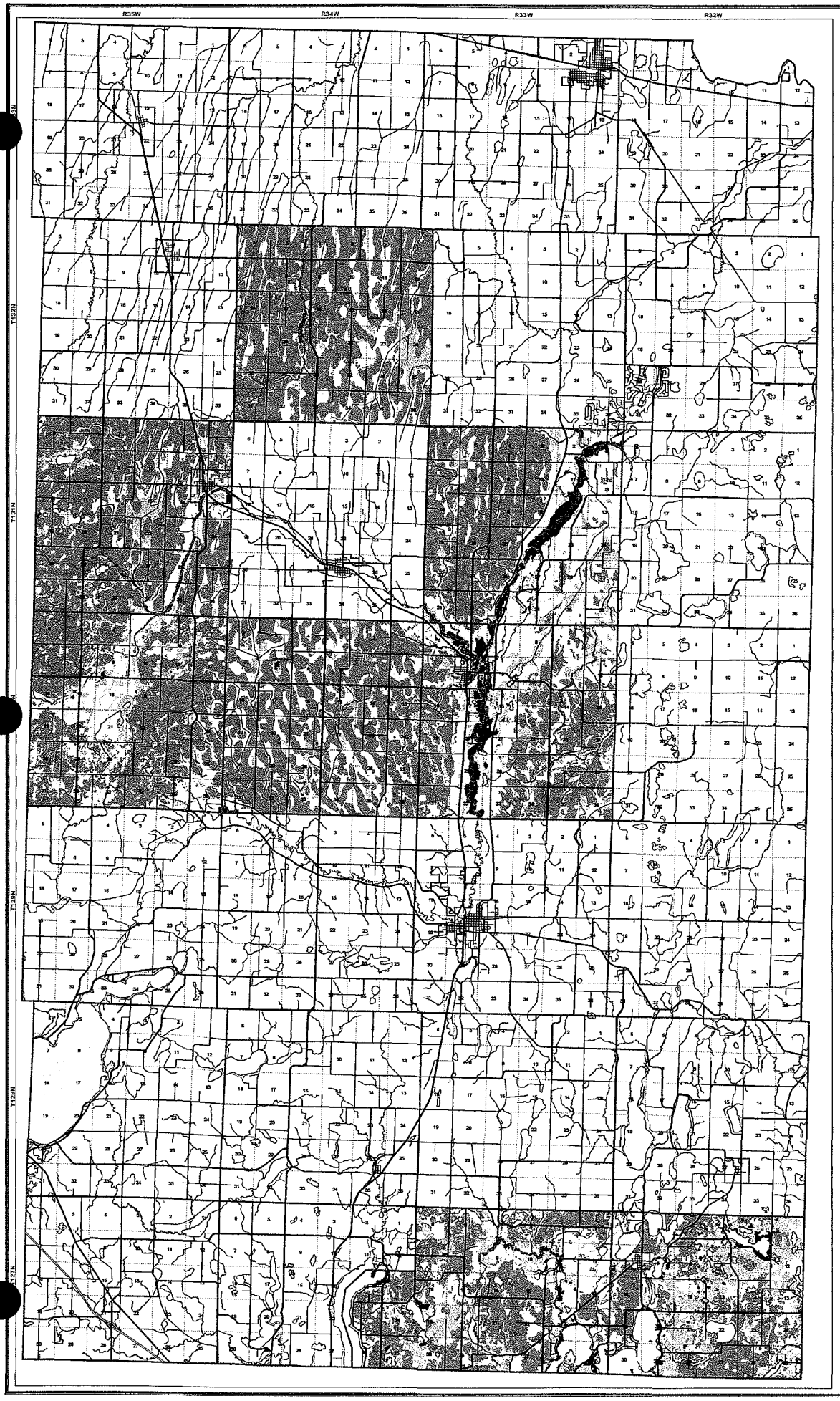

AGRICULTURAL LAND PRESERVATION MODEL 2

Townships: Using Parcel Boundary Information where Completed

LEGEND:

- Township
- Municipality

Road Network
- Interstate
- US-Paved
- State Highway
- CSAH-Paved
- CSAH-Gravel
- County Road-Paved
- County Road-Gravel
- TWP-Paved
- TWP-Gravel
- TWP-Min. Maint.
- Municipal
- Private

- Section Lines
- Lakes & Wetlands
- Rivers & Streams

AG Land Suitability Results

Suitability Code	Total Acres	Percent
0 : lowest	2795	2
1 : low	7706	4
2 : moderate	18815	10
3 : high	61713	34
4 : highest	89770	50
Total:	180799	100

0 1 2 3 Miles

Model based on the following information:

LAND USE COMPATIBILITY (35%)	
Dataset:	Weight:
Manure Application	25%
Proximity to Cities	10%
Rural Residences by PLS40	10%
1989 Land Use	20%
Parcel Size	35%

SOIL SUITABILITY (45%)	
Dataset:	Weight:
Corn Yield	50%
Land Capability Index	50%

ENVIRONMENTAL SUITABILITY (20%)	
Dataset:	Weight:
FEMA floodplains	25%
Water Buffers	25%
NWI	50%

Map Produced for:
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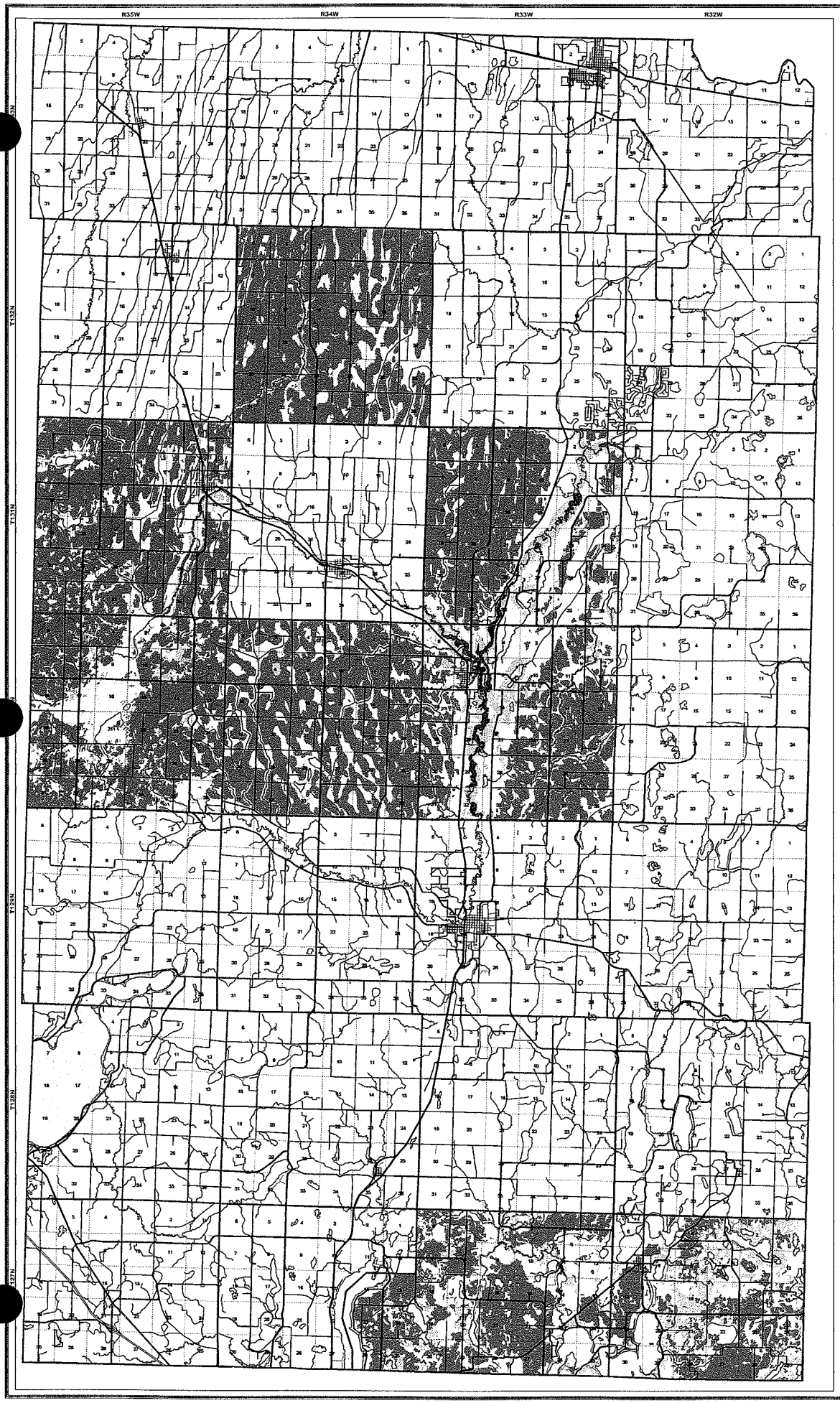

AGRICULTURAL LAND PRESERVATION MODEL 3

Townships: Without Parcel Boundary Information

LEGEND:

- Township
- Municipality

Road Network
- Interstate
- US-Paved
- State Highway
- CSAH-Paved
- CSAH-Gravel
- County Road-Paved
- County Road-Gravel
- TWP-Paved
- TWP-Gravel
- TWP-Min. Maint.
- Municipal
- Private

- Section Lines
- Lakes & Wetlands
- Rivers & Streams

AG Land Suitability Results

Suitability Code	Total Acres	Percent
0 : lowest	0	0
1 : low	4263	2
2 : moderate	13642	8
3 : high	65699	36
4 : highest	97305	54
Total:	180909	100

Model based on the following information:

LAND USE COMPATIBILITY	
Dataset:	Weight:
Manure Application	11.1%
Proximity to Cities	11.1%
Rural Residences by PLS40	11.1%
1989 Land Use	11.1%

SOIL SUITABILITY	
Dataset:	Weight:
Corn Yield	11.1%
Land Capability Index	11.1%

ENVIRONMENTAL SUITABILITY	
Dataset:	Weight:
FEMA floodplains	11.1%
Water Buffers	11.1%
NWI	11.1%

Map Produced for:
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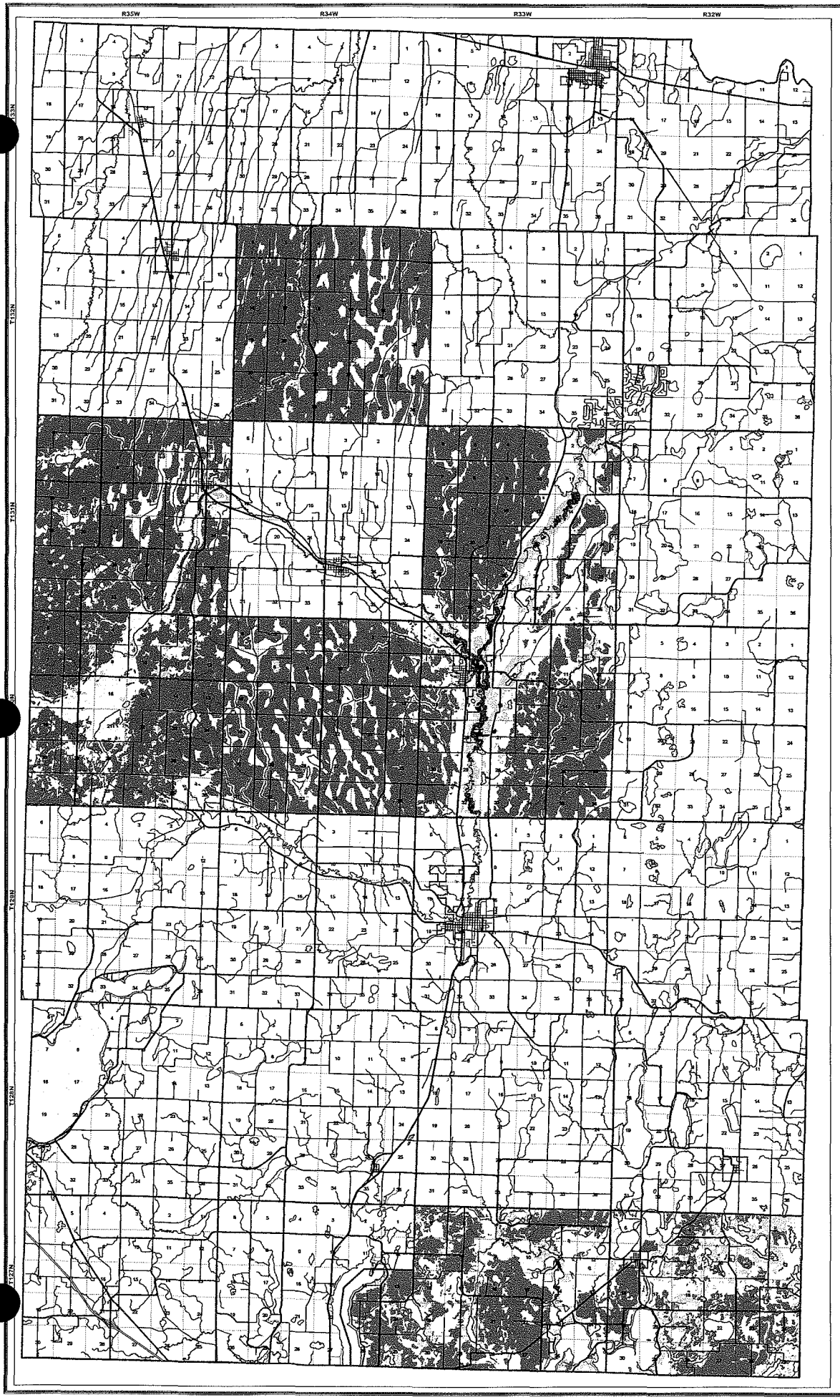

AGRICULTURAL LAND PRESERVATION MODEL 3

Townships: Using Parcel Boundary Information where Completed

LEGEND:

- Township
- Municipality

Road Network

- Interstate
- US-Paved
- State Highway
- CSAH-Paved
- CSAH-Gravel
- County Road-Paved
- County Road-Gravel
- TWP-Paved
- TWP-Gravel
- TWP-Min. Maint.
- Municipal
- Private
- Section Lines
- Lakes & Wetlands
- Rivers & Streams

AG Land Suitability Results

Suitability Code	Total Acres	Percent
0 : lowest	0	0
1 : low	4108	2
2 : moderate	12616	7
3 : high	61256	34
4 : highest	102925	57
Total:	180908	100

1 0 1 2 3 Miles

Model based on the following information:

LAND USE COMPATIBILITY	
Dataset:	Weight:
Manure Application	10%
Proximity to Cities	10%
Rural Residences by PLS40	10%
1999 Land Use	10%
Parcel Size	10%

SOIL SUITABILITY	
Dataset:	Weight:
Corn Yield	10%
Land Capability Index	10%

ENVIRONMENTAL SUITABILITY	
Dataset:	Weight:
FEMA floodplains	10%
Water Buffers	10%
NWI	10%

Map Produced for:
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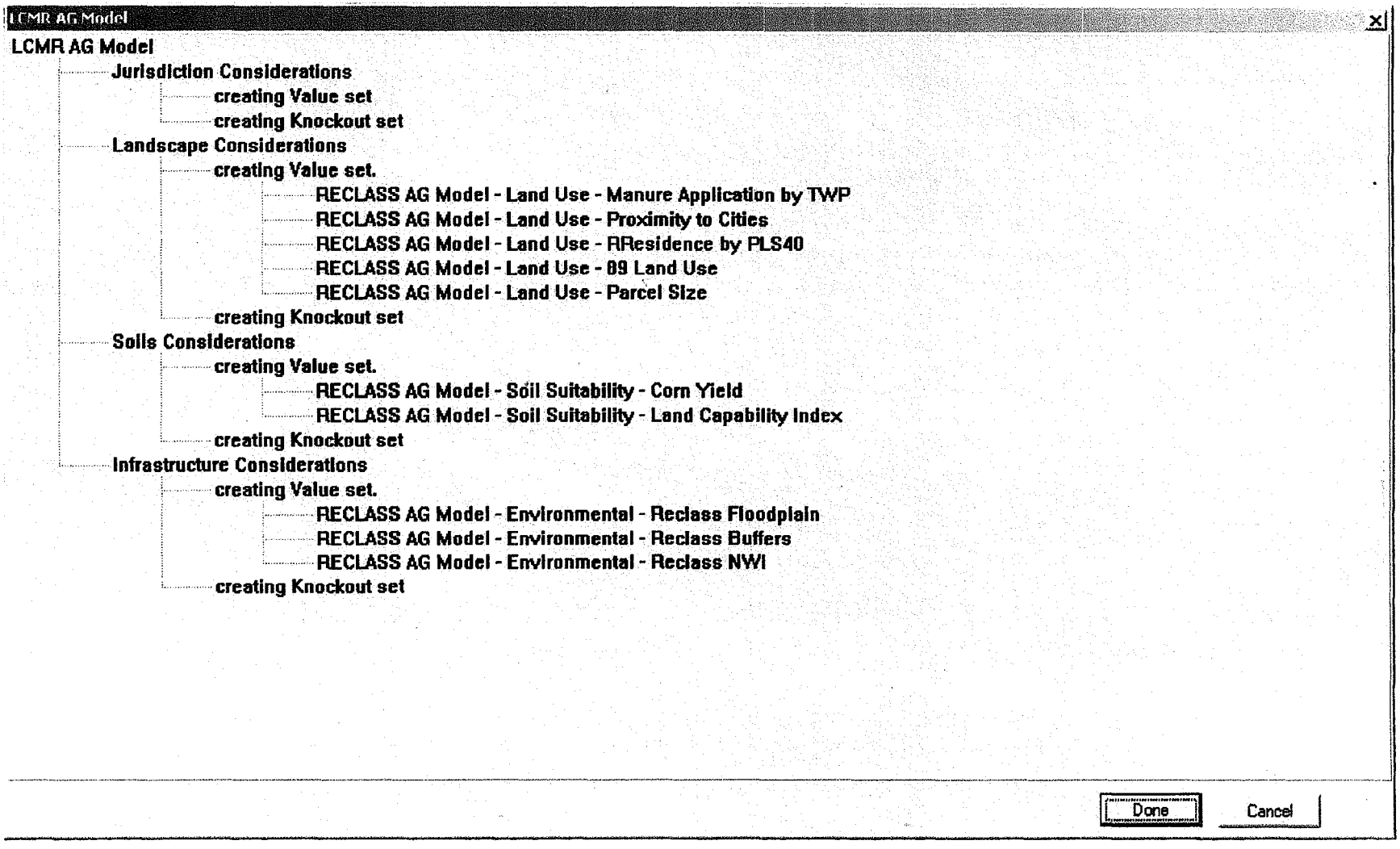

LCMR AG Model
LCMR AG Model
Jurisdiction Considerations
creating Value set
creating Knockout set
Landscape Considerations
creating Value set.
RECLASS AG Model - Land Use - Manure Application by TWP
RECLASS AG Model - Land Use - Proximity to Cities
RECLASS AG Model - Land Use - RResidence by PLS40
RECLASS AG Model - Land Use - 89 Land Use
RECLASS AG Model - Land Use - Parcel Size
creating Knockout set
Soils Considerations
creating Value set.
RECLASS AG Model - Soil Suitability - Corn Yield
RECLASS AG Model - Soil Suitability - Land Capability Index
creating Knockout set
Infrastructure Considerations
creating Value set.
RECLASS AG Model - Environmental - Reclass Floodplain
RECLASS AG Model - Environmental - Reclass Buffers
RECLASS AG Model - Environmental - Reclass NWI
creating Knockout set
Done
Cancel

LCMR AG Model

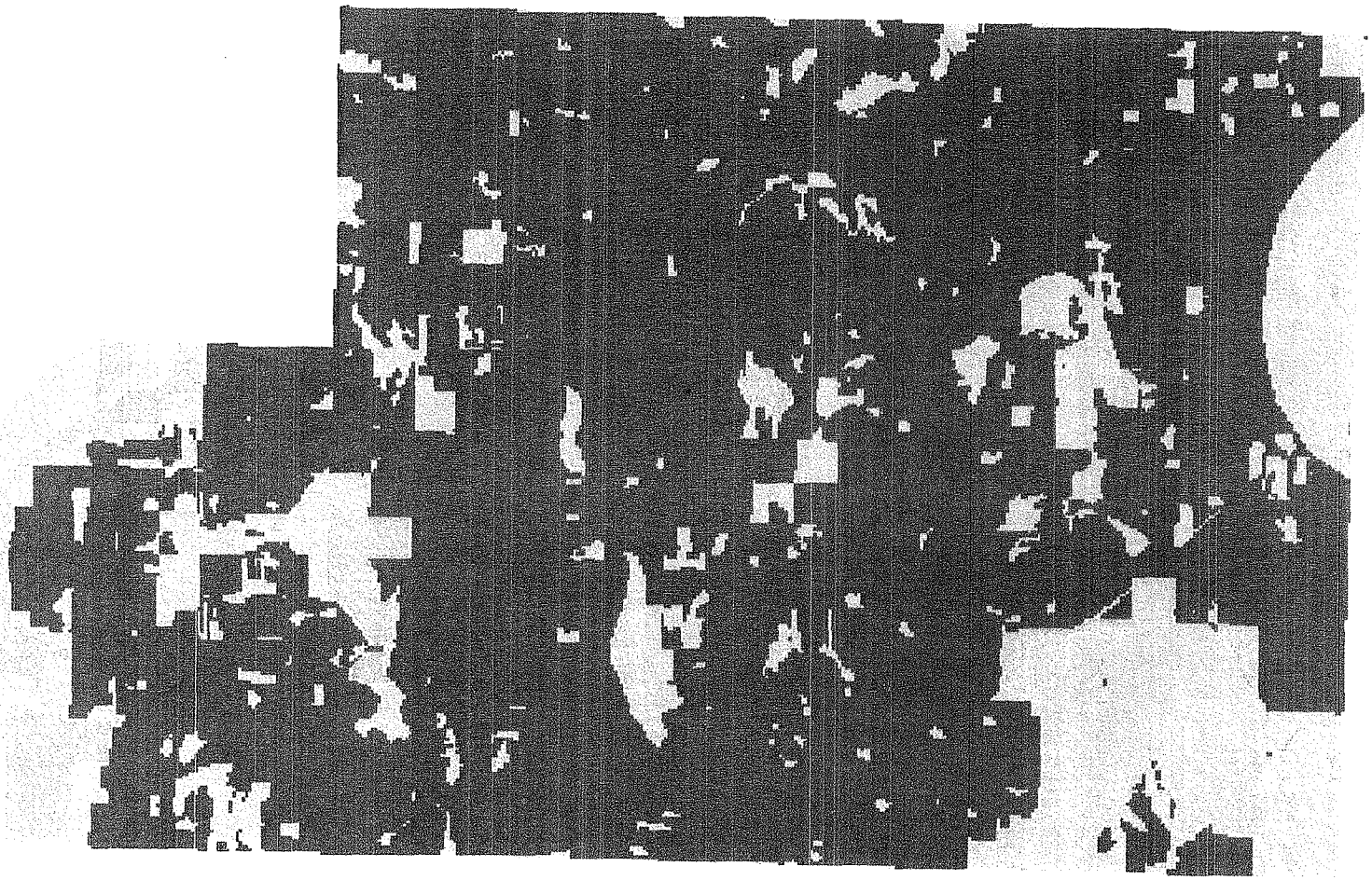
LOWEST
LOW
MODERATE
HIGH
HIGHEST
KNOCKOUT

Scale:
0 1 2 mi

30 meter cell size
all datasets have equal weight in model

9/15/2003 9:33:18 AM

LCMR AG Model Land Use Considerations



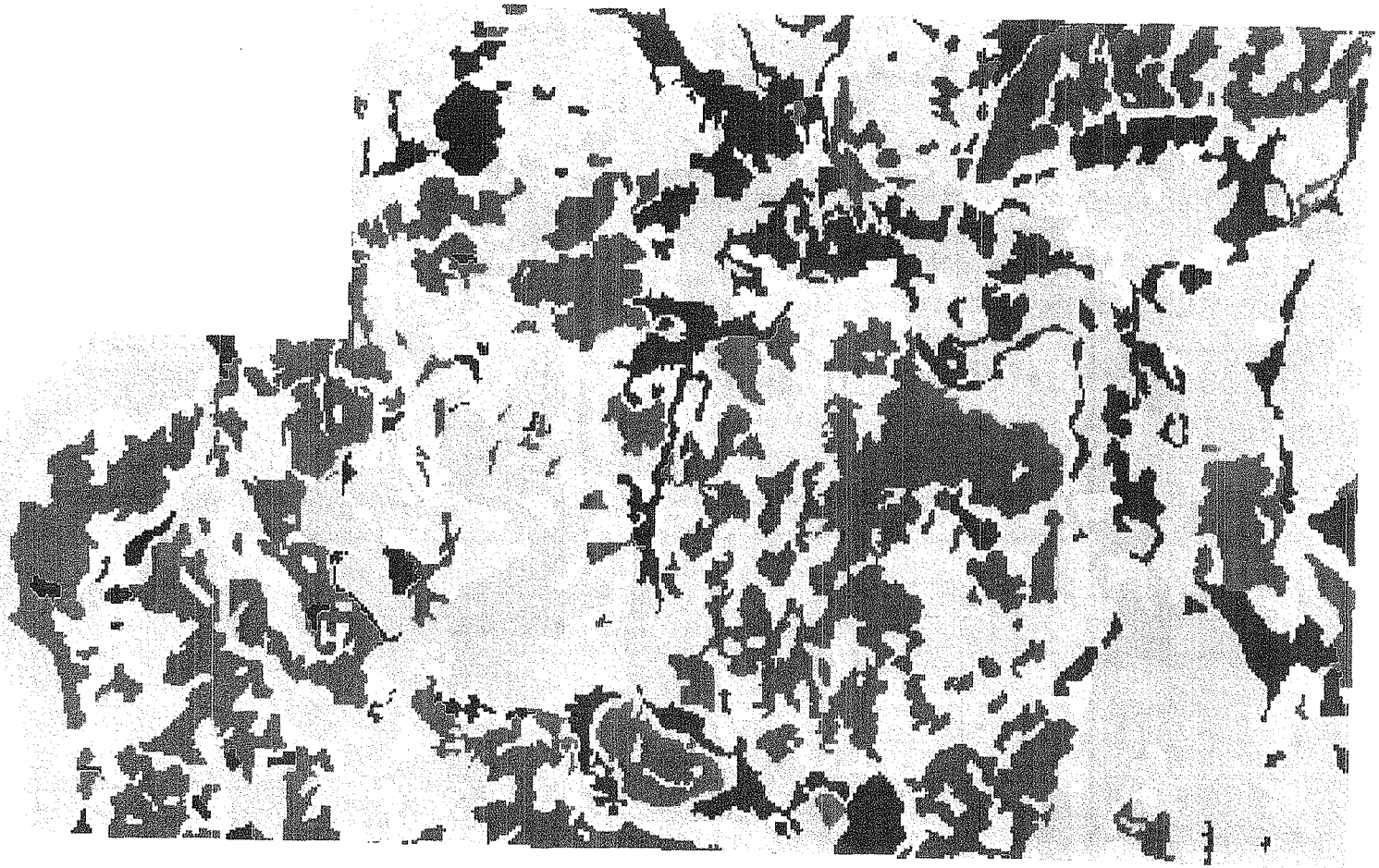
LOWEST
LOW
MODERATE
HIGH
HIGHEST
KNOCKOUT

Scale: 0 1 2 mi

includes manure application by township, proximity to cities, 89 land use, rural residences by PLS40, and parcel size

9/15/2003 9:30:56 AM

LCMR AG Model Soils Considerations



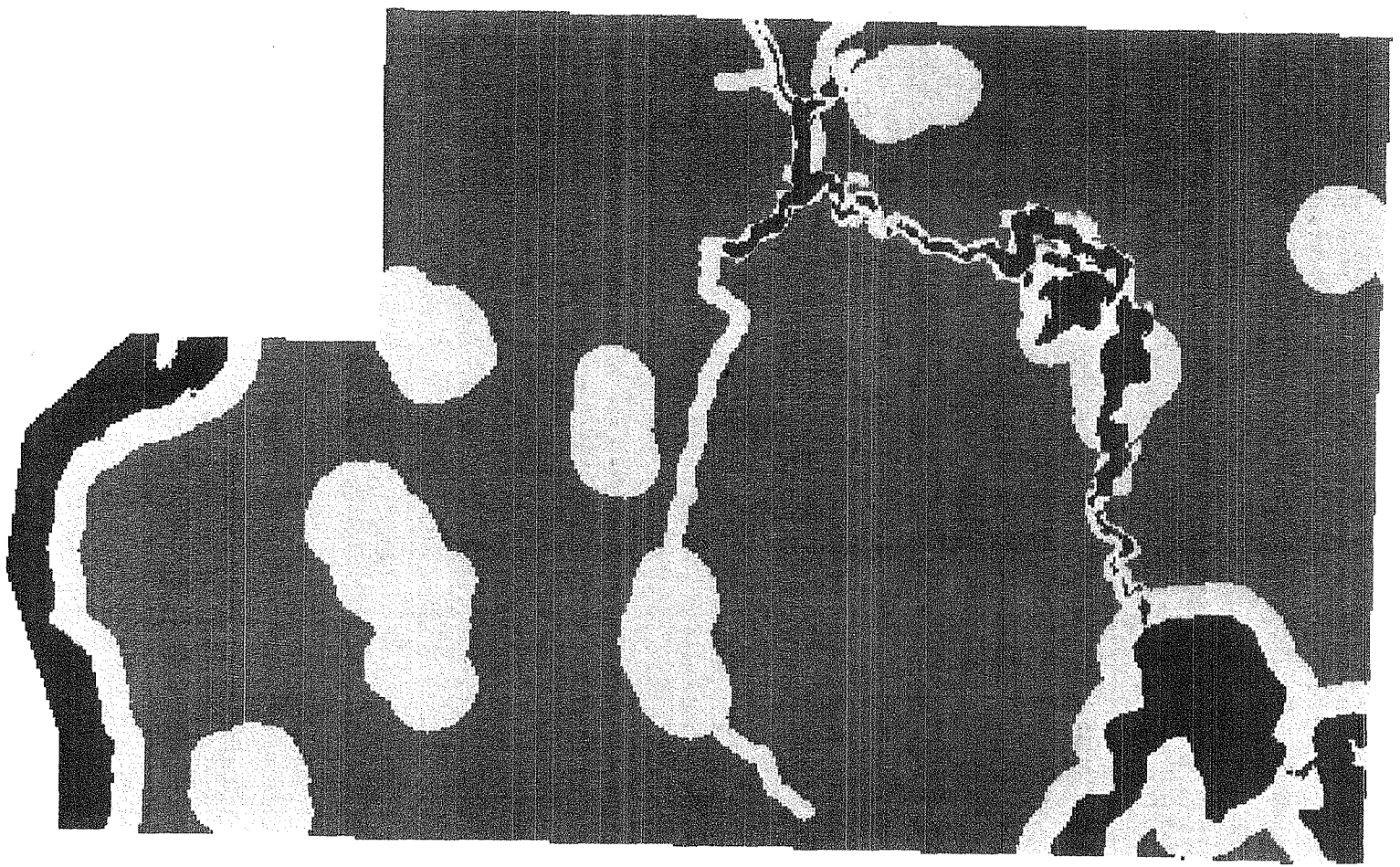
LOWEST
LOW
MODERATE
HIGH
HIGHEST
KNOCKOUT

Scale:
0 1 2 mi

includes corn yield, and land capability index data

9/15/2003 9:31:43 AM

LCMR AG Model Environmental Considerations



LOWEST
LOW
MODERATE
HIGH
HIGHEST
KNOCKOUT

Scale:
0 1 2 mi

includes FEMA floodplains, DNR protected water buffers, NWI wetlands

9/15/2003 9:32:31 AM

Todd County Development Impact Assessment

The Todd County Development Impact Assessment utilizes financial, demographic and land data for Todd County, City of Long Prairie, Long Prairie Township, Long Prairie-Grey Eagle School District, and municipal utilities data to estimate the cost of public services under a series of three development scenarios. These scenarios include (1) a balance of growth within the City of Long Prairie and Long Prairie Township; (2) growth concentrated primarily in the City of Long Prairie; and (3) growth concentrated primarily in Long Prairie Township.

Projections displayed within this summary were assembled utilizing the Development Impact Assessment Model – a Technical Resource (DIAMaTR) created by the Minnesota Department of Agriculture. All data utilized in the development of cost of public services projections are based on the year 2000 and are projected to a horizon year of 2020. While the projections presented by the DIAMaTR model are based upon real data and development scenarios, other social, economic, and political factors may influence costs for public services in a variety of ways. It is important to note that the information provided within this summary is intended to raise discussion as to the development of lands within Todd County cities and townships in assisting officials and staff in future decision-making on land use and development. The information is not intended to be used for budgeting purposes.

Todd County Summary

Located in the heart of Minnesota, Todd County is a growing county rich with agricultural land. Many small communities within the County provide opportunity for local shopping, a variety of community facilities, services and infrastructure, and places for community gathering. Todd County encompasses 942 square miles of land, or 602,893 acres, and supports a population of 24,426 as of the 2000 U.S. Census. Eleven cities and 28 townships exist within the county, and the total school enrollment within the county was 5,498 in the year 2000.

The Todd County Assessor, Auditor and Planning and Zoning offices provided data utilized in assembling Todd County projections. Additional County data used in developing the projections was obtained from the Office of the Minnesota State Auditor.

City of Long Prairie

Located along a significant U.S. Highway and Minnesota State Highways, the City of Long Prairie serves as the county seat for Todd County. Growing from a population of 2,786 in 1990 to a population of 3,040 in 2000, the City has experienced significant growth in recent years. The total land area of the City of Long Prairie is 2.37 square miles as reported from the Minnesota Planning Bureau of the Department of

Administration resulting in a somewhat dense population distribution within a relatively small area.

City of Long Prairie data utilized in assembling the DIAMaTR projections presented was obtained from the City of Long Prairie Administrator and through the Office of the Minnesota State Auditor.

Long Prairie Township

Long Prairie Township surrounds the City of Long Prairie entirely. The total population of the Township according to the 2000 U.S. Census was 823, showing a consistent decline in population since the 1970 population of 937. A low-density Township, there is approximately one household for every 69 acres in Long Prairie Township or approximately one person for every 26 acres within the Township. Long Prairie Township data utilized in the projections provided by this model was obtained from the Office of the Minnesota State Auditor.

Long Prairie – Grey Eagle School District #2753

In 2000, the Long Prairie – Grey Eagle School District maintained an enrollment of 1,430 students from throughout the central Todd County area. Long Prairie – Grey Eagle School District data was obtained from the school district and also from the Minnesota Department of Children, Families, and Learning, which is now the Minnesota Department of Education.

Utilities

The utilities data used for the development of DIAMaTR projections include utility information from the City of Long Prairie wastewater and drinking water utilities. Currently, the utilities system serves 1,170 households within the general vicinity of the City of Long Prairie. All utilities data used in the development of the DIAMaTR model were provided by the City of Long Prairie.

General Notation on Data

All data utilized in the development of this model are provided on an "as is" basis with no warranty, expressed or implied, as to the accuracy of the data. All data have been obtained with every effort to guarantee their accuracy, and every effort has been made to cite all sources of the data. Some adjustments have been made in order to ensure consistency with DIAMaTR projections and to provide for the most accurate scenarios in determining future costs of services within Todd County. The scenarios presented within this summary have been developed in a cooperative effort between the Region 5 Development Commission, the Minnesota Department of Agriculture, and Todd County.

Scenario #1: Equal Proportion of Growth in City and Township

Scenario (1) assumes the following:

1. Todd County will grow by 25 dwelling units per year over the next 20 years
2. 11* of these units will be located within the City of Long Prairie
3. 11* of these units will be located within Long Prairie Township

*The remainder (3) dwelling units would be located outside of the Long Prairie City and Township vicinity.

Scenario #2: Higher Proportion of Growth in City

Scenario (2) assumes the following:

1. Todd County will grow by 25 dwelling units per year over the next 20 years
2. 20 of these units will be located within the City of Long Prairie
3. 5 of these units will be located within Long Prairie Township

Scenario #3: Higher Proportion of Growth in Township

Scenario (3) assumes the following:

1. Todd County will grow by 25 dwelling units per year over the next 20 years
2. 2.5 of these units will be located within the City of Long Prairie
3. 22.5* of these units will be located within Long Prairie Township

*These additional housing units would increase the density of Long Prairie Township from the current density of one housing unit per 68 acres to a density of one housing unit per 28 acres.

Scenario Comparison

Scenario Name	(1) Equal Proportion of Growth in City and Township	(2) Higher Proportion of Growth in City	(3) Higher Proportion of Growth in Township
Scenario Description	**Assumptions include: 25 new dwelling units per year over 20 years with 11 per year in Long Prairie and 11 per year in Long Prairie Township.**	**Assumptions include: 25 new dwelling units per year over 20 years with higher proportion into Long Prairie (20 du per year).**	**Assumptions include: 25 new dwelling units per year over 20 years with lower proportion into Long Prairie (2.5 du per year or 50 new DU by horizon year) and increased density in township (to 1du/30 ac).**
County 2020 average residential share of net revenue (net expenditure) per capita	($130.16)	($129.39)	($130.23)
City 2020 average residential share of net revenue (net expenditure) per capita	$9.24	$23.70	($7.11)
Township 2020 average residential share of net revenue (net expenditure) per capita	($0.31)	($0.31)	[1]($21.50) [2]($0.60)
Estimated per pupil transportation expense in the city	($413.15)	($405.02)	($420.83)
Estimated per pupil transportation expense in the balance of County	($544.46)	($544.56)	($544.45)
Overall average per pupil transportation expense	($529.49)	($526.45)	($531.78)

[1] With $100,000 capital costs divided by new dwelling units through horizon year (2020).
[2] With no capital costs attributed to new growth.

Overall Findings

The findings presented within this report identify the development scenario most likely to be most cost effective to the horizon year of 2020 out of the three previously mentioned scenarios by assessing the data provided in the above scenario comparison. Through the comparison, a trend can be seen as to the direct link between the future costs of public services and the type of development scenario provided. These findings are presented by each studied cost.

County 2020 average residential share of net revenue (net expenditure) per capita

This result shows the overall per capita share of net revenue or expenditures for all County residents. In comparing the three scenarios presented, the Assessment indicates that the most cost effective development scenario would most likely be scenario two, where the majority of new dwelling units occur within the City. This result appears to be due to the lower projected street and road maintenance costs where a more dense population occurs in the City of Long Prairie, rather than the more concentrated Township development scenario presented in scenario three, or the even distribution of development displayed in scenario one. The DIAMaTR model assumes some cost efficiencies for street and road maintenance outlays when densities are higher. Statistical analysis in Minnesota indicates that per capita street and road maintenance outlays decline as densities increase and the percentage of a county's population in cities increases.

City 2020 average residential share of net revenue (net expenditure) per capita

In examining the per capita costs for City residents, a very similar result to the per capita costs for County residents is observed. . The Assessment indicates that the second development scenario is most cost effective for City residents. This again appears to be due to assumed cost efficiencies for street and road maintenance outlays when densities are higher.

Township average residential share of net revenue (net expenditure) per capita

The average costs for Township residents in scenarios one and two are equal. The major difference exists with more dense population within the Township area as presented in scenario three. This appears to be due to an assumption that the additional residential development in the Township would require additional capital improvements (roads, bridges, etc.).

Estimated per pupil transportation expense in the city

Consistent with the assumptions showing greater costs to residents of the County, City, and Township, is the cost effectiveness of student transportation. Based on the information provided by the comparison, the model projects that the higher proportion of development in the City area as presented in scenario two would be more cost effective for residents. The model assumes greater cost efficiencies for school transportation when there is higher residential density (i.e., less traveling distance per pupil). This is based on statistical analysis in Minnesota that indicates that, as residential densities increase, per pupil transportation costs tend to decline. .

Estimated per pupil transportation expense in the balance of County

In contrast to estimated per pupil transportation expenses in the city, per pupil transportation expenses are slightly higher in Township areas for scenarios one and two. However the differences are minor. The slightly higher expenses for scenarios one and two appear to be due to somewhat lower densities of those scenarios. As mentioned above, the model assumes greater cost efficiencies for school transportation when there is higher residential density.

Overall average per pupil transportation expense

For the reasons described above, the overall average per pupil transportation expense data presented in the scenario comparison indicates that the most cost-effective development scenario for County student transportation is that presented by scenario two.

Overall Conclusions

The findings associated with scenario one show that the equal concentration of new development among Townships and Cities within Todd County may result public services costs that are less than in scenario three, but greater than in scenario two. While the concentration of development within the Township area presented in scenario three could prove to be very beneficial to the Townships within Todd County, the results of this study indicate the potential for higher public services costs than in scenarios one and two. In contrast with scenarios one and three, the concentration of development within the City area as presented by scenario two is mostly likely to provide for greater revenue and/or lower costs in providing public services overall.

MDA-Scenario 1

Projection info based on Todd.bwb info from Tim Schmidt, 9/18/2003 with added assumptions from Bob Patton, 9/19/2003.

County

2020 average residential share of net revenue (net expenditure) per capita:		($130.16)	
	X		
Build-out population in 2020:		25,716	persons
	=	($3,347,262)	total net revenue (expenditure)

City

2020 average residential share of net revenue (net expenditure) per capita:		$9.24	
	X		
Build-out population in 2020:		3,665	persons
	=	$33,878	total net revenue (expenditure)

Township

2020 average residential share of net revenue (net expenditure) per capita:		($0.31)	
	X		
Build-out population in 2020:		1,484	persons
	=	($466.42)	total net revenue (expenditure)

MDA-Scenario 1

Projection info based on Todd.bwb info from Tim Schmidt, 9/18/2003 with added assumptions from Bob Patton, 9/19/2003.

County Government	Per Existing Resident			Annual Avg Per New Resident	
Todd County	2000	2000	2000	Located in	Located in
Summary Fiscal Impact, Residential S	County Average	in Cities	in BOC	Cities	BOC
Total Expenditures	705	682	717	758	825
Total Revenue	573	558	581	690	729
Surplus/Deficit Per Capita	**($132)**	**($125)**	**($136)**	**($68)**	**($96)**
Surplus/Deficit Per Capita Sensitivity,	2020	2020	2020	2020	2020
Modestly Constrained Supply	($132)	($125)	($136)	($68)	($96)

Township Government	2000	
Long Prairie Township	Per	Annual Avg Per
Summary Fiscal Impact, Residential S	Existing Resident	New Resident
Total Expenditures	$92	$92
Total Revenue	$95	$88
Surplus/Deficit Per Capita	$2	($4)
Surplus/Deficit Per Capita Sensitivity,	2020	2020
Modestly Constrained Supply	$2	($4)

Municipal Government	2000	
City of Long Prairie	Per	Annual Avg Per
Summary Fiscal Impact, Residential S	Existing Resident	New Resident
Total Expenditures	$415	$555
Total Revenue	403	692
Surplus/Deficit Per Capita	**($13)**	**$137**
Surplus/Deficit Per Capita Sensitivity,	2020	2020
Modestly Constrained Supply	($13)	$137

Utilities		
Annual Cost Per Connection	2000	2020
Water Fund		
Operating Outlays	151	147
Debt Service	536	486
Total	**$687**	**$634**
Sewer Fund		
Operating Outlays	286	271
Debt Service	0	0
Total	**286**	**272**
Combined		
Operating Outlays	438	419
Debt Service	536	487
Total	**$974**	**$905**

School District		
Long Prairie-Grey Eagle	2000	2020
Per Pupil Transportation Expense		
City of Long Prairie	$423	$413
Balance of District, Outside Cities	$545	$544
Average for District	$484	$479

	Per Existing Dwelling Unit	Annual Avg Per New Dwelling Unit	Per Existing Pupil	Annual Avg Per New Pupil

MDA-Scenario 1

Projection info based on Todd.bwb info from Tim Schmidt, 9/18/2003 with added assumptions from Bob Patton, 9/19/2003.

Annual Capital Costs	$0	$13	$0	$8

MDA-Scenario 2

Lower proportion of population into BOC (about 10%), and higher proportion into Long Prairie (20 du per year). Bob Patton, 9/19/2003.

County

2020 average residential share of net revenue (net expenditure) per capita:		($129.39)	
	X		
Build-out population in 2020:		25,716	persons
	=	($3,327,463)	total net revenue (expenditure)

City

2020 average residential share of net revenue (net expenditure) per capita:		$23.70	
	X		
Build-out population in 2020:		4,333	persons
	=	$102,695	total net revenue (expenditure)

Township

2020 average residential share of net revenue (net expenditure) per capita:		($0.31)	
	X		
Build-out population in 2020:		1,484	persons
	=	($466.42)	total net revenue (expenditure)

MDA-Scenario 2

Lower proportion of population into BOC (about 10%), and higher proportion into Long Prairie (20 du per year). Bob Patton, 9/19/2003.

County Government	Per Existing Resident			Annual Avg Per New Resident	
Todd County	2000	2000	2000	Located in	Located in
Summary Fiscal Impact, Residential S	County Average	in Cities	in BOC	Cities	BOC
Total Expenditures	705	682	717	756	914
Total Revenue	573	558	581	690	729
Surplus/Deficit Per Capita	**($132)**	**($125)**	**($136)**	**($66)**	**($185)**
Surplus/Deficit Per Capita Sensitivity,	2020	2020	2020	2020	2020
Modestly Constrained Supply	($132)	($125)	($136)	($66)	($185)

Township Government	2000	
Long Prairie Township	Per	Annual Avg Per
Summary Fiscal Impact, Residential S	Existing Resident	New Resident
Total Expenditures	$92	$92
Total Revenue	$95	$88
Surplus/Deficit Per Capita	$2	($4)
Surplus/Deficit Per Capita Sensitivity,	2020	2020
Modestly Constrained Supply	$2	($4)

Municipal Government	2000	
City of Long Prairie	Per	Annual Avg Per
Summary Fiscal Impact, Residential S	Existing Resident	New Resident
Total Expenditures	$415	$551
Total Revenue	403	692
Surplus/Deficit Per Capita	**($13)**	**$140**
Surplus/Deficit Per Capita Sensitivity,	2020	2020
Modestly Constrained Supply	($13)	$140

Utilities		
Annual Cost Per Connection	2000	2020
Water Fund		
Operating Outlays	151	147
Debt Service	536	486
Total	**$687**	**$634**
Sewer Fund		
Operating Outlays	286	271
Debt Service	0	0
Total	**286**	**272**
Combined		
Operating Outlays	438	419
Debt Service	536	487
Total	**$974**	**$905**

School District		
Long Prairie-Grey Eagle	2000	2020
Per Pupil Transportation Expense		
City of Long Prairie	$423	$405
Balance of District, Outside Cities	$545	$545
Average for District	$484	$475

	Per Existing Dwelling Unit	Annual Avg Per New Dwelling Unit	Per Existing Pupil	Annual Avg Per New Pupil

MDA-Scenario 2

Lower proportion of population into BOC (about 10%), and higher proportion into Long Prairie (20 du per year). Bob Patton, 9/19/2003.

Annual Capital Costs	$0	$13	$0	$8

MDA-Scenario 3

High proportion of population into BOC (98.5%), lower proportion into Long Prairie (2.5 du per year or 50 new DU by horizon year), increased density in township (to 1du/30 ac). Bob Patton, 9/19/2003.

County

2020 average residential share of net revenue (net expenditure) per capita:		($130.23)	
	X		
Build-out population in 2020:		25,716	persons
	=	($3,349,052)	total net revenue (expenditure)

City

2020 average residential share of net revenue (net expenditure) per capita:		($7.11)	
	X		
Build-out population in 2020:		3,458	persons
	=	($24,566.48)	total net revenue (expenditure)

Township

2020 average residential share of net revenue (net expenditure) per capita:		($109.90)	
	X		
Build-out population in 2020:		1,965	persons
	=	($215,944)	total net revenue (expenditure)

MDA-Scenario 3

High proportion of population into BOC (98.5%), lower proportion into Long Prairie (2.5 du per year or 50 new DU by horizon year), increased density in township (to 1du/30 ac). Bob Patton, 9/19/2003.

County Government	Per Existing Resident		Annual Avg Per New Resident		
Todd County	2000	2000	2000	Located in	Located in
Summary Fiscal Impact, Residential S	County Average	in Cities	in BOC	Cities	BOC
Total Expenditures	705	682	717	758	824
Total Revenue	573	558	581	690	729
Surplus/Deficit Per Capita	**($132)**	**($125)**	**($136)**	**($68)**	**($95)**
Surplus/Deficit Per Capita Sensitivity,	2020	2020	2020	2020	2020
Modestly Constrained Supply	($132)	($125)	($136)	($68)	($95)

Township Government	2000	
Long Prairie Township	Per	Annual Avg Per
Summary Fiscal Impact, Residential S	Existing Resident	New Resident
Total Expenditures	$92	$281
Total Revenue	$95	$88
Surplus/Deficit Per Capita	$2	($193)
Surplus/Deficit Per Capita Sensitivity,	2020	2020
Modestly Constrained Supply	$2	($193)

Municipal Government	2000	
City of Long Prairie	Per	Annual Avg Per
Summary Fiscal Impact, Residential S	Existing Resident	New Resident
Total Expenditures	$415	$559
Total Revenue	403	692
Surplus/Deficit Per Capita	**($13)**	**$133**
Surplus/Deficit Per Capita Sensitivity,	2020	2020
Modestly Constrained Supply	($13)	$133

Utilities		
Annual Cost Per Connection	2000	2020
Water Fund		
Operating Outlays	151	147
Debt Service	536	486
Total	**$687**	**$634**
Sewer Fund		
Operating Outlays	286	271
Debt Service	0	0
Total	**286**	**272**
Combined		
Operating Outlays	438	419
Debt Service	536	487
Total	**$974**	**$905**

School District		
Long Prairie-Grey Eagle	2000	2020
Per Pupil Transportation Expense		
City of Long Prairie	$423	$421
Balance of District, Outside Cities	$545	$544
Average for District	$484	$483

	Per Existing Dwelling Unit	Annual Avg Per New Dwelling Unit	Per Existing Pupil	Annual Avg Per New Pupil

MDA-Scenario 3

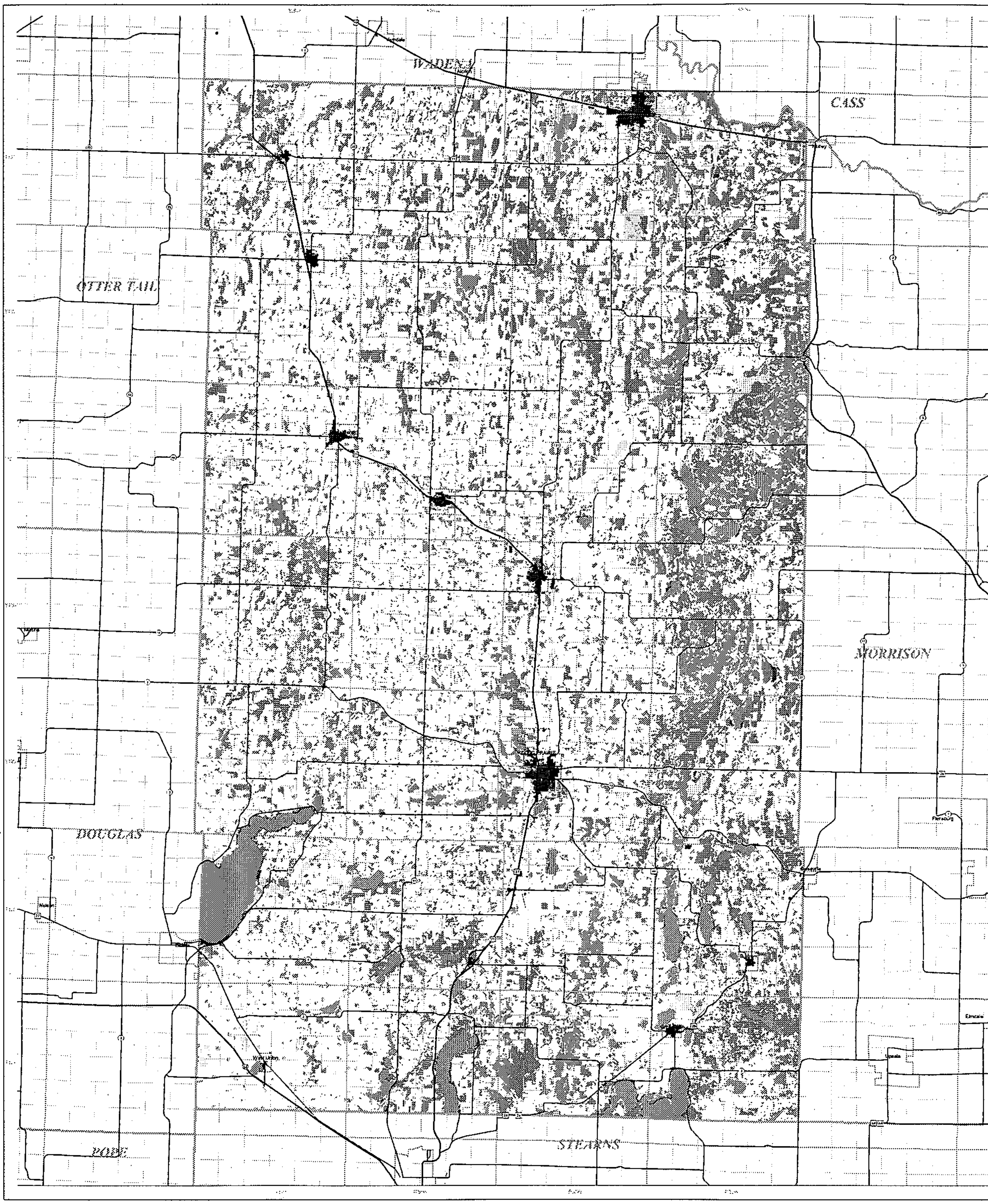
High proportion of population into BOC (98.5%), lower proportion into Long Prairie (2.5 du per year or 50 new DU by horizon year), increased density in township (to 1du/30 ac). Bob Patton, 9/19/2003.

Annual Capital Costs	$0	$13	$0	$8

Todd County Land Use and Cover

State of Minnesota

1988 - 1990



MAP FEATURES

Land Use[1]
- Urban and Industrial
- Farmsteads and Rural Residences
- Rural Residential Development Complexes
- Other Rural Developments
- Cultivated Land
- Transitional Agricultural Land
- Grassland
- Grassland-Shrub-Tree Complex (Deciduous)
- Grassland-Shrub-Tree Complex (Coniferous)
- Deciduous Forest
- Coniferous Forest
- Water
- Wetlands
- Gravel Pits and Open Mines
- Bare Rock
- Exposed Soil, Sandbars, and Sand Dunes

Cities[1]
- COUNTY SEAT
- Other Cities
- Municipal Boundary

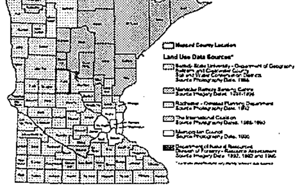
Highways[1]
- Interstate Highway
- U.S. Trunk Highway
- State Trunk Highway
- County State-Aid Highway (CSAH)

Public Land Survey[1]
- State Boundary
- County Boundary
- Township & Range
- Section
- Township
- Range & Direction

Data Sources

Todd County Land Use Statistics

Source: The Land Management Information Center (LMIC)



ABOUT THIS MAP

Credits and Acknowledgements

PLANNING

MDA Total cover used other sets?

LMIC Links
- LMIC home
- Datanet
- EPPL and EPIC
- Geographic Data Clearinghouse
- Governor's Council on Geographic Information
- Project Services
- Spatial data standards

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MINNESOTA LAND USE AND COVER

Viewers can explore land use for the entire state and individual counties through an interactive mapping tool and statistical profiles of land use data collected during the 1990s. The land use statistics were generated to generally correspond to the published statewide map titled *Minnesota Land Use and Cover: 1990s Census of the Land*. The map was produced by the Department of Natural Resources using data from seven separate land use and cover inventories to create a consistent, statewide inventory.

An eight-category scheme was developed in order to merge data from varying time periods, land use and cover definitions, data collection techniques and data resolutions. Data was compiled from several inventories including those of the Manitoba Remote Sensing Centre; the International Coalition; Metropolitan Council and University of Minnesota; Bemidji State University Geography Department and Beltrami and Clearwater Counties; Rochester-Olmsted County Planning Department; and the Minnesota Department of Natural Resources, Forestry Division.

- Category definitions
- How the statistics were generated
- Uses and cautions
- Data documentation
- Application development

Return to state land use and cover map

CATEGORY DEFINITIONS

Urban and rural development: residential, commercial, industrial, cultural and recreational developments and related developments such as power plants, power lines, pipelines, airports, waste treatment facilities, golf courses, farmsteads and feedlots. Associated structures include garages, sheds and landscaped areas.

Cultivated land: areas under intensive cropping or rotation, including fallow fields and fields seeded for forage or cover crops that exhibit linear or other patterns associated with current tillage

Hay/pasture/grassland: areas covered by grasslands and herbaceous plants; these may contain up to one-third shrub and tree cover. Some areas may be used as pastures and mowed or grazed. Included are fields that show evidence of past tillage but now appear to be abandoned and grown over with native vegetation or planted with a cover crop.

Brushland: areas with a combination of grass, shrubs, and trees

Dept. of Administration:
- Divisions

Services for:
- Local government
- State government
- General public
- Business

Content by Type
- Media releases
- Data
- Environmental projects
- Maps
- Reports
- All

Featured Data
- Census 2000
- Children's Report Card
- Geographic Data Clearinghouse
- Minnesota Milestones
- Datanet
- All

Featured Mapping
- MN Mapper
- EPPL7/EPIC software
- All

Search tools
- Place name
- Site search

in which deciduous or coniferous tree cover comprises from one to two-thirds of the area, or shrub cover comprises more than one-third of the area. These areas are often found adjacent to hay/pasture/grassland or forested areas and vary greatly in shape and extent.

Forested: areas where two-thirds or more of the total canopy cover is composed of predominantly woody deciduous and coniferous species and areas of regenerated or young forest where commercial timber has been completely or partially removed by logging, other management activities or natural events; includes woodlots, shelterbelts and plantations.

Water: permanent bodies of water such as lakes, rivers, reservoirs, stock ponds and open water areas where photo evidence indicates that the areas are covered by water the majority of the time

Bog/marsh/fen: grassy, wet areas with standing or slowly moving water. Vegetation consists of grass and sedge sods, and common hydrophilic vegetation such as cattail and rushes. These areas include wetlands with lowland coniferous forest and peat-covered or peat-filled depressions with a high water table; areas are often interspersed with channels or pools of open water.

Mining: area stripped of topsoil revealing exposed substrate such as sand or gravel, including gravel quarries, mine tailings, borrow pits and rock quarries. Included are areas that lack appreciable soil development or vegetation cover such as rock outcrops, sand dunes or beaches.

HOW THE STATISTICS WERE GENERATED

The Minnesota Department of Natural Resources generated the land use statistics through the following process: Data from the statewide map *Minnesota Land Use and Cover: 1990s Census of the Land* was stored by county and matched to the departments version of the state's county borders. The statewide map incorporates the major transportation routes from the Minnesota Department of Transportation's road file rather than being interpreted from Landsat imagery or aerial photography. The process of creating the statewide coverage involved rasterizing all existing vector land use datasets at a resolution of 30 meters squared. The resulting files were mosaicked together to form a single statewide working Arc/Info GRID. The statistics were then generated by crosstabulating DNR's County border data with the Statewide coverage. All processing of vector and raster data was performed using ESRI's ArcView Spatial Analyst Grid processing software.

USES AND CAUTIONS

This land use map and its corresponding statistics are not directly comparable to other inventories. The Minnesota Land Management Information Center does not warrant the results that may be obtained by using this map. This map and statistics are provided as is, without express or implied warranties, including warranties of merchantability and fitness. In no event will the Land Management Information Center be liable for any consequential, incidental or special damages, including any lost profits or lost savings, even if it has been advised of the possibility of such damages or any claim by any third party.

DATA DOCUMENTATION

Documentation for the eight-category land use dataset shown here is in the Minnesota Land Use and Cover: 1990s Census of the Land metadata record.

Documentation for the more detailed data sources used to create the 1990's Census of the Land is in the following records (documentation for Olmsted County and for the seven-county Twin Cities area is under development):

- Agricultural and transition areas
- Forested areas
- Beltrami and Clearwater Counties

Both the Agricultural and Transition Areas inventory and the Forested Areas inventory were funded by the Legislature as recommended by the Legislative Commission on Minnesota Resources.

APPLICATION DEVELOPMENT

This application was developed by the Land Management Information Center web and applications programmers using MapServer and EPPL7 software utilities. A special thanks to the Department of Natural Resources applications staff who consolidated the original land use inventories and modified the MapServer technology.

Page last modified: Monday, 02-Feb-2004 14:11:31 CST
webmaster@mnplan.state.mn.us

About this site

- Full Metadata - - View Attributes - - View Sample - - Get Data -

Minnesota Land Use and Cover: 1990s Census of the Land (8 category statewide)

This page last updated: 05/12/2004
Metadata created using Minnesota Geographic Metadata Guidelines

Metadata Summary

Originator

Minnesota Department of Natural Resources

Abstract

This data set integrates six different source data sets to provide a generalized overall view of Minnesota's land use / cover. The six source data sets covered different parts of the state, were in differing formats, and used different legend classifications. MnDNR developed a generalized 8-category legend and translated each source data set's original detailed classification into the 8-category system. They also standardized the data to 30 meter grid cells. The data set was used to produce a 43 inch by 50 inch wall map of the same title.

Browse Graphic

View a sample of the data.

Time Period of Content Date

Currentness Reference

The dates for the source data sets range between 1987 - 1996.

1. Agricultural and Transition Areas: Approximately 1989 - 1991
2. Forested Areas: 1991 - 1996
3. Metropolitan Counties: TM imagery 1991 (all classes in original data set were used); Generalized Land Use from the Metropolitan Council 1990 (only the farmstead class from the original data was used)
4. Beltrami and Clearwater Counties: 1987
5. Olmsted County: 1992
6. Camp Ripley 1992 and 1996; Beltrami Island State Forest 1993 and 1996

Access Constraints

Only the 8-class legend attributes are distributed for this data set. For the more detailed legends, users need to obtain the original data sets (see Associated Data Sets element).

Use Constraints

Redistribution Conditions: In obtaining these data from LMIC, it is understood that you and/or your organization have the right to use them for any internal purpose. If you modify them, you should document those changes in a metadata record that should accompany all redistributed data. If you transmit or provide these data in any form to another user, the data MUST be accompanied by a copy of LMIC's disclaimer NOTICE.TXT and all documentation provided with the original data set including the full metadata record.

Distributor Organization

Minnesota Land Management Information Center (LMIC)

Ordering Instructions

This data set is distributed on the internet by clicking below after Online Linkage. Doing so will tell your browser to start downloading a self-extracting 'ZIP' file which will contain the following:

- An Arc/INFO Grid file
- A default color palette (.clr) for use when displaying in software such as ArcView
- lulookup.dbf: a database that shows how each category in the original data sets was reclassified into the 8-category system.
- Documentation (.htm) file for the dataset

- NOTICE.RTF, an important notice about this data set that can be read by most word processing software, and an ascii text version of the same notice (NOTICE.TXT)

After downloading this self-extracting 'zip' file (which will have an 'exe' extension), simply execute (run) the file. (For example, you can double click it from Windows Explorer or File Manager). Doing this will automatically extract the files described above. You can then delete file types that you do not need, if any.

(The file is also available in EPPL7 format. Go to ftp://ftp.lmic.state.mn.us/pub/data/phys_biol/landuse and download the luse8epp.exe file. This format is also included on the Minnesota.data CD collection; see: http://www.lmic.state.mn.us/chouse/mndata.html .)

Online Linkage Click here to download data. (See Ordering Instructions above for details.) By clicking here, you agree to the notice in "Distribution Liability" in Section 6 of this metadata.

Full Metadata

Minnesota Land Use and Cover: 1990s Census of the Land (8 category statewide)

Go to Section:

Section 1 Identification Information

Top of page

Originator Minnesota Department of Natural Resources

Title Minnesota Land Use and Cover: 1990s Census of the Land (8 category statewide)

Abstract This data set integrates six different source data sets to provide a generalized overall view of Minnesota's land use / cover. The six source data sets covered different parts of the state, were in differing formats, and used different legend classifications. MnDNR developed a generalized 8-category legend and translated each source data set's original detailed classification into the 8-category system. They also standardized the data to 30 meter grid cells. The data set was used to produce a 43 inch by 50 inch wall map of the same title.

Purpose The original purpose of the data set was to create the wall map showing a statewide view of Minnesota land use. The data set can also be used for general statewide analysis. For studies at the regional, county or more local level, users are encouraged to go back to the original data sets which contain more spatial and attribute detail.

Time Period of Content Date

Currentness Reference The dates for the source data sets range between 1987 - 1996.

1. Agricultural and Transition Areas: Approximately 1989 - 1991
2. Forested Areas: 1991 - 1996

3. Metropolitan Counties: TM imagery 1991 (all classes in original data set were used); Generalized Land Use from the Metropolitan Council 1990 (only the farmstead class from the original data was used)
4. Beltrami and Clearwater Counties: 1987
5. Olmsted County: 1992
6. Camp Ripley 1992 and 1996; Beltrami Island State Forest 1993 and 1996

Progress

Complete

Maintenance and Update Frequency

None planned

Spatial Extent of Data

Minnesota

Bounding Coordinates

-97.5
-89
49.5
43

Place Keywords

Minnesota

Theme Keywords

Land Use, Land Cover

Theme Keyword Thesaurus

Access Constraints

Only the 8-class legend attributes are distributed for this data set. For the more detailed legends, users need to obtain the original data sets (see Associated Data Sets element).

Use Constraints

Redistribution Conditions: In obtaining these data from LMIC, it is understood that you and/or your organization have the right to use them for any internal purpose. If you modify them, you should document those changes in a metadata record that should accompany all redistributed data. If you transmit or provide these data in any form to another user, the data MUST be accompanied by a copy of LMIC's disclaimer NOTICE.TXT and all documentation provided with the original data set including the full metadata record.

Contact Person Information

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FAX: (651) 296-4946
E-mail: tim.loesch@dnr.state.mn.us

Browse Graphic

View a sample of the data.

Browse Graphic File Description

This application on LMIC's web site allows users to view the 8-category map and to generate statistics by state, county, or user-specified group of counties.

Associated Data Sets

Land Use - Minnesota, Agricultural and Transition Areas
This data set uses a 17-category classification scheme. It covers 63 counties in the western and southern parts of the state, including the portions of Roseau and Morrison Counties not contained in the Camp Ripley / Beltrami Island State Forest data set. See:
http://www.lmic.state.mn.us/chouse/metadata/luse89.html

Land Use - Minnesota Forested Area
The Manitoba Remote Sensing Centre interpreted Landsat TM imagery to create a land use data set for the following predominantly forested counties: Aitkin, Carlton, Cass, Cook, Crow Wing, Hubbard, Itasca, Koochiching, Lake, Lake of the Woods, Mille Lacs, Pine, St. Louis, and Wadena. See: http://www.lmic.state.mn.us/chouse/metadata/mrsc_lu.html

1997 Generalized Land Use for the Twin Cities Metropolitan Area
This data set encompasses the seven county Twin Cities (Minneapolis and St. Paul) Metropolitan Area in Minnesota. See: http://www.datafinder.org/metadata/landuse_hist.htm

Interpreted TM Satellite Imagery for the Metropolitan Counties
This 10-category data set was created by the University of Minnesota's Department of Forestry using imagery from June 16 and September 4, 1991. A multitemporal classification using TM bands 1-5 was used to classify 'neighborhoods' of pixels which were similar into a single class. The accuracy measured was 91% for the ten classes and 95% for five classes (developed, cropland, forest, wetland, and water). For more information, contact Dr. Marvin Bauer, Dept. of Forest Resources, University of Minnesota, 1530 N. Cleveland Avenue, St. Paul MN 55108, (612) 624-3703, mbauer@forestry.umn.edu .

Olmsted County
This 37 category land use data set was developed by the Olmsted County Planning Department. For more information, contact Jan Chezick, Olmsted Planning Department, 2122 Campus Drive S.E., Rochester, MN 55904, (507) 285-8628.

Beltrami and Clearwater Counties Land Use
See: http://www.lmic.state.mn.us/chouse/metadata/bsuluse.html

Camp Ripley and Beltrami Island State Forest
This data set covers Camp Ripley, a military reservation in northern Morrison County, and Beltrami Island State Forest, in southeastern Roseau County. See: http://www.lmic.state.mn.us/chouse/metadata/ripbisf.html

Minnesota Land Use / Land Cover 1969
This data set contains 9 land use/cover classes interpreted from high altitude aerial photography. See http://www.lmic.state.mn.us/chouse/metadata/luse69.html

Section 2 Data Quality Information

Top of full metadata Top of page

Attribute Accuracy

No more accurate than the original attribute coding. See documentation for each source data set (listed in the 'Associated Data Sets' element).

Note: for the 10-category data set created by the University of Minnesota's Dept. of Forestry, one minor area of misclassification has been reported in the 'developed' category. In some areas, what appears to be cattail swamp / wetland was grouped with developed lands.

Logical Consistency

Data are stored within a valid ARC/GRID data structure.

Completeness

A lookup table (lulookup.dbf) details the translation between the original legend categories and the 8-category system. Also, see 'Completeness' element in metadata records for each source data set (listed in the 'Associated Data Sets' element).

Horizontal Positional Accuracy

No more accurate than the original horizontal positional accuracy. See metadata records for each source data set (listed in the 'Associated Data Sets' element). No formal statistical tests have been conducted on this data set. Additional error was introduced during the gridding process described in the Lineage element. Users who have a version of this data set created before 4/2000 should be aware that making the corrections noted in 'Lineage' slightly shifted the data in Chisago, Roseau and Wabasha Counties.

Vertical Positional Accuracy

Not applicable.

Lineage

Land Use Data Sources:

Agricultural and Transition Areas
Forested Areas
Interpreted TM satellite imagery for the Twin Cities metro area
Generalized Land Use for the Twin Cities Metropolitan Area (only the farmstead category)
Olmsted County
Beltrami and Clearwater Counties
Camp Ripley and Beltrami Island State Forest

County Boundaries Data Source:
MnDNR's CTYBDNE2 coverage (see documentation at http://deli.dnr.state.mn.us/metadata/full/ctybdne2.html)

DNR's Regional Boundaries Data Source:
DNR Regions coverage (see documentation at http://deli.dnr.state.mn.us/metadata/full/dnrrgne2.html)

MnDNR's Processing Steps:

All land use/cover data was put together by county in raster format using Arc/INFO GRIDs. The data that existed as vector data sets (Agriculture and Transition Areas, farmstead category from the Metropolitan Council data set, and Olmsted County) was rasterized to 30 meter by 30 meter cells prior to mosaicking using the THEME menu, Convert to Grid option in ArcView's Spatial Analyst. All county tiles were based on DNR's CTYBDNE2 coverage.

Special Processing for the metro area: Two data sets were used in the metro area. All land use classifications in the interpreted TM satellite imagery data set were used since they more closely matched classifications used in other areas in Minnesota. The one class that was not well-represented in the TM data set was scattered houses so the farmstead class from the Metropolitan Council land use data was incorporated into the TM data. This was done using simple overlay techniques in Spatial Analyst.

Individual county data sets were merged into tiles based on DNR's Administrative Regions. The DNR Administrative regions coverage was derived from the CTYBDNE2 coverage since most regional boundaries are based on county borders.

Each regional landuse/cover grid was then subjected to the following clean-up process. When raster data is mosaicked, there are gaps that occur between the tiles where they did not match up perfectly. Typically these gaps are very small, on the order of one or two cells in width. To fill in these gaps, the NIBBLE process in Spatial Analyst was used to replace cells that were offsite by using nearest neighbor rules. Each data set was masked so that only those cells within each region were processed. This is similar to a clip command in a vector GIS system.

Each of the regional data set grids were then mosaicked together using the MERGE request and then cleaned-up using the NIBBLE request as described above.

The resulting landuse/cover grid had one attribute called VALUE. This item contained the attribute codes for each of the different landuse/cover classes from each of the differing coding schemes. Since there were 6 sources for the data and since there were 5 different coding schemes, a new coding scheme had to be developed to maintain data integrity. To accomplish this, the data from different sources was offset in the following fashion:

100 Beltrami / Clearwater Counties
200 Camp Ripley / Beltrami Island State Forest
300 Forested
400 Olmsted County
500 Ag and Transition Areas
600 Twin Cities metro (TM and farmsteads)

Using this coding scheme, every unique data value was preserved. In all but Olmsted County, the data sets were simply offset by the appropriate value. For Olmsted County, where the landuse and cover class values exceeded 100, they were simply numbered sequentially from 1 to 37 and then offset by

400.

A lookup table (lulookup.dbf) was then created with the following fields:
New_code - The new code as it exists in the statewide grid
Orig_code - The Original code as it existed in the source data
Map_code - The codes as they were assigned on the statewide 1990s Land Use and Cover map
Orig_desc - The Original class description
Map_desc - The Class descriptions as shown on the statewide 1990s Land Use and Cover map

This table could be related/joined to the grid table using the VALUE item in the GRID and the NEW_CODE item in the lookup table.

Files for Public Distribution: A file that contained only the NEW_CODE item was created for public distribution. It is available in ArcGRID and EPPL7 raster formats. The lookup table, lulookup.dbf, is provided to show how the detailed legend categories in the original data sets were matched to one of the eight land use categories in this data set.

Several reported errors were corrected (4/2000):
1. City of Roseau: the western portion of the city was recoded from cultivated (2) to urban (1).
2. Chisago County: two small areas along the northern county boundary were recoded from forested (5) to unknown (9).
3. City of Wabasha: the northern portion of the city was recoded from water (6) to urban (1).
4. City of Hammond: the eastern portion of the city was recoded from cultivated (2) to urban (1).
5. Olmsted County: an area just northeast of the city of Rochester was recoded from unknown (9) to cultivated (2).

Source Scale Denominator

Section 3 Spatial Data Organization Information

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Native Data Set Environment Arc/INFO GRID

Geographic Reference for Tabular Data

Spatial Object Type Raster

Vendor Specific Object Types Cell

Tiling Scheme State

Section 4 Spatial Reference Information

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Horizontal Coordinate Scheme UTM

Ellipsoid GRS80

Horizontal Datum	NAD83
Horizontal Units	Meters
Distance Resolution	Unknown
Altitude Datum	Not applicable
Depth Datum	Not applicable
Cell Width	30
Cell Height	30
UTM Zone Number	15E
Coordinate Offsets or Adjustments	None

Section 5 Entity and Attribute Information

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Entity and Attribute Overview

1. Urban and rural development
Residential, commercial, industrial, cultural and recreational developments and related developments such as power plants, power lines, pipelines, airports, waste treatment facilities, golf courses, farmsteads and feedlots. Associated structures include garages, sheds and landscaped areas.

2. Cultivated land
Areas under intensive cropping or rotation, including fallow fields and fields seeded for forage or cover crops that exhibit linear or other patterns associated with current tillage

3. Hay/Pasture/Grassland
Areas covered by grasslands and herbaceous plants; these may contain up to one-third shrub and tree cover. Some areas may be used as pastures and mowed or grazed. Included are fields that show evidence of past tillage but now appear to be abandoned and grown over with native vegetation or planted with a cover crop.

4. Brushland
Areas with a combination of grass, shrubs, and trees in which deciduous or coniferous tree cover comprises from one to two-thirds of the area, or shrub cover comprises more than one-third of the area. These areas are often found adjacent to hay/pasture/grassland or forested areas and vary greatly in shape and extent.

5. Forested
Areas where two-thirds or more of the total canopy cover is composed of predominantly woody deciduous and coniferous species and areas of regenerated or young forest where commercial timber has been completely or partially removed by logging, other management activities or natural events; includes woodlots, shelterbelts and plantations.

6. Water
Permanent bodies of water such as lakes, rivers, reservoirs, stock ponds and open water areas where photo evidence indicates that the areas are covered by water the majority of the time

7. Bog/Marsh/Fen
Grassy, wet areas with standing or slowly moving water. Vegetation consists of grass and sedge sods,

and common hydrophilic vegetation such as cattail and rushes. These areas include wetlands with lowland coniferous forest and peat-covered or peat-filled depressions with a high water table; areas are often interspersed with channels or pools of open water.

8. Mining
Areas stripped of topsoil revealing exposed substrate such as sand or gravel, including gravel quarries, mine tailings, borrow pits and rock quarries. Included are areas that lack appreciable soil development or vegetation cover such as rock outcrops, sand dunes or beaches.

9. Unknown
Areas that were not classified or were unlabelled in the original data sets.

Entity and Attribute Detailed Citation

Section 6 Distribution Information

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Publisher

Minnesota Land Management Information Center (LMIC)

Publication Date

1999

Contact Person Information

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Distributor's Data Set Identifier

Downloadable Data

Distribution Liability

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For data delivered on-line or by physical media by
The Land Management Information Center, MN Planning

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Transfer Format Name

Arc/INFO GRID or EPPL7

Transfer Format Version Number

Transfer Size

GRID: 46 megabytes (22 mb zipped); EPPL7: 40 mb (19 mb zipped).

Ordering Instructions

This data set is distributed on the internet by clicking below after Online Linkage. Doing so will tell your browser to start downloading a self-extracting 'ZIP' file which will contain the following:

- An Arc/INFO Grid file
- A default color palette (.clr) for use when displaying in software such as ArcView
- lulookup.dbf: a database that shows how each category in the original data sets was reclassified into the 8-category system.
- Documentation (.htm) file for the dataset
- NOTICE.RTF, an important notice about this data set that can be read by most word processing software, and an ascii text version of the same notice (NOTICE.TXT)

After downloading this self-extracting 'zip' file (which will have an 'exe' extension), simply execute (run) the file. (For example, you can double click it from Windows Explorer or File Manager). Doing this will automatically extract the files described above. You can then delete file types that you do not need, if any.

(The file is also available in EPPL7 format. Go to ftp://ftp.lmic.state.mn.us/pub/data/phys_biol/landuse and download the luse8epp.exe file. This format is also included on the Minnesota.data CD collection; see: http://www.lmic.state.mn.us/chouse/mndata.html .)

Online Linkage

Click here to download data. (See Ordering Instructions above for details.) By clicking here, you agree to the notice in "Distribution Liability" above.

Section 7 Metadata Reference Information

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Metadata Date

05/12/2004

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Metadata Standard Name

Minnesota Geographic Metadata Guidelines

Metadata

1.2

Standard Version

Metadata Standard Online Linkage	http://www.lmic.state.mn.us/gc/stds/metadata.htm

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