NORTH MOORHEAD/OAKPORT TOWNSHIP ALTERNATIVE URBAN AREAWIDE REVIEW (AUAR) AND MITIGATION PLAN

Final for Council Consideration
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Prepared for the City of Moorhead
as the Responsible Governmental Unit (RGU)

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Table of Contents

List of Figures

List of Tables

Appendices

Executive Summary

WHAT IS AN AUAR?

An Alternative Urban Areawide Review (AUAR) is authorized under Minnesota Rules Chapter 4410.3610 as an alternative form of environmental review for development projects. Generally, the AUAR consists of one or more development scenarios, an inventory of environmental and cultural resources, an assessment of the "cumulative" impacts that the development scenarios may have on these resources as well as public infrastructure services, and a set of mitigation measures that reduce or eliminate the potential impacts generated by the development. The AUAR is intended t o address the "cumulative" impacts resulting from a sequence of related development projects as opposed to an Environmental Assessment Worksheet (EAW) or Environmental Impact Statement (EIS) which simply looks at a single project's impacts and does not attempt to outline mitigation initiatives.

WHY AN AUAR FOR THIS PROJECT?

An AUAR was chosen for the project area because it will provide a better framework for coordinating a number of future development projects that will occur over a long period of time, identifying potential impacts, and focusing on effective, efficient mitigation strategies.

HOW IS AN AUAR USED?

An AUAR is used as a tool to help parties interested in development within the project area understand the existing environmental and cultural resources present on a site prior to initiating detailed planning and design. It is also used to identify key initiatives that must or should be undertaken to minimize negative impacts generated by proposed development.

Any proposed development in the project area would need to be reviewed for consistency with the AUAR and Mitigation Plan. If a development plan is not consistent with these documents or other statutory requirements, the developer may need to conduct additional environmental documentation or review or request an amendment to the AUAR. Natural and cultural inventory information in the AUAR and the Mitigation Plan will be used to guide development. Design and construction would proceed only after all approvals and appropriate agreements are complete.

OVERVIEW OF THE AUAR PROCESS

City staff began exploring the concept of completing an AUAR for the project area in conjunction with study of the North Moorhead/Oakport Township growth area. The City of Moorhead knew that property owners and developers in the growth area had begun exploring development projects. Rather than evaluating projects individually, the City desired a comprehensive look at the potential impacts of full growth north of the city. The City hired a consultant to assist with the preparation of the AUAR. The process followed the statutory requirements for completion of an AUAR.

DESCRIPTION OF THE DEVELOPMENT SCENARIO

The project area encompasses over 10,000 acres in north Moorhead and west Oakport Township. Total build out of the project area is not anticipated for over 50 years. There are two development

scenarios being evaluated in this AUAR. One scenario reflects the 2004 City of Moorhead Comprehensive Plan, 2002 Clay County Comprehensive Plan and 2006 Dilworth Growth Area Plan. The comprehensive plans envision a mixture of residential, commercial, industrial, civic and park/open space. At total build out, this scenario is anticipated to have 8,207 new residential units, 5.1 million square feet of non-residential development and 3,450 new jobs.

The second scenario reflects the land use pattern described in the North Moorhead and Oakport Township Growth Area Plan (GAP). The GAP was developed as an implementation initiative to the Comprehensive Plan adopted by the City in 2004. General directions for the GAP were established based on the 2004 Comprehensive Plan, storm water plans, utility infrastructure plans, and regional transportation plan as provided by Fargo-Moorhead Council of Governments (Metro COG). The general public, city staff, affected property owners and the development community were integrally involved throughout the process providing input before alternatives were conceived and reviewing proposed alternatives to help converge on a preferred plan. At total build out, this scenario is anticipated 29,750 new residential units, 13.9 million square feet of non-residential development and 35,750 jobs.

IDENTIFICATION OF POTENTIAL IMPACTS

Natural, Cultural and Physical Resources

Past and current land uses in the project area have primarily been agricultural, with row crops being the predominant form. The next largest user of land is residential, with subdivisions located primarily in the western sections of the study area near the Red River and Oakport Coulee. These subdivisions generally feature larger lots. The southern portion of the project area, which is in the City of Moorhead, is comprised of a mixture of uses. West of 11th Street N is a residential neighborhood, small commercial node, the National Guard Amory, Moorhead Country Club, a cemetery and MB Johnson Park. This area is not anticipated to change in either scenario.

East of 11th Street N is one of Moorhead's largest non-residential land users. American Crystal Sugar is a cooperative that owns more than 500 acres in North Moorhead. The property includes a research facility in the southeast corner, a sugar beet processing facility, and farmland they have purchased to create a buffer to the property.

On the other side of Highway 75 are the American Crystal Sugar wastewater lagoons and waste disposal facilities. There are also the City of Moorhead's compost site, wastewater treatment facility and water treatment plant lagoons. North of the City's facilities on Highway 75 is also a small commercial area that provides a limited amount of goods and services to the area.

The most prominent feature in the study area is the Red River of the North, which is classified as a *Riverine* by the National Wetland Inventory. Other national wetland inventory features includes marshes and swamps comprising what is generally referred to as the Oakport Coulee. A number of other wetland features are located near the Red River.

Two areas with grassland include part of MB Johnson Park and the northern portion of the study area along the Oakport Coulee. Deciduous forest remains primarily along the Red River and the Oakport Coulee. Along Broadway Street N is a portion of the forest owned by the North Dakota State University Foundation (NDSU). Small stands of trees around farmsteads are located on large lot residential homes and as tree breaks in some agricultural fields.

The topography within the project area is generally flat and is not composed of highly erodible soils. However, wind erosion can be of concern depending upon the season and weather. The

potential for erosion of soils exposed during development of the project area will be minimized using Best Management Practices (BMPs) during and after construction. Specific erosion control practices will be identified in final grading and construction plans for each proposed development project. Developments will be required to meet as necessary the standards of the National Pollutant Discharge Elimination System (NPDES), the NPDES Municipal Separate Storm Sewer System Permit requirements, the NPDES General Permit for Construction, the City of Moorhead, and the Buffalo Red River Watershed Management District.

Land cover in the project area is primarily agricultural cropland. Opportunities for wildlife habitat are limited to deciduous forests along the Red River and Oakport Coulee. Wildlife currently consists of those typical in this type of environment, including deer, fox, rabbit, muskrat, pheasant, various birds, mice, and squirrels. Future development of the area will likely displace those wildlife populations. Some will remain within the park and open space areas designated to accommodate more natural habitat. Others will travel along these natural areas to the north to undeveloped areas exist.

The Red River of the North flows from west-central Minnesota north to southern Manitoba. The Red River supports a variety of fish and aquatic species, including walleye, catfish, pike, and sauger. It is currently considered impaired in the Moorhead area by federal standards because it does not meet water quality standards. Development in the project area has the potential to decrease water quality and impact aquatic habitat in the Red River, if storm water is not managed adequately. The City of Moorhead continues to be proactive in developing stormwater systems that adequately address runoff in the project area. The proposed stormwater systems are intended to filter pollutants and reduce sediment loads on the Red River. The MPCA is studying the Red River to determine the total maximum daily load (TDML) for pollutants and strategies to reduce the loads to meet water quality standards. The City of Moorhead and other regional partners will continue to work with the MPCA in this study and implement measures to protect the Red River. This would include other water quality and non-degradation programs, such as the impaired waters program.

The soil characteristics of the Red River Valley are extremely fertile. However, these same characteristics have made the banks of the Red River vulnerable to erosion and ground movement, such as slumping, creeping or earthflow. The rates of ground movement are influenced by a number of factors including soil moisture conditions, water levels in the river, and the actions of people such as the removal of the natural vegetation, weight of the homes and accompanying structures, and watering of landscaping. Although the rates of ground movement may be difficult to predict, it is not difficult to predict that development too close to the Red River will be impacted by the area's geology. To best protect private and public investment, development should be restricted immediately adjacent the Red River to proper setback distances and land should remain natural in protected park or open space areas.

Throughout history, waterways, such as the Red River, have been a prevalent location for human settlement. Archaeological artifacts have been found near the banks of the Red River in various parts of the Fargo-Moorhead area. Since the Red River has meandered throughout its history, the potential for archaeological sites exist within about an eighth to a quarter mile of the river. The Minnesota State Historic Preservation Office (SHPO) indicates that the Red River Trail within a portion of the project area is an archaeological feature. Since a systematic survey of Moorhead has not been completed, a survey of the project area should be completed to assess whether there is the potential for archeological sites.

A few architectural features exist within the study area. The Randolph M. Probstfield House, part of the Probstfield Farm, is listed on the National Register of Historic Properties. Adjacent to the

Red River, the property consists of 118 acres of crop land, woodlands, and several outbuildings. The Minnesota State Historic Preservation Office database also inventoried the Moorhead Country Club and American Crystal Sugar Plant as architectural features. Both scenarios assume these existing uses continue into the foreseeable future.

Municipal Infrastructure

The City of Moorhead continues to be proactive in assessing future needs for sanitary sewer extensions. As needed the City has completed Sanitary/Storm Water Preliminary Master Plans to investigate future service area needs. Additional wastewater system investments, including lift stations, sewers and forcemains will be needed to serve full build out. The Sanitary/Storm Sewer Preliminary Master Plans identify phasing for the logical and cost-efficient expansion of the wastewater system. The existing Wastewater Treatment facility is currently operating under its design capacity, however, an expansion will be needed in about 20 years to serve new development in the project area.

Moorhead Public Service (MPS), a municipal owned utility, will provide water to development in the study area. MPS is poised to serve the future development. Expansions of the water supply, water treatment facilities, storage and infrastructure will need to be completed over the long-term. MPS is monitoring needs closely. While a detailed water distribution system master plan was completed in 2006 it did not cover this growth area. It is anticipated that this will be updated in 2010 and will address this growth area. It should be also noted that MPS will be conducting a detailed water system study in 2009 which will include future needs for treatment, pumping, and storage. MPS is also currently working with regional partners to identify potential water sources.

Storm Water Management

Storm water runoff is anticipated to increase as development occurs in the growth area. While storm water runoff will increase, water quality should improve due to the installation of the stormwater management system and best management practices that otherwise would not be implemented in rural development or agricultural land use. The Sanitary Sewer/Storm Water Preliminary Master Plan illustrate a conceptual storm water system with enough storm water runoff capacity to handle a 100 year, 24-hour event or 5.26 inches of rain in a 24-hour period. The City of Moorhead will work with property owners and developers to construct and manage the storm water system as development occurs.

Traffic Related Impacts

Traffic will be generated by the future urbanization of North Moorhead and Oakport Township. The City and Fargo-Moorhead Council of Governments (Metro COG) maintain a long range transportation planning system that is poised to handle the increased traffic demands generated by new growth. Highway 75 is the principal arterial in the project area connecting Highway 10 to rural Clay County to the north. Minor arterial roadways in both scenarios include 15th Avenue N, Wall Street Avenue, Broadway Street, 11th Street N and 34th Street N. In the more intense development pattern proposed in Scenario Two, these roadways could carry between 13,000 and 26,000 vehicle trips per day within or adjacent to the project area. These roadways are designed or planned as four lane roadways with traffic management devices (signals, roundabouts and turn lanes) at key intersections to facilitate through movements and to maintain an acceptable and safe level of service. Local street systems will be designed to facilitate through movements and alternative routes for traffic with local destinations. As development occurs in the project area,

level of service analysis will need to be conducted periodically to monitor operations and to project improvement needs for five year capital improvement planning purposes.

MITIGATION INITIATIVES

A Mitigation Plan is included at the end of the AUAR worksheet questions. The Mitigation Plan identifies key steps that the City will take to mitigate potential impacts identified in the AUAR. In addition to general mitigation initiatives, the mitigation plan includes strategies in the following areas:

- Natural and Physical Resources
- Cultural Resources
- Parks, Trails and Open Spaces
- Land Use Management
- Erosion Control and Sedimentation
- Water Supply and Appropriation
- Wastewater System
- Storm Water Management
- Traffic

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Alternative Urban Areawide Review (AUAR) Worksheet Form

This section consists of the Environmental Assessment Worksheet (EAW) form and response to questions as modified by Environmental Quality Board (EQB) AUAR Guidance as April, 2005. The EAW question is shown in bold uppercase text, AUAR guidance is shown in grey italicized text, and the response to the question is shown in regular text.

AUAR Guidance as Revised by EQB staff

This guidance has been prepared by the EQB staff to assist in the preparation of AUAR documents. It is based on the directive of 4410.3610, subp. 4 that "the content and format [of an AUAR document] must be similar to that of an EAW, but must provide for a level of analysis comparable to that of an EIS for impacts typical of urban residential, commercial warehousing, and light industrial development and associated infrastructure."

General Guidance

This guidance is based on the items of the standard EAW form (February 1999 version); the numbers listed below refer to the item numbers of that form. Except where stated otherwise, the information requested here is intended to augment (or clarify) the information asked for on the EAW form; therefore, the EAW form and the guidance booklet "EAW Guidelines" must be read along with this guidance.

The information requested must be supplied for each of the major development scenarios being analyzed, and it is important to clearly explain the differences in impacts between the various scenarios. If this guidance indicates that an EAW item is not applicable to the AUAR, the item # and its title (the text in bold print on the EAW form) should be included with an indication that the EQB guidance indicates that no response is necessary in an AUAR (as opposed to just skipping reference to that item at all).

One general rule to keep in mind throughout the preparation of the AUAR document is that whenever a certain impact may or may not occur, depending on the exact design of future developments, the AUAR should cover the possible impacts through a "worst case scenario" analysis or else prevent the impacts through the provisions of the mitigation plan. Failure to cover possible impacts by one of these means risks the invalidation of the environmental review exemption for specific development projects.

1. TITLE

North Moorhead / Oakport Township Growth Area Plan

2. PROPOSER

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4. REASON FOR EAW PREPARATION

Not applicable to AUAR.

Over the past decade the City of Moorhead has experienced an increase in development activity that has led to the need to plan now for future growth. In updating its Comprehensive Plan, the City of Moorhead recognized the need for more detailed land use planning that would facilitate the development of multiple parcels in a cohesive manner and ensure that the public infrastructure needed to support development is planned for appropriately. This AUAR is being prepared to evaluate the potential future growth and its associated impacts on a cumulative basis rather than on a piecemeal basis as individual projects require or conduct environmental reviews. This is a discretionary AUAR completed by the City of Moorhead.

5. LOCATION AND MAPS

a. The county map is not needed for an AUAR.
b. The USGS map should be included.
c. Instead of a site plan, include:

(1) a map clearly depicting the boundaries of the AUAR and any subdistricts used in the AUAR analysis;
(2) land use and planning and zoning maps as required in conjunction with items 9 and 27
(3) a cover type map as required for item 10. Additional maps may be included throughout the document wherever maps are useful for displaying relevant information.

The AUAR Project Area is located on the north side of the City of Moorhead and extends into Oakport Township. Figures 5.1, 5.2, and 5.3 show the project location. The project area boundary extends from the Red River of the North on the west to 40th Street N on the east. The northern boundary is 80th Avenue N. The southern boundary extends along 15th Avenue N from the Red River of the North until Highway 75, where it extends further south to 8th Avenue N to the 40th Street N.

The project area has been divided into two different types of subdistricts: TAZ districts and Sewer Districts. Figure 5.4 shows traffic analysis zones (TAZ) which were created to analyze traffic impacts as part of the GAP effort. The project area was also divided into the sewer subdistricts shown in Figure 5.5 to estimate wastewater flows as part of the GAP effort. A breakdown of each land use's gross acres, net acres, units and jobs is provided for each TAZ and sewer district in Appendix B.

County: Clay
City: Moorhead
Locations: Township 140N, Range 48W, Sections 7-10, 15-22, 27-29, 32-34; Township 140N, Range 49, Sections 12-13; Township 139N, Range 48W, Sections 3-5.

The following figures are included within the AUAR:

Figure 5.1 - Project Location
Figure 5.2 - AUAR Boundary
Figure 5.3 - USGS Map

Figure 5.4 – Traffic Analysis Zones (TAZ) Districts
Figure 5.5 – Sanitary/Storm Sewer Districts
Figure 6.1 – Scenario One Land Use Plan
Figure 6.2 – Scenario Two Land Use Plan
Figure 6.3 – Dilworth Growth Area Plan Phasing
Figure 6.4 – Scenario Two Development Staging
Figure 7.1 – Development Potential
Figure 9.1 – Existing Land Use
Figure 9.2 - Sites of Environmental Concern
Figure 10.1 - Land Cover
Figure 10.2 – Land Cover Overlay with Scenario One
Figure 10.3 – Land Cover Overlay with Scenario Two
Figure 17.1 North – Proposed Stormwater/Sanitary System – Scenario One
Figure 17.1 South – Proposed Stormwater/Sanitary System – Scenario One
Figure 17.2 South – Proposed Stormwater/Sanitary System – Scenario Two
Figure 19.1 - Soils Map
Figure 21.1 - 2006 Average Daily Traffic Counts
Figure 21.2 – Proposed Roadway System – Scenario One
Figure 21.3 – 2030 Modeled Traffic Volumes – Scenario One
Figure 21.4 – Proposed Roadway System – Scenario Two
Figure 21.5 - 2030 Modeled Traffic Volumes – Scenario Two
Figure 21.6 – Transportation Improvements – Scenario Two
Figure 25.1 – Sensitive Resources – Scenario One
Figure 25.2 – Sensitive Resources – Scenario Two
Figure M.1 – Scenario Two Revised Land Use Plan

6. DESCRIPTION

Instead of the information called for on the form, the description section of an AUAR should include the following elements for each major development scenario included:
-anticipated types and intensity (density) of residential and commercial/warehouse/light industrial development throughout the AUAR area;
-infrastructure planned to serve development (roads, sewers, water, stormwater system, etc.) Roadways intended primarily to serve as adjoining land uses within an AUAR area are normally expected to be reviewed as part of an AUAR. More "arterial" types of roadways that would cross an AUAR area are an optional inclusion in the AUAR analysis; if they are included, a more intensive level of review, generally including an analysis of alternative routes, is necessary;
-information about the anticipated staging of various developments, to the extent known, and of the infrastructure, and how the infrastructure staging will influence the development schedule. Note: the RGU must assure that the development described complies with the requirements of 4410.3610, subpart 3 (and also that it properly orders the AUAR and sets the description in that order as required by 4410.3610, subpart 3).

Every AUAR document must review one or more development scenarios based on and consistent with the RGU's Comprehensive Pan in effect when the AUAR is officially ordered. (This is equivalent to reviewing the "no-build" alternative in an EIS.) If an RGU expects to amend its existing Comprehensive Plan, it has the option of deferring the start of the AUAR until after adopting the amended plan or reviewing developments based on both the existing and amended comprehensive plans; however, it cannot review only a development based on an expected amendment to the existing plan. Also, the rules require that one or more development scenarios

analyzed must be consistent with known development plans of property owners within the AUAR area.

Two development scenarios are evaluated in this AUAR. One scenario reflects the 2004 City of Moorhead Comprehensive Plan, 2002 Clay County Comprehensive Plan and 2006 Dilworth Growth Area Plan. The second scenario reflects the land use pattern described in the North Moorhead and Oakport Township Growth Area Plan (GAP).

Scenario One

Land Use

Scenario One reflects the 2004 City of Moorhead Comprehensive Plan, 2002 Clay County Comprehensive Plan and 2006 Dilworth Growth Area Plan. The compilation of these land use plans is shown in Figure 6.1. Table 6.1 summarizes the assumed development intensities. A description of the predominant uses within each land use category is provided following the table.

Table 6.1 Scenario One Development Assumptions

Residential Land Uses

Land Use	Source	Maximum Density (units per acre)	Percent Single-Family	Percent Multi-Family
General Rural Area	Clay County	0.025	100%	0%
Planned Growth Area	Clay County	0.05	100%	0%
Oakport Residential	Moorhead	3	100%	0%
Rural Residential	Dilworth	0.75	100%	0%
Low Density Residential	Moorhead	4	100%	0%
Moderate Density Mixed Residential	Moorhead	5*	80%	20%
Low to Moderate Density Residential	Dilworth	6	100%	0%
Medium Density Residential	Dilworth	12	0%	100%
Medium Density Residential	Moorhead	12	50%	50%
High Density Mixed Residential	Moorhead	12*	20%	80%
High Density Residential	Dilworth	24	0%	100%
High Density Residential	Moorhead	30	0%	100%

Non-Residential Land Uses

Land Use	Source	Floor Area Ratio (FAR)**	Size in Acres	Jobs per acre
Neighborhood Commercial	Moorhead	0.3	< 5	11.04
Community Commercial	Moorhead	0.25	5 to 15	11.04
Regional Commercial	Dilworth	0.2	> 15	11.04
Light Industrial	Moorhead	0.25	Any	5.33
Public/Institutional	Moorhead	0.15	Any	5.13

*Rather than a maximum these land use categories strive for an average density as shown.
**Floor Area Ratio describes the ratio of gross building area to the net lot area of a site.

Clay County Comprehensive Plan Land Uses

Planned Growth Areas lie outside of existing urbanized areas and are in the direct path of urban growth. The County looks to the respective city comprehensive plans for guidance on land use. New residential development in advance of annexation should be at densities lower than 1 unit per 20 acres.

General Rural Areas are intended primarily to accommodate agricultural land uses. Low density rural, non-farm residential development is allowed at densities of no more than one unit per 40 acres. Although the Clay County Comprehensive Plan notes that higher densities may be accommodated on poorer farmland soils, the project area is known as good agricultural land so higher densities are not anticipated. Commercial and industrial development is directed to areas along arterial roadways.

Moorhead Comprehensive Plan Land Uses

- Oakport Residential – predominantly single-family detached housing.
- Low Density Residential – predominantly single-family detached housing.
- Medium Density Residential – while predominantly townhomes and condominiums, it can include smaller lot detached and attached single-family developments.
- Moderate Density Mixed Residential – this category includes a mixture of single-family detached housing and attached units such as duplexes and twinhomes.
- High Density Residential – this category includes multi-unit and multi-building apartment complexes, as well as higher density townhome developments. The maximum building height is four stories so as to integrate with the surrounding area.
- High Density Mixed Residential – while a mixture of single-family and multi-family is encouraged, multi-family units are the predominant type.
- Neighborhood Commercial – typically provides convenience retail and services such as corner stores, coffee shops, salons, insurance and real estate offices.
- Community Commercial – includes neighborhood commercial uses, as well as larger users such as a grocery store or sit-down restaurant.
- Public/Institutional—public/institutional land uses include schools, churches and government facilities such as police, fire and libraries.

Dilworth Growth Area Plan Land Uses

- Rural Residential – agricultural preservation/urban reserve areas.
- Low to Moderate Density Residential – predominantly single-family and two-family housing.
- Medium Density Residential – provides a compatible variety in residential densities with single-family, two-family and multi-family buildings up to eight units.
- High Density Residential – comprises a mixture of multi-family developments.
- Regional Commercial – provides the City and the region with an area of commercial establishments that will provide a variety of goods and services.
- Park and Open Space – provides recreational facilities and open spaces for public use.

Development Staging

Moorhead and Dilworth are planning for additional growth in the study area. The Dilworth Growth Area Plan identifies a series of phases for development. As Figure 6.3 shows, the study area is within Phases I and II. Phase 1 contains the next 20 to 30 years of growth, while Phase II encompasses 30 to 50 years. Both of these areas can also be serviced without significant investment in infrastructure expansion.

Development in Oakport Township primarily will occur in the area under the Joint Powers Agreement with the City of Moorhead. The agreement does allow some residential and non-residential development, but limits the number of hook-ups that can occur. City of Moorhead plans for infrastructure analyze needs and capacity for the development anticipated in this area.

Water Supply Improvements

Moorhead Public Service (MPS), a municipal owned utility, will provide water to development in the study area. Expansions of the water supply, water treatment facilities, storage and infrastructure will be needed over the long-term. MPS is monitoring needs closely. While a detailed water distribution system master plan was completed in 2006, it did not cover this growth area. It is anticipated that this will be updated in 2010 and will address this growth area. It should be also noted that MPS will be conducting a detailed water system study in 2009 which will include future needs for treatment, pumping, and storage.

Sanitary Sewer Improvements

The City of Moorhead conducted a Sanitary/Storm Sewer Preliminary Master Plan in 2006 to evaluate future needs for a two-region area which includes the Scenario One study area. It should be noted that this 2006 Preliminary Master Plan went beyond evaluating the urban infrastructure needs required for Scenario One and assumed the entire study area will eventually be developed at urban densities. This greater analysis was done to provide a clearer understanding of the long-term costs of completing the entire system. While the Preliminary Master Plan is broader, it does show that the City's infrastructure can serve the needs of Scenario One. However, in order to accommodate all growth evaluated, infrastructure improvements will be needed. Phasing of development in a logical manner is important for improvement costs. For example, if the study area develops in a logical order the cost per acre for sanitary sewer improvements alone will be nearly $4,400 an acre. However, if development would occur on the opposite side of the study area improvement costs would be over $11,000 an acre.

The September 2006 City of Moorhead Sanitary/Storm Water Preliminary Master Plan is incorporated by reference and is available for review through the City of Moorhead Engineering

Department. The Plan states that the regional lift station located near the Wastewater Treatment Facility will handle all the flow generated as initial development occurs. A trunk sanitary sewer line will flow to this facility from the north. A pump lift station will be needed to the west of the Burlington Northern railroad track, north of Wall Street Avenue for a forcemain system that will connect to the interceptor. Another interceptor is proposed to the east of 40th Street N to serve the extreme eastern edge of the study area. This interceptor system will connect to multiple forcemain systems and lift stations. The current Wastewater Treatment Facility (WWTF) is expected to accommodate growth without improvements for approximately the next 20 years.

Electrical Service Improvements

Three power companies serve the project area. Areas annexed to the City of Moorhead will be served by Moorhead Public Service (MPS) which has existing infrastructure to accommodate the extent of development proposed.

Transportation Improvements

Transportation planning is done in collaboration with the City, County, and Fargo-Moorhead Council of Government (FMCOG). The Fargo-Moorhead Council of Government Short and Long Range Metropolitan Transportation Plan was used as the basis for long-range transportation planning. Full build out of the project area is more than 50 years away. Transportation system improvements will include acquisition of road right-of-way and construction of new roads, reconstruction and upgrading of existing roads and development of traffic management devices such as traffic signals and signage and extension of transit services to better serve the growth areas. Responsibility for these improvements will be dependent upon the roadway jurisdiction. Local roads improvements will be the responsibility of the City of Moorhead. Highway 75 will be the responsibility of MnDOT, while any County Roadways that are not turned back to the City will be the responsibility of Clay County. It is anticipated that planning and design of future improvements will be a collaborative effort amongst the three jurisdictions and Metro COG. As development occurs in the project area, level of service analysis will need to be conducted periodically to monitor operations and to project improvement needs for 5 year capital improvement planning purposes. Transportation improvements to accommodate full build out in the project area include the construction of 34th Street N and 57th Avenue N as minor arterials, the upgrading of 40th Street N as a collector and the paving of 43rd Avenue and 15th Avenues N east of 34th Street N.

Storm Water Improvements

Storm water runoff will need to be managed as the area is converted from primarily agricultural fields to urban land uses. The increase in impervious surfaces from urban development will result in more storm water runoff; however, water quality should be improved due to the installation of the stormwater management system and best management practices that otherwise would not be implemented in rural development or agricultural land use. As noted in the Sanitary Sewer Improvements section, the September 2006 City of Moorhead Sanitary/Storm Water Preliminary Master Plan investigated future storm water needs for a two-region area which includes the Scenario One study area. The document is incorporated by reference and is available for review through the City of Moorhead Engineering Department. While upgrades to the existing system will accommodate development proposed in Scenario One, new structures will be needed as urban development extends further north into areas currently assumed to be rural in the Clay County Comprehensive Plan.

Parks and Open Space

The project area currently includes the recreational facilities in MB Johnson Park and Centennial Athletic Complex. A new neighborhood park is identified in Moorhead's Comprehensive Plan north of 15th Avenue N and west of 34th Street N. In addition, Dilworth's Growth Area Plan identifies a new park in the project area, located just north of 15th Avenue N and east of 34th Street N.

Scenario Two

Scenario Two is the North Moorhead / Oakport Township Growth Area Plan (GAP). The GAP was developed as an implementation initiative of the Comprehensive Plan adopted by the City in 2004. The key purposes of developing the GAP were to:

- Provide a detailed land use plan illustrating how a large land area with multiple property owners develops in a manner consistent with the long term community vision.
- Identify an efficient and logical system of major roadways to connect growth areas and existing community destinations.
- Establish a comprehensive network of parks and open spaces to serve future residents by providing active and passive recreation areas, community amenities, and trails to connect neighborhoods.
- Identify a system and strategies for storm water management that serves as an asset and amenity for future neighborhoods while performing the needs of managing increased storm water run off due to future development.

The GAP encompasses approximately 10,000 acres on the north side of the City of Moorhead and southwest portion of Oakport Township. As Figure 6.2 shows, the GAP has a mixture of land uses and housing densities to provide places for people to live, work, shop and recreate. The types and intensities of development for each of the land uses will be:

- Rural Residential – single family detached homes with a maximum density of 1 dwelling unit per 2 acres of land. Homes may be clustered for land conservation and efficient use of utilities.
- Low Density Residential – consists of single family detached homes. The density per net acre should range between 1 and 4 units per acre. Homes may be clustered for land conservation and efficient use of utilities.
- Medium Density Residential – includes single family detached homes, twin homes, townhomes and manor homes. Typically attached units with 2 to 3 stories. The density per net acre should range between 4 and 12 units per acre.
- High Density Residential – includes for-rent apartments and/or for-sale condominiums. Buildings range from low-rise (2 to 4 stories) to high-rise buildings (above 8 stories). The density per net acre should range between 12 to 30 units per acre.
- Regional Center – commercial areas typically dominated by retail uses including several large anchors. Generally consumes around 40 to 100 acres of land with 300,000 to 800,000 square feet of retail space.
- Town Center – area with a mix of uses, including retail, office, housing, civic and park or plaza space. Generally includes a minimum of 50,000 square feet of commercial space occupied by specialty stores, but may include anywhere from 100,000 to 500,000 square feet of commercial

- Neighborhood Center – provides the immediate neighborhood with places to live, shop and play as well as promote social gathering. It typically includes from 30,000 to 150,000 square feet of retail space on 3 to 15 acres of land.
- Office/Technology Park – these areas may be developed as stand alone buildings, in a campus setting with other office buildings, or as part of mixed use building or development. Uses may include medical clinics, law services, computer technology, food production and biotechnology to graphic design, printing, engineering and architectural services.
- Industrial – primarily focused on the manufacturing, storage and/or distribution of goods and products. May also serve utilitarian needs of municipalities such as treatment of water, composting, power plants or storage of equipment.
- Agricultural – continued agricultural production with farmsteads.
- Civic – public facilities to serve the population, including fire rescue and police facilities, schools, libraries, and community gathering places.

Development Staging

The City of Moorhead and Oakport Township are poised for additional growth with no specific infrastructure improvements for the initial stages of development. The timing of later stages of development will be based on the City's ability to expand sanitary sewer infrastructure capacity. Although the City has flexibility to accommodate property owners or developers who are ready to develop, the City generally will encourage growth in a contiguous fashion to maximize municipal investment. The project area likely will develop over the next 50 to 100 years depending upon market conditions. See Figure 6.4 for development staging.

Water Supply Improvements

Moorhead Public Service (MPS), a municipal owned utility, will provide water to development in the study area. MPS is poised to serve the future development; expansions of the water supply, water treatment facilities, storage and infrastructure will need to be completed over the long-term. MPS is monitoring needs closely. While a detailed water distribution system master plan was completed in 2006, it did not cover this growth area. It is anticipated that this will be updated in 2010 and will address this growth area. It should be also noted that MPS will be conducting a detailed water system study in 2009 which will include future needs for treatment, pumping, and storage.

Sanitary Sewer Improvements

The April 2008 City of Moorhead Sanitary/Storm Water Preliminary Master Plan investigated future sanitary sewer needs in the project area. The document is incorporated by reference and is available for review through the City of Moorhead Engineering Department. The entire study area will flow to four regional lift stations that will discharge directly into the Wastewater Treatment Facility. Flow to the regional lift stations will be by gravity trunk sewers, regional sewers, sub-regional lift stations or in combinations. The four regions are entirely separate systems that do not rely on the other. As much as possible existing systems will be upgraded; however, due to the scope of development, new trunk sanitary sewer lines, lift stations and forcemains will be needed. The current Wastewater Treatment Facility (WWTF) is expected to accommodate growth without improvements for approximately the next 20 years. The City of Moorhead already is planning to expand its sanitary sewer system to accommodate additional growth.

Electrical Service Improvements

Three power companies in the project area. Areas annexed to the City of Moorhead will be served by Moorhead Public Service (MPS). The only improvement identified to serve the additional growth proposed in Scenario Two is the construction of a substation along Highway 75.

Transportation Improvements

Transportation planning was done in collaboration with the City, County, and Fargo-Moorhead Council of Government (FMCOG). The North Moorhead/Oakport Township GAP identifies future arterials and collectors that will connect to the existing transportation system and accommodate projected development. As part of the GAP planning process, traffic generation was estimated and modeled in the area to determine long term impacts on the roadway network and to identify future planning needs.

As this area develops, improvements to the transportation system will be needed to accommodate an expected increase in traffic volumes. Transportation system improvements will include acquisition of road right-of-way and construction of new roads, reconstruction and upgrading of existing roads and development of traffic management devices such as traffic signals and signage and extension of transit services to better serve the growth areas. Responsibility for these improvements will depend upon the roadway jurisdiction. For local roads improvement, responsibility lies principally with the City of Moorhead. Highway 75 will be the responsibility of MnDOT; any county roadways that are not turned back to the City will be the responsibility of Clay County. Planning and design of future improvements will be a collaborative effort of the three jurisdictions and Metro COG. As development occurs in the project area, level of service analysis must be conducted periodically to monitor operations and to project improvement needs for 5 year capital improvement planning purposes. Transportation improvements needed to accommodate full build out in the project area include the construction of two new minor arterials, upgrading of four roadways to collectors and paving of a number of existing gravel roadways.

Storm Water Improvements

Storm water runoff needs to be managed as the area is converted from primarily agricultural fields to urban land uses. The increase in impervious surfaces from urban development will result in more storm water runoff. Water quality will be improve, however, due to the installation of the stormwater management system and best management practices not implemented in rural development or agricultural land use. Scenario Two illustrates a conceptual storm water system with enough runoff capacity to handle a 100 year, 24-hour event (5.26 inches of rain in a 24-hour period). Its design is consistent with the design engineering parameters established by the *South Moorhead Storm Water Management Plan* completed in 2004 by Houston Engineering, Inc. The April 2008 City of Moorhead Sanitary/Storm Water Preliminary Master Plan, which investigated future storm sewer needs for Scenario Two, is available from the City Engineering Department and is incorporated by reference.

Parks and Open Space

Both the City's Comprehensive Plan and North Moorhead/Oakport Township Growth Area Plan (GAP) emphasize the amenity value and identity that parks and open spaces bring to neighborhoods and the community as a whole. The GAP identifies about 755 net acres of land to be used for parks, open spaces, and stormwater ponding, comprised of multiple elements to ensure a rich variety of social and recreational opportunities for all residents. Storm water

management is incorporated where possible into the park and open space system as natural features and amenities.

7. PROJECT MAGNITUDE DATA

The cumulative totals of the parameters called for should be given for each major development scenario, except that information on "manufacturing," "other industrial," "institutional," and "agricultural."

The project area encompasses 10,175 acres in north Moorhead and southwest Oakport Township, including areas already developed and within the 100 year floodplain. Total build out of the project area is not anticipated for over 50 years. Figure 7.1 shows the areas assumed to be developable/ redevelopable, already developed and in the floodway. The net developable areas are 7,931 acres. In determining the project magnitude for the ultimate build out of the area, a number of assumptions were made and used in both scenarios:

- No development will occur in the floodway, as provided by Houston Engineering in June 2007.
- Existing, platted residential subdivisions will remain.
- American Crystal Sugar and City of Moorhead facilities will remain. However, the Moorhead Public Service lime ponds will be redeveloped over the long-term.
- Individual lots surrounded by large, agricultural tracts will redevelop when the large tracts develop.
- Ultimately future development will occur in areas with land use changes, such as the existing commercial properties along Highway 75.
- Residential parcels greater than 5 acres were assumed to be redevelopable. Some parcels less than 5 acres were considered redevelopable if, combined with adjacent properties of similar character, they formed an area that would be feasible to subdivide.

At total build out, Scenario One is anticipated to have 8,207 new residential units, 5.1 million square feet of non-residential development and 3,452 new jobs. Scenario Two is anticipated to generate 29,750 new residential units, 13.9 million square feet of non-residential development and 35,750 jobs. Tables 7.1 and 7.2 summarize the anticipated types and intensity/density of land uses through the AUAR area.

Table 7.1
Scenario One Project Magnitude Data

Land Use	Source	Total Net Developable Acres	Maximum Intensity of Development	Project Magnitude Data
CCCP* General Rural Area	County	4,095	0.025 units per acre	102 units
CCCP* Planned Growth Area	County	1,270	0.05 units per acre	63 units
Oakport Residential	Moorhead	640	3 units per acre	1,920 units
Rural Residential	Dilworth	7	0.75 units per acre	5 units
Low Density Residential	Moorhead	0	4 units per acre	0 units
Moderate Density Mixed Residential	Moorhead	531	5 units per acre	2,654 units
Low to Moderate Density Residential	Dilworth	31	6 units per acre	186 units

Land Use	Source	Total Net Developable Acres	Maximum Intensity of Development	Project Magnitude Data
Medium Density Residential	Dilworth	89	12 units per acre	1,068 units
Medium Density Residential	Moorhead	3	12 units per acre	39 units
High Density Mixed Residential	Moorhead	38	12 units per acre	453 units
High Density Residential	Dilworth	68	24 units per acre	1,632 units
High Density Residential	Moorhead	0	30 units per acre	0 units
Neighborhood Commercial	Moorhead	27	0.3 FAR & 11.04 jobs per acre	357,825 square feet & 302 jobs
Community Commercial	Moorhead	1	0.25 FAR & 11.04 jobs per acre	9,801 square feet & 10 jobs
Regional Commercial	Dilworth	102	0.2 FAR & 11.04 jobs per acre	888,624 square feet & 1,126 jobs
Light Industrial	Moorhead	290	0.25 FAR & 5.33 jobs per acre	3,156,566 square feet & 1,545 jobs
Public/Institutional	Moorhead	131	0.15 FAR & 5.13 jobs per acre	854,257 square feet & 671 jobs
Parks and Open Space	Moorhead	0		
Parks and Open Space	Dilworth	9		
Right-of-Way & Railroad	All	599		
Total		**7,931**		**8,122 units & 5.3 million square feet & 3,654 jobs**

**Clay County Comprehensive Plan*

Table 7.2
Scenario Two Project Magnitude Data

Land Use	Net Acres	Maximum Intensity of Development	Project Magnitude Data
Agricultural	450	0.025 units per acre	11 units
Rural Residential	831	0.2 units per acre	166 units
Low Density Residential	2,937	4 units per acre	11,747 units
Medium Density Residential	562	12 units per acre	6,711 units
High Density Residential	312	30 units per acre	9,370 units
Mixed Use/Walkable Street	54	30 units per acre & 0.2 FAR & 11.04 jobs per acre	1,294 units & 93,950 square feet & 119 jobs
Commercial	250	0.2 FAR & 11.04 jobs per acre	2.2 million square feet & 2,763 jobs
Office/Technology Park	767	0.25 FAR & 11.04 jobs per acre	8.4 million square feet & 30,944 jobs
Industrial	205	0.25 FAR & 5.33 jobs per acre	2.2 million square feet & 1,093 jobs
Civic	162	0.15 FAR & 5.13 jobs per acre	1.1 million square feet & 834 jobs
Parks and Open Space	755		
Right-of-Way	646		
Total	**7,931**		**29,752 units & 13.9 million square feet & 35,752 jobs**

8. PERMITS AND APPROVALS REQUIRED

A listing of major approvals and public financial assistance and infrastructure likely to be required by the anticipated types of development projects should be given. This list will help orient reviewers to framework that will protect environmental resources. The list can also serve as a starting point for the development of the implementation aspects of the mitigation plan to be developed as part of the AUAR.

Table 8.1 presents a list of known local, state, and federal permits and approvals. The specific permits and approvals needed will depend on the type and magnitude of a particular development project. Additional consultation with city and agency staff will be needed to clarify whether a permit or approval is necessary.

Table 8.1
Permits and Regulatory Review/Approvals

Unit of Government	Type of Permit/review or approval	Regulatory Citation (as may be noted)
City of Moorhead	Subdivision Approval	City Code Chapter 11
	Planned Unit Development Approval	City Code Chapter 10, Article 28 and 58
	Rezoning	City Code Chapter 10, Article 3
	Flood Fringe and Floodway Overlay	City Code Chapter 10 Article 59
	Conditional Use Permit Approval	City Code Chapter 10, Article 4
	Grading/Erosion Control Permit	
	Site Plan Review Approval	City Code Chapter 10, Article 15
	Comprehensive Plan Amendments	
	Zoning Ordinance Amendments	City Code Chapter 10, Article 3
	Variance	City Code Chapter 10, Article 5
Clay County	Roadway Access Permit	
	Utilities in Right-of-Way Permit	
Minnesota Department of Natural Resources	Utility Crossings Permit	MN Statute 103G, MN Rules 6115.0810
	Natural Heritage Program Coordination	Federal Endangered Species Preservation Act of 1973, as amended in 1978, 1982, and 1988; MN Statutes Chapter 84.0895; MN Rules Chapter 6134
	Public Waters Work Permit if not part of Utility Crossing Permit	MN Statute 103G, MN Rules 6115

Unit of Government	Type of Permit/review or approval	Regulatory Citation (as may be noted)
U.S. Army Corps of Engineers	Clean Water Act Section 404/10 Wetland Permits	Section 404 Of The Clean Water Act Title 33CFR26 - Water Pollution Prevention and Control Subchapter IV - Permits and Licenses
Minnesota Department of Health	Water Main Plan Review	MN Rules 4720
Minnesota Pollution Control Agency	NPDES General Permit for Construction	MN Statute 115, MN Rules 7002
	Sanitary Sewer Extension Permit	
	Clean Water Act Section 401 Water Quality Certification required if a U.S. Army Corps of Engineers Clean Water Action Section 404 Permit is required	Section 401 of the Clean Water Act Title 33CFR26 - Water Pollution Prevention and Control Subchapter IV - Permits and Licenses
Buffalo-Red River Watershed District	Watershed Permit	
BNSF and OTVR Railroad	Utility Crossing License Agreement	
	Roadway Crossing License Agreement	
Minnesota State Historic Preservation Office	Cultural Resource Coordination	Section 106 of the Historic Preservation Act, Protection of Historic Properties" (36 CFR Part 800), MN Statutes 138.31-.42, MN Private Cemeteries Act- MN Statute 307.08
Minnesota Department of Transportation	Utilities in Right-of-Way Permit	
	Access Permit	
Minnesota Environmental Quality Board (EQB)	Environmental Assessments (AUAR)	Minnesota Rules 4410

Financial assistance may be provided for qualifying projects. Assistance for housing development is primarily provided through state programs. In addition to state economic development programs, the City of Moorhead provides assistance to businesses through programs such as the Border City Development Zone and Moorhead Community Loan Program.

9. LAND USE

Describe current and recent past land use and development on the site and on adjacent lands. Discuss project compatibility with adjacent and nearby land uses. Indicate whether any potential conflicts involve environmental matters. Identify any potential environmental hazards due to past site uses, such as soil contamination or abandoned storage tanks, or proximity to nearby hazardous liquid or gas pipelines.

- *Discuss past and current land use at the project's site.*

- *Generally, "proximity" means within a mile or so of the project; however, the distance can be greater in specific instances.*
- *If a site assessment for past contamination has been done, include a brief summary of the results.*
- *Discuss what is adjacent to the site (all directions).*
- *Note any nearby features of concern, including areas where vulnerable populations live or visit such as a nursing homes, schools, day care centers, water resources, parks, etc.*
- *Indicate the distance and direction to the nearest residential receptor. Since air and water contamination can potentially travel in any direction, please include all residential areas surrounding the site. You may need to contact the city or county in which the project is location for information.*

As shown in Figure 9.1, most of the study area is currently in agricultural production, with row crops being the predominant form. The next largest user of land is residential, with larger lot subdivisions located primarily in the western sections of the study area near the Red River and Oakport Coulee.

The southern portion of the project area, which is in the City of Moorhead, is comprised of a mixture of uses. West of 11th Street N is a residential neighborhood, small commercial node, the National Guard Armory, Moorhead Country Club, a cemetery and MB Johnson Park. This area is not anticipated to change in either scenario.

East of 11th Street N is one of the largest non-residential land users. American Crystal Sugar is a cooperative that owns more than 500 acres in North Moorhead. The property includes a research facility in the southeast corner, a sugar beet processing facility, and farmland they have purchased to create a buffer to the property.

On the other side of Highway 75 are American Crystal Sugar's wastewater lagoons and waste disposal facilities. There are also the City of Moorhead's compost site, wastewater treatment facility and water treatment plant lagoons. North of Highway 75 is also a small commercial area that provides a limited amount of goods and services to the area.

Adjacent land uses consist of a combination of urban and rural land uses. Across the Red River to the west of the study area is the City of Fargo's residential, commercial and golf course/open space. To the south is the residential and commercial development in the cities of Moorhead and Dilworth. To the north and east are primarily agricultural land uses and a couple of small residential neighborhoods.

The anticipated land uses in each scenario is compatible with the adjacent land uses. The mixture of residential, commercial, industrial, public/institutional and park/open space will be an expansion of the urban land uses already present in the area.

Within the project area are six places listed in the Minnesota Pollution Control Agency's (MPCA) Leaking Underground Storage Tank (LUST) database. These include three residences and three businesses. All but one of the cases were closed, indicating that the MPCA no longer requires investigation or clean up of the site. As of 2004, the only one remaining open was a residence just north of 43rd Avenue N.

The MPCA maintains a historical database, the Master Entity System (MES), containing information on potential soil and ground water contamination sites in Minnesota. Figure 9.2 shows four sites within the project area that are part of this database. The Old Moorhead Dump was identified as a site where no further remedial action was planned. The Moorhead National

Guard Armory was a "voluntary investigation and clean-up site," where the owner voluntarily investigates and, if necessary, cleans up any contamination. The final two sites are identified as American Crystal Sugar. The southern site is considered permitted solid waste, the northern site is classified as an "Unpermitted Dump Site." According to the resource information accompanying the MES, most of the Unpermitted Dump Sites date prior to the creation of the MPCA in 1967 and do not have detailed information. The list of Unpermitted Dump Sites includes abandoned dumps, demolition sites and tree disposal sites. Further investigation of these sites is needed to determine the risk to human health or environment and what mitigation is necessary. The unpermitted dump site is located in MB Johnson Park and is not planned to be developed.

10. COVER TYPES

The following information should be provided instead:
a. cover type map, at least at the scale of a USGS topographic map, depicting:
-wetlands – identified by type (Circular 39)
-watercourses – rivers, streams, creeks, ditches
-lakes – identify protected waters status and shoreland management classification
-woodlands – breakdown by classes where possible
-grassland – identify native and old field
-cropland
-current development
b. an "overlay" map showing anticipated development in relation to the cover types; this map should also depict any "protection areas," existing or proposed, that will preserve sensitive cover types. Separate maps for each major development scenario should generally be provided.

Cover Type Map

Figure 10.1 shows cover types, including national wetland inventory, watercourses, grassland, woodlands, cropland and current development. The most prominent feature in the study area is the Red River of the North, which is classified as a *Riverine* by the National Wetland Inventory. Other national wetland inventory features include marshes and swamps comprising what is generally referred to as the Oakport Coulee. There are a number of other wetland features located near the Red River.

Land Cover is also shown in Figure 10.1 based on the 1990 International Coalition Land Use/Land Cover dataset from the Minnesota Department of Natural Resources (MnDNR). A visual comparison of the dataset to the 2002 Aerial Photograph from Clay County showed that the dataset is still relatively accurate except relative to the conversion of agricultural land to urban land uses. There are two areas with grassland, one is part of MB Johnson Park while the other is located in the northern portion of the study area along the Oakport Coulee. Deciduous forest remains primarily along the Red River and the Oakport Coulee. Along Broadway Street N is a portion of the forest owned by the North Dakota State University Foundation (NDSU). Small stands of trees are around farmsteads, large lot residential homes and as tree breaks in some agricultural fields.

The 100 Year Flood Plain is located along the Red River, Oakport Coulee and tributary streams in the project area. The 100 Year Flood Plain is guided by sections of both the City of Moorhead's City Code and Clay County Development Code. The proposed 100 Year Flood Plain is currently under review and will not be adopted until 2009 or later. This is discussed further in question 14.

According to the Minnesota Department of Natural Resource's Natural Heritage Program Rare Natural Features, no sensitive environmental features exist in the project area. No features are identified in the MnDNR's electronic databases of the Minnesota County Biological Survey (MCBS) Sites of Biodiversity Significance and Native Plant Communities.

Overlay Map

Current land use in and around the project area is shown in Figure 9.1; future land use according to the two scenarios are presented in Figures 6.1 and 6.2. An overlay map showing the cover types, 100 year flood plain and future land use according to the two scenarios is presented in Figures 10.2 and 10.3.

Pre- and Post- Land Cover Analysis

An analysis was conducted to determine the pre- and post- development land cover using the 1990 International Coalition Land Use/Land Cover dataset. The results of this analysis are shown in Table 10.1 below. The assumptions used in creating this table included:

- In Scenario One, Cultivated Land was assumed to remain if it was designated in the Clay County Comprehensive Plan as General Rural Area or Planned Growth Area. As noted in Question 6 on pages 10 and 11, these areas are planned for low densities with General Rural Areas designated as 1 unit per 40 acres and Planned Growth Areas as 1 unit per 20 acres.
- In Scenario Two, Cultivated Land is assumed to remain if it is designated as Agricultural.
- In both scenarios, Grassland and Grassland – Shrub – Tree (deciduous) is assumed to remain if it is designated as Park and Open Space. It is anticipated that the Park, Trail and Open Space Master Plan described in the Mitigation Plan will determine exactly what remains.
- In both scenarios, it is assumed that approximately 80% of the existing Deciduous Forest will remain through implementation of existing ordinances, conservation design techniques, and designation of areas as park and open space land use.
- In both scenarios, it is assumed that all existing water and wetlands will remain no matter its future land use designation. It should be noted that the National Wetland Inventory provides a more accurate location of wetlands.

Table 10.1 Land Cover

Land Cover	Existing (1990)	Scenario One	Scenario Two
Cultivated Land	7,420	5,240	439
Grassland	162	0	82
Grassland – Shrub – Tree (deciduous)	55	41	54
Deciduous Forest	919	735	735
Water	19	19	19
Wetlands	20	20	20
Developed (urban, industrial, farmsteads, rural residential, rural development & right-of-way)	1,580	4,121	8,827
Total	10, 175	10,175	10,175

An estimate of imperviousness was also developed for both scenarios and shown in Table 10.2. Assumptions for amount of imperviousness are based on general knowledge of Moorhead development.

Table 10.2 Imperviousness

Land Use	Assumed Imperviousness	Scenario One		Scenario Two	
		Acres	Acres Impervious	Acres	Acres Impervious
Agricultural	5%	5,796	290	450	23
Rural Residential	10%	7	1	1,369	137
Low Density Residential	30%	2,094	628	2,966	890
Medium Density Residential	55%	171	94	591	325
High Density Residential	70%	77	54	312	219
Mixed Use	80%	0	0	54	43
Commercial	80%	133	106	1,018	814
Industrial	75%	658	493	639	479
Civic	75%	278	208	231	173
Park and Open Space	10%	360	36	1,893	189
Right-of-Way	75%	602	451	651	488
Total	-	10,175	2,362	10,175	3,781

11. FISH, WILDLIFE, AND ECOLOGICALLY SENSITIVE RESOURCES

a. The description of wildlife and fish resources should be related to the habitat types depicted on the cover types maps (of item 10). Any differences in impacts between development scenarios should be highlighted in the discussion.
b. For an AUAR, prior consultation with the DNR Natural Heritage program for information about reports of rare plant and animal species in the vicinity is required.
If such consultation indicates the need, an on-site habitat survey for rare species in the appropriate portions of the AUAR area is required. Areas of on-site surveys should be depicted on a map, as should any "protection zones" established as a result.

Wildlife and Fish Resources

Land cover in the project area is primarily agricultural cropland with limited opportunities for wildlife habitat, including deciduous forests along the Red River and Oakport Coulee. Wildlife currently consists of those typical in this type of environment, including deer, fox, rabbit, muskrat, various birds including eagles, mice, beavers, squirrels, and the occasional river otter. Future development of the area will likely displace a portion of those wildlife populations. Some

will remain within the park and open space areas designated to accommodate more natural habitat. Others will travel along these natural areas to the north where undeveloped areas exist.

The Red River of the North flows from west-central Minnesota north to southern Manitoba. The Red River supports a variety of fish and aquatic species, including walleye, catfish, pike, and sauger. Currently, it is considered impaired in the Moorhead area because it does not meet federal standards for water quality standards. Development in the project area has the potential to decrease water quality and impact aquatic habitat in the Red River if storm water is not managed adequately. The City of Moorhead continues to be proactive in developing stormwater systems which adequately address runoff in the project area. The proposed stormwater systems are shown in Figures 17.1 and 17.2 (note that the figures also show the proposed sanitary sewer system). The proposed stormwater system filters pollutants and reduces sediment loads on the Red River. The MPCA currently is studying the Red River to determine the total maximum daily load (TDML) for pollutants and strategies to reduce the loads to meet water quality standards. The City of Moorhead and other regional partners will continue to work with the MPCA in this study and implement measures to protect the Red River. This would include other water quality and non-degradation programs, such as the impaired waters program.

Natural Heritage Program

The Department of Natural Resources (MnDNR) Natural Heritage and Nongame Research Program (NHP) was contacted during the preparation of the AUAR. There are no occurrences of rare plant and animal species within the project area.

12. PHYSICAL IMPACTS ON WATER RESOURCES

The information called for on the EAW form should be supplied for any of the infrastructure associated with the AUAR development scenarios, and for any development expected to physically impact any water resources. Where it is uncertain whether water resources will be impacted depending on the exact design of future development, the AUAR should cover the possible impacts through a "worst case scenario" or else prevent impacts through the provisions of the mitigation plan.

Development in the project area is not anticipated to involve the physical or hydrologic alteration of any existing surface waters, however, development could impact the Red River and its tributary streams if storm water runoff is not managed adequately. The MPCA has identified portions of the Red River in the Moorhead area as impaired. Additional drainage from urban development could increase sediment and pollutant loads into the Red River.

Recognizing this issue, the City of Moorhead has developed Stormwater Ordinance which will address the treatment of storm water runoff, including construction techniques to minimize erosion and stabilize soils. The City has identified a greenway corridor along the Red River and the Oakport Coulee in Scenario Two to help prevent and reduce sediments from entering the river. In addition to regional methods of addressing storm water runoff, ensuring adequate on-site storm water treatment needs will be considered as part of every development proposal. As mentioned previously in the response to Question 11, there is currently a study being conducted by MPCA to determine the total maximum daily load (TMDL) of sediments and pollutants. Once the study has been completed, additional mitigation measure may be implemented to protect water quality.

There are a number of flood mitigation projects in or near the AUAR study area which may impact development over the long-term. One project, the Oakport Township Flood Mitigation Project being undertaken by the Buffalo Red River Watershed District (BRRWD), was

considered during the planning process for Scenario Two. This project which will be constructed in phases between 2009 and 2011 involves the construction of over 43,000 lineal feet of FEMA certified dike system. According to the BRRWD, computer modeling shows that the project will not have an impact on the water surface levels during a 100 year flood in the Red River or Oakport Coulee. The project will also result in over 90 acres of project right-of-way being maintained as parkway, natural resource habitat and/or biking/walking trails.

The United States Army Corps of Engineers, in conjunction with the cities of Fargo and Moorhead, is currently conducting the Fargo-Moorhead Metropolitan Flood Risk Management Study to assess the feasibility of measures to reduce flood risk in the metropolitan area. The study will consider potential measures such as nonstructural flood proofing, diversion channels, levee/floodwall systems and flood storage. The study is scheduled for completion in December 2010. The impacts of this study on future development in the study area will need to be reevaluated after the study's conclusion.

At the same time, the City of Fargo and Southeast Cass Water Resources District are also undertaking a Southside Flood Protection project. This project is examining what measures can be taken to provide protection from overland flooding that threatens most properties south of Interstate 94. Measures being examined include FEMA levees/floodwalls, pump stations, control structures, floodwater storage within the project and channel expansions. The project is still at the early stages with one of the next steps being the Environmental Assessment. While outside of this AUAR study area, it is important that the City of Moorhead and Oakport Township ensure that any measures undertaken in the Southside Flood Protection project do not result in the water surface levels being raised during a flood upstream.

13. WATER USE

If the area requires new water supply wells specific information about that appropriation and its potential impacts on groundwater levels should be given; if groundwater levels would be affected, any impacts resulting on other resources should be addressed.

Development within the project area will be connected to Moorhead Public Service (MPS), a municipally owned utility. MPS serves the City of Moorhead, City of Dilworth and Oakport Township. MPS draws the majority of the public water supply from the Red River of the North. It also has two wells in the Moorhead Aquifer, located within Moorhead, and five wells in the Buffalo Aquifer, located to the east of Moorhead. MPS has three (one of which is owned by Oakport Township) water towers and four ground storage tanks.

In the last decade MPS constructed a new river water treatment plant and upgraded its river pumping station. These improvements were made as part of a long-term plan to make greater use of river water when it is available. Using more river water reserves greater amounts of water from the Buffalo and Moorhead Aquifers for use in periods of long-term drought or river contamination. An investigation into the vulnerability of the two aquifers demonstrated that that Moorhead Aquifer is not vulnerable to contamination, while vulnerability of the Buffalo Aquifer ranges from very high to low. Currently MPS is working proactively with Clay County, other communities and the Buffalo-Red River Watershed District to establish protective regulations in the Buffalo Aquifer.

The increased demand from development within the project area is summarized in Tables 13.1 and 13.2. The assumptions used for both analyses are provided in Table 13.3

Table 13.1
Scenario One Projected Water Use

	Average Demand	Peak Demand
Current Demand (Million Gallons Per Day)	4.4	9.2
Estimated Future Demand in Scenario One (Million Gallons Per Day)	2.1	3.3
Total Demand at Build Out for City (Million Gallons Per Day)	6.5	12.5
Current Capacity of Water Treatment Plant (Million Gallons Per Day)	16	
Current Pumping Capacity (Million Gallons Per Day)	14.5	

Table 13.2
Scenario Two Projected Water Use

	Average Demand	Peak Demand
Current Demand (Million Gallons Per Day)	4.4	9.2
Estimated Future Demand in Scenario One (Million Gallons Per Day)	8.6	12.2
Total Demand at Build Out for City (Million Gallons Per Day)	13.0	21.4
Current Capacity of Water Treatment Plant (Million Gallons Per Day)	16	
Current Pumping Capacity (Million Gallons Per Day)	14.5	

Table 13.3
Water Usage Assumptions

	Average Day Water Use/Acre (gpd/acre)	Peak Day Water Use/Acre (gpd/acre)
Agricultural	0	0
Rural Residential	0	0
Low Density Residential	1,100	2,000
Medium Density Residential	2,200	3,500
High Density Residential	2,800	3,200
Mixed Use (Residential)	2,800	3,200
Mixed Use (Commercial)	2,500	2,500
Commercial/Office/Technology Park	2,500	2,500
Industrial[1]	0	0
Civic/Institutional/Parks and Open Space	300	300

[1] No demand was given for industrial because of the variability of water demands in different industries. The need for water will be evaluated on an individual basis.

MPS will be able to accommodate initial development in both scenarios. Full build out of either scenario will require investment in infrastructure and the identification of additional water supply sources. MPS is monitoring needs closely and will be completing a detailed water system master plan in 2009 to assist with long-range planning water treatment, pumping, storage and water supply needs.

Future water supply is an identified issue. Groundwater recharge of the Moorhead Aquifer is virtually non-existent and use of the aquifer since the early 1900s has drawn the volume of water down to below 100 feet. Recharge of the Buffalo Aquifer does occur, though in addition to the City of Moorhead, there are two high-capacity irrigation wells and 27 residential wells in the area. Currently MSP is working on two future water supply sources. The first is the potential expansion of the Buffalo River Aquifer south of the City. The other is the potential Red River Water Supply Project. In both scenarios, MPS will continue to monitor the need for expansion of water supply sources.

In addition to the water supply, MPS will need to expand its infrastructure to accommodate all of the anticipated growth in the project area. The current water treatment plants have a capacity of 16 million gallons per day, while MPS has the capacity of pumping 14.5 million gallons per day. Analysis of both scenarios shows a need to expand water treatment capabilities. MPS is carefully monitoring the situation and will expand infrastructure as needed.

The existing storage and pumping capacities are 7.78 million gallons (MG) and 14.5 mg respectively. Growth in either scenario presents the need for future storage and pumping infrastructure improvements. While it is difficult to determine how much or when future storage and pumping improvements will be need, MPS will be monitoring this need as growth occurs.

Two main transmission lines serve the north side of Moorhead. The first is a 12-inch transmission line that comes out of the Water Treatment Plant and goes north along Highway 75 to 15th Avenue North. There it branches out to both the east and the west. The second is also a 12-inch transmission line which starts at 15th Avenue N and runs north along 11th Street North eventually ending at Wall Street Avenue in Oakport Township. Both scenarios result in the need to continue the first transmission line further north into the growth area. The size of the transmission line may need to be increased to serve the higher growth anticipated in Scenario Two.

The distribution system consists of water mains with sizes ranging from 6 inches to 10 inches. The future growth proposed in both scenarios would result in new distribution mains in a typical grid pattern. MPS has a policy to install 12-inch mains on all section lines and 8-inch mains on all quarter section lines.

No specific water wells are planned to be abandoned as part of this development. However, it is likely that there are some wells on existing, developed property that will be abandoned as part of redevelopment projects. All wells will be sealed and abandoned in compliance with Minnesota Department of Health regulations prior to development.

One or more temporary MnDNR Water Appropriation Permits may be necessary to conduct construction dewatering. Dewatering may be necessary during construction to install sanitary sewer, municipal water, and storm sewer in some areas. Contractors will carry out these activities on a case-by-case basis at the minimum duration and quantity necessary to construct utility service for the affected sites. The quantity and duration of construction dewatering is not known at this time, but it is expected that the dewatering will be temporary groundwater appropriated for construction dewatering purposes and will be discharged to temporary or permanent ponds located within the project area.

A temporary MnDNR Water Appropriation Permit would be required if construction dewatering and pumping from development exceeds the 10,000 gallon per day or 1,000,000 gallons per year thresholds. If it becomes apparent that construction dewatering will not exceed 50 million gallons in total, and a duration of one year from the start of pumping, the contractor or project proposer will apply to the MnDNR for coverage under MnDNR General Permit 1997-0005 for Temporary Water Appropriations. It is not anticipated that construction dewatering or pumping will be extensive or continue long enough to impact domestic or municipal wells.

14. WATER-RELATED LAND USE MANAGEMENT DISTRICTS

Such districts should be delineated on appropriate maps and the land use restrictions applicable in those districts should be described. If any variances or deviations from these restrictions within the AUAR area are envisioned, this should be discussed

As previously shown in Figure 10.1, the western portion of the project area along the Red River and Oakport Coulee is within the proposed 100 year flood plain. The 100 year flood plain is currently under review and will not be adopted until 2009 or later. Development within this area is subject to the regulations of Chapter 7 - Subdividing in Flood Areas of Title 11 - Subdivisions of the Moorhead City Code or Article 5A - Flood Hazard Zone and Districts of Title 8 of the Clay County Code.

These codes require that any buildings for human occupation cannot be in the flood way. Buildings can be built outside the floodway, but within the floodplain, provided the building sites are filled to a height not more than one foot below the regulatory flood protection elevation and structures are constructed with local floodplain regulations. Commercial and industrial development at lower elevations may be allowed if it is protected with flood protection techniques. All flood protection techniques must not increase flood flows or damages. All public utilities located in the flood plain must be elevated or flood proofed.

The Red River is not part of the Wild and Scenic Rivers program or the Critical Areas program. The Red River and Oakport Coulee are public waters and are subject to shoreland management regulations. These regulations are administered Clay County. The City will be reviewing and revising its floodway and floodplain overlay district ordinances within the next two years to include the new regulatory flood protection elevations and additional regulations for river and riverbank protection. Shoreland regulations will be reviewed at the same time to ensure adequate protection of these public waters is provided.

15. WATER SURFACE USE

This item need only be addressed if the AUAR area would include or adjoin recreational water bodies. If the project will change the number or type of watercraft on a water body, indicate the current and projected watercraft usage and discuss any potential overcrowding or conflicts with other uses.

A significant number of additional watercraft are not anticipated because the area along the Red River is already largely developed and the topography changes significantly from the Red River to buildable areas of adjacent properties.

The development of the project area as envisioned in Scenario Two is not anticipated to increase the number or type of watercraft on the Red River. Scenario Two proposes that all undeveloped areas along the Red River be park and open space.

16. EROSION AND SEDIMENTATION

The number of acres to be graded and number of cubic yards of soil to be moved need not be given; instead, a general discussion of the likely earthmoving needs for development of the area should be given, with an emphasis on unusual or problem areas. In discussing mitigation measures, both the standard requirements of the local ordinances and any special measures that would be added for AUAR purposes should be included.

The topography within the project area is generally flat and is not composed of highly erodible soils. However, wind erosion can be of concern depending upon the season and weather. The potential for erosion of soils exposed during development of the project area will be minimized using Best Management Practices (BMPs) during and after construction. Specific erosion control practices will be identified in final grading and construction plans for each proposed development project. Developments will be required to meet as necessary the standards of the National Pollutant Discharge Elimination System (NPDES), the NPDES Municipal Separate Storm Sewer System Permit requirements, the NPDES General Permit for Construction, the City of Moorhead, and the Buffalo Red River Watershed Management District.

17. WATER QUALITY-STORMWATER RUNOFF

For an AUAR the following additional guidance should be followed in addition to that in "EAW Guidelines":

-it is expected that an AUAR will have a detailed analysis of stormwater issues;
-a map of the proposed stormwater management system and of the water bodies that will receive stormwater should be provided;
-the description of the stormwater systems would identify on-site and "regional" detention ponding and also indicate whether the various ponds will be new water bodies or converted existing ponds or wetlands. Where on-site ponds will be used but have not yet been designed, the discussion should indicate the design standards that will be followed.
-if present in or adjoining the AUAR area, the following types of water bodies must be given special analyses:
-lakes: within the Twin Cities metro area a nutrient budget analysis must be prepared for any "priority lake" identified by the Metropolitan Council. Outside of the metro area, lakes needing a nutrient budget analysis must be determined by consultation with the MPCA and DNR staffs;
-trout streams: if stormwater discharges will enter or affect a trout stream an evaluation of the impacts on the chemical composition and temperature regime of the stream and the consequent impacts on the trout population (and other species of concern) must be included;

Storm water runoff is of particular concern in the Moorhead Area due to the lack of natural drainage systems in the Lake Agassiz plain and the relatively flat topography of the area. In the project area storm water runoff is currently managed through a system of natural and man made ditches that ultimately discharge into the Red River. Major ditch systems serving the project area include Clay County Ditches 41, Lateral 1 of 41, 67 and 20. These ditches are currently under the jurisdiction of the Buffalo-Red River Watershed District. Existing runoff in the project area is fairly limited since most of the land is used for agricultural purposes.

Development in the project area is anticipated to increase storm water runoff due to the increase in impervious surfaces associated with urban land uses. The intention of the City's storm water analysis is to provide adequate storage volume on a regional basis so as to not increase discharge greater than the historic rate. The systems proposed for each scenario illustrate enough storm water runoff capacity to handle a 100 year, 24-hour event or 5.26 inches of rain in a 24-hour period.

The City of Moorhead conducted a Sanitary/Storm Sewer Preliminary Master Plan in 2006 to evaluate future needs for a two-region area which includes the Scenario One study area. It should be noted that this 2006 Preliminary Master Plan went beyond evaluating the urban infrastructure needs required for Scenario One and assumed the entire study area will eventually be developed at urban densities. This greater analysis was done to provide a clearer understanding of the long-term costs of completing the entire system. Figures 17.1 North and 17.1 South illustrate the conceptual storm water system, as well as the proposed sanitary sewer system. This conceptual system will likely need to be adjusted as developments are proposed. While upgrades to the existing system will accommodate development proposed in Scenario One, the conceptual system will need to be adjusted as urban development extends further north into areas currently assumed to be rural in the Clay County Comprehensive Plan.

A new Sanitary Sewer/Stormwater Preliminary Master Plan was completed in April 2008 to evaluate the impacts of the proposed land use in Scenario Two. Figure 17.2 illustrates the conceptual storm water and sanitary sewer system for this scenario. One of the significant differences between these two scenarios is the proposed major storm water collection corridors along 28th Street North and 70th Avenue North.

The Growth Area Plan (GAP) associated with Scenario Two encourages storm water to be kept on the surface to reduce expensive storm drainage system costs. It also encourages the storm water drainage system to be integrated with the open space system to create a valuable amenity

for neighborhoods. The GAP illustrates how landscape corridors and parkways can meander through neighborhoods and contain storm water systems.

Storm water detention facilities will need to be created since there are no existing water bodies in the project area. Each of the stormwater detention facilities will consist of a storm water detention pond, outlet structure and miscellaneous structures. The storm water detention pond will be constructed to reduce the increased runoff rate for future development to less than the historic undeveloped runoff rate. The ponds will improve water quality. They will also be designed to have permanent "dead storage" below their outlets for long-term treatment of pollutants. Outlet structures will be constructed at each of the detention facilities to regulate outflow. The outlet structures will be a gravity type system, lift station or combination of both. Where possible, stormwater ponds are constructed as regional facilities to minimize the amount of land required.

The hydraulic design of stormwater detention ponds, outlet structures and other facilities was based on the storm water runoff calculated assuming the conversion of the existing agricultural land to future development assumed in Scenario Two. The design of ponds was based on the principles set forth in the MPCA document *Protecting Water Quality in Urban Areas – Best Management Practices for Dealing with Storm Water Runoff from Urban, Suburban and Developing Areas of Minnesota, State of Minnesota Stormwater Manual,* and the requirements of the National Pollutant Discharge Elimination System (NPDES) General Storm Water Permit for Construction. Development of the storm water management system will be done in cooperation with the Buffalo-Red River Watershed District, and the MPCA.

18. WATER QUALITY-WASTEWATER

Observe the following points of guidance in an AUAR:
-only domestic wastewater should be considered in an AUAR—industrial wastewater would be coming from industrial uses that are excluded from review through an AUAR process;
-wastewater flows should be estimated by land use subareas of the AUAR area; the basis of flow estimates should be explained; -the major sewer system features should be shown on a map and the expected flows should be identified;
-if not explained under item 6, the expected staging of the sewer system construction should be described;
-the relationship of the sewer system extension to the RGU's comprehensive sewer plan and (for metro area AUARs) to Metropolitan Council regional systems plans, including MUSA expansions, should be discussed. For non-metro area AUARs, the AUAR must discuss the capacity of the RGU's wastewater treatment system compared to the flows from the AUAR area; any necessary improvements should be described;
-if on-site systems will serve part of the AUAR the guidance in "EAW Guidelines" (pages 16-17) should be followed.

The City of Moorhead continues to be proactive in assessing future needs for sanitary sewer extensions. In 2006, the City of Moorhead Sanitary/Storm Water Preliminary Master Plan was completed to investigate future needs for a two-region area which includes the Scenario One study area. The study primarily concerns lift stations, forcemains, and gravity links between the lift stations and the Wastewater Treatment Facility. The proposed Sanitary Sewer Collection System for the Scenario One study area from the 2006 Preliminary Master Plan is shown in Figures 17.1 North and 17.1 South. The average flow for each sanitary trunk system or lift station was calculated by taking the area being served by the improvement and multiplying it by 1,500 gallons per acre per day. Additional information about wastewater flows by subarea and expected staging of sewer system construction is provided in the 2006 Preliminary Master Plan available from the City of Moorhead.

An update of the Sanitary/Storm Water Preliminary Master Plan was conducted in 2008 to evaluate the proposed land use pattern of Scenario Two. The analysis was conducted using four phases. These phases were established by considering anticipated construction based on recent developer requests and the expected natural progression of growth. Average wastewater flows were allocated to each different land use proposed as shown in Table 18.1. The wastewater flows for each land use subarea are available in the 2008 Preliminary Master Plan available from the City of Moorhead.

Table 18.1
Wastewater Flow Assumptions

Land Use	Flow Allocation
Rural Residential	350 gallons per unit per day
Low Density Residential	350 gallons per unit per day
Medium Density Residential	250 gallons per unit per day
High Density Residential	200 gallons per unit per day
Mixed Use (Residential)	200 gallons per unit per day
Industrial	2,000 gallons per acre
Commercial	1,500 gallons per acre
Office/Technology	1,000 gallons per acre
Civic	1,000 gallons per acre
Parks	50 gallons per acre

The entire study area will flow to four specific regional lift stations that will discharge directly into the Wastewater Treatment Facility. Flow to the regional lift stations will be by gravity trunk sewers, or regional sewers, or sub-regional lift stations or in combinations. The four regions are entirely separate systems that do not rely on each other. Figure 17.2 shows the four phases' proposed facilities for sanitary sewer and storm water. As much as possible existing systems will be upgraded, however, due to the scope of development new trunk sanitary sewer lines, lift stations and forcemains also will be needed. The staging of sanitary sewer system construction is provided in the 2008 Preliminary Master Plan available from the City of Moorhead.

The analysis of sanitary sewer needs found that significant, expensive improvements were needed to serve sanitary sewer districts 6 and 3-A. Currently, the existing infrastructure in this area serves 512 hookups and without additional improvements can serve 150 more. This growth area plan analysis found the need for $4.7 million in improvements in order to serve almost 2,200 new households. In order to reduce the amount of required improvements and maximize the use of existing infrastructure, the growth area plan should be revised to provide for only 767 new households. The Mitigation Plan will address this issue.

All wastewater in the City of Moorhead is transported to the Wastewater Treatment Facility (WWTF). The WWTF is currently operating under its design capacity of 6 million gallons per day, however, in order for either scenario to be completely developed, an expansion to the WWTF will be needed. Based on the City's anticipated rate of growth, expansion will not be needed for the next 20 years.

On-site septic systems will not be the primary form of wastewater treatment in the project area; however, interim development outside of the city limits and the Oakport Township Orderly Annexation Area can occur with on-site septic systems. All new on-site septic systems will need to follow Minnesota Department of Health and Clay County regulations. Existing on-site septic systems will be used until such time as municipal services are requested for the site or are available.

19. GEOLOGIC HAZARDS AND SOIL CONDITIONS

A map should be included to show any groundwater hazards identified. A standard soils map for the area should be included.

The Red River Valley was once the basin of Lake Agassiz, the largest North American glacial lake. Lake Agassiz covered parts of the Minnesota, the Dakotas, and Manitoba over 9,000 years ago. As shown in Figure 19.1, soils in the project area are either part of the Fargo Association or the Bearden-Colvin Association. The Fargo Association is nearly level to gently sloping with poorly drained, silty to clayey soils. Urban development is problematic due to its wetness, frost action and shrink-swell properties. The Bearden-Colvin Association is nearly level to gently sloping and predominantly poorly drained silty soils. Development in the Bearden-Colvin Association also has limitations due to wetness, high water table, shrink-swell, and frost-heave.

The silty and clayey soils deposited on the lake bed make the Red River Valley extremely fertile. However, the characteristics of clays make the banks of the Red River vulnerable to erosion and several types of slope failure, including slumping, creeping, and earthflow. As the Red River meanders the velocity of the water movement along the outside of the bank causes erosion at the base of the existing river bank. When the force of gravity is greater than the forces holding the clays together the entire bank can slump down into the river. Many factors influence erosion and slope failures, but it is more likely to occur when natural vegetation such as trees and grassland are removed.

Homes along the Red River have experienced a type of ground movement which is due to the characteristics of the underlying clays. The removal of the natural vegetation, weight of the homes and accompanying structures, and additional watering of landscaping have caused the underlying clays to move laterally through the nearby banks of the Red River. Gravity fills the resultant void with the overlying ground. This type of ground movement has occurred at various locations along the Red River throughout Fargo and Moorhead. Rates of ground movement are influenced by a number of factors including soil moisture conditions, water levels in the river, and the actions of people.

To best protect private and public investment, development immediately adjacent the Red River should be limited and land should remain natural in protected park or open space areas wherever possible. Dr. Donald Schwertz of North Dakota State University recommends that any development may need to be 500 to 1,000 feet away from the Red River to minimize the potential for ground movement. Further analysis of the geologic and geotechnical setting will provide the indication of where best to build.

20. SOLID WASTES; HAZARDOUS WASTES; STORAGE TANKS

For a, generally only the estimated total quantity of municipal solid waste generated and information about any recycling or source separation programs of the RGU need to be included. No response is necessary for b. For c, potential locations of storage tanks associated with commercial uses in the AUAR should be identified (e.g., gasoline tanks at service stations).

A) Solid Wastes

New residential, commercial, and public/institutional uses will generate municipal solid waste (MSW). Sanitation collection, disposal and recycling services will be provided to all properties within the City of Moorhead. Properties in Dilworth or outside of municipal boundaries must contract with private companies for their collection and disposal services. For evaluation purposes, the City of Moorhead waste generation rates were used to determine future volumes.

Table 20.1
Summary of Residential Waste Generation

Waste Generation Rates[1]	Scenario One		Scenario Two	
	New Households	Additional Waste Per Year	New Households	Additional Waste Per Year
0.979 tons of MSW/household/year	8,207	8,035	29,752	29,127
0.269 tons of recycled product/household/year	8,207	2,208	29,752	8,003

[1]Based on 2007 City of Moorhead Data. It was estimated that 60% of all waste is from residential households.

Table 20.2
Summary of Future Non-Residential Waste Generation

Waste Generation Rates[1]	Scenario One		Scenario Two	
	Future Employment Estimate	Additional Waste Per Year	Future Employment Estimate	Additional Waste Per Year
0.427 tons of MSW/employee/year	3,452	1,474	35,752	15,266
0.158 tons of recycled product/employee/year	3,452	545	35,752	5,649

[1]Based on 2007 City of Moorhead Data. It was estimated that 40% of all waste is from non-residential customers.

B) Hazardous Wastes

No response required.

C) Storage Tanks

No specific locations for new above or below ground storage tanks have been identified at this time. However, in commercial areas a service station may need an underground storage tank for gasoline. If any business should need above or below ground storage tanks, it would need to follow MPCA and other applicable standards and procedures.

21. TRAFFIC

For most AUAR reviews a relatively detailed traffic analysis will be needed, especially if there is to be much commercial development in the AUAR area or if there are major congested roadways in the vicinity. The results of the traffic analysis must be used in the response to item 22 and to the noise aspect of item 24. Instead of responding to the information called for in item 21, the following information should be provided:
-a description and map of the existing and proposed roadway system, including state, regional, and local roads to be affected by the development of the AUAR area. This information should include existing and proposed roadway capacities and existing and projected background (i.e., without the AUAR development) traffic volumes;
—trip generation data —trip generation rates and trip totals—for teach major development scenario broken down by land use zones and/or other relevant subdivisions of the area. The projected distributions onto the roadway system must be included;
—analysis of impacts of the traffic generated by the AUAR area on the roadway system, including: comparison of peak period total flows to capacities and analysis of Levels of Service and delay times at critical points (if any);
—a discussion of structural and non-structural improvements and traffic management measures that are proposed to mitigate problems;
Note: in the above analyses the geographical scope must extend outward as far as the traffic to be generated would have a significant effect on the roadway system and traffic measurements and projections should include peak days and peak hours, or other appropriate measures related to identifying congestion problems, as well as ADTs.

This AUAR relies upon a general understanding of existing traffic patterns and volumes as outlined in the Metro COG Fargo-Moorhead Area Short and Long Range Metropolitan Transportation Plan (as incorporated by reference to this AUAR). Year 2006 average daily traffic (ADT) volumes as generated by FMCOG are illustrated in Figure 21.1.

The proposed roadway network for Scenario One is illustrated in Figure 21.2. This system is as proposed in the Metropolitan Transportation Plan. The 2030 average daily traffic volumes are shown in Figure 21.3. These average daily traffic volumes were determined by applying the factors identified in Table 21.1 to the land uses in the Metropolitan Transportation Plan. It is important to note that the time frame for full build out of the project area is more than 50 years. Traffic volumes and related impacts were assessed by City of Moorhead Engineering staff and Metro COG staff. Peak hourly traffic volumes are estimated to be 10% of the average daily traffic volumes and typically occur on weekdays between 4 pm and 6 pm.

Table 21.1
Average Factors Applied to Future Land Use Maps in the Metropolitan Transportation Plan

Land Use	Average Households per Acre	Average Jobs per Acre
Rural Residential	0.75	NA
Low-Density Single Family	3.5	NA
Medium-Density Single Family	10	NA
High Density Single Family	20	NA
Commercial/Retail	NA	11.04
Office	NA	40.34
Industrial	NA	5.33
Schools/Public	NA	5.13

The Metropolitan Transportation Plan conducted a capacity analysis to identify roads that are or may experience of delay based on traffic volumes. The existing level of service analysis did not show any issues within the study area. The future capacity analysis was based on projected year 2030 traffic volumes. This analysis also did not identify any level of services with a D, E or F which might merit further evaluation. The proposed roadway network for Scenario Two is illustrated in Figure 21.4. This system, as identified in the North Moorhead/Oakport Township Growth Area Plan, was developed in cooperation with City of Moorhead and FMCOG staff. The GAP provides further direction for design character of each classification of street. Future traffic volumes, as shown in Figure 21.5, were generated by FMCOG (with assistance from the Advanced Traffic Analysis Center or ATAC) based on a full build out scenario. Table 21.2 summarizes the average factors used to calculate traffic volumes.

Table 21.2
Average Factors Applied to Growth Area Plan

Land Use	Average Households per Acre	Average Jobs per Acre
Rural Residential	0.2	NA
Low-Density Single Family	4	NA
Medium-Density Single Family	12	NA
High Density Single Family	30	NA
Commercial	NA	11.04
Office	NA	18
Industrial	NA	5.33
Schools/Public	NA	5.13

The time frame for the full build out scenario is assumed to be 50 or more years. Traffic volumes and related impacts were assessed by City of Moorhead Engineering staff and Metro COG staff. Peak hourly traffic volumes are estimated to be 10% of the average daily traffic volumes and typically occur on weekdays between 4 pm and 6 pm. A detailed analysis of peak period traffic volumes to system capacities and an analysis of Levels of Service and delay times was not conducted because virtually all arterial and collector streets will need to be upgraded. These upgrades will incorporate the improvements (lane additions, traffic control, etc.) necessary to minimize delay and maintain acceptable Levels of Service. Figure 21.6 shows the proposed lane categories based on the 2030 estimated traffic counts and future functional classification. It also shows where intersection improvements, either a roundabout or signalization, are proposed.

As development occurs in the project area, level of service analysis will need to be conducted periodically to monitor operations and to project improvement needs for 5 year capital improvement planning purposes. Transportation improvements needed to accommodate full build out in the project area include the following for each scenario

Scenario One

- Construction of 34th Street N from 28th Avenue N to Wall Street Avenue as a minor arterial.
- Construction of 57th Avenue N as minor arterial (currently gravel).
- Paving of 43rd Avenue N for local traffic.
- Upgrade of 40th Street N as a minor collector (currently gravel).

Scenario Two

- Upgrade of 80th Avenue N to collector (currently gravel).

- Upgrade of 70th Avenue N between Highway 75 and 40th Street N to collector (currently gravel).
- Upgrade of 43rd Avenue N between 11th Street N and 40th Street N to collector (currently gravel).
- Construction of Wall Street Avenue/57th Avenue as minor arterial.
- Construction of 34th Street N from 28th Avenue N to Wall Street Avenue as a minor arterial.
- Construction of 8th Avenue N from Highway 75 as a collector.
- Upgrade of 28th Street N from 8th Avenue N as a collector (currently gravel).
- Upgrade of 40th Street N from 8th Avenue N as a collector (currently gravel).

Further mitigation initiatives will be outlined in the mitigation plan.

22. VEHICLE-RELATED AIR EMISSIONS

The guidance provided in "EAW Guidelines: should also be followed for an AUAR. Mitigation proposed to eliminate any potential problems may be presented under item 21 and merely referenced here. The MPCA staff should be consulted regarding possible ISP requirements for certain proposed developments; although the RGU may not want to assume responsibility for applying for an ISP for specific developments, it may be desirable to coordinate the AUAR and ISP analyses closely.

Detailed air quality modeling and testing was not conducted as part of this AUAR.

Development in the project area will result in additional traffic to internal and external roadways that will contribute additional pollutants expected from urban growth. Of concern are carbon monoxide and particulate matter under 10 microns in size. Pollutant concentrations are subject to the Environmental Protection Agency's (EPA) National Ambient Air Quality Standards (NAAQS). Concentrations in the Fargo-Moorhead Metro area are below comparable limits established by NAAQS. There are also no EPA or Minnesota Pollution Control Agency (MPCA) requirements for particulate matter analysis and dispersion modeling for roadway projects.

The MPCA requires carbon monoxide modeling if a project affects traffic at an identified carbon monoxide hot-spot or produces more than 77,200 vehicles per day. There were no carbon monoxide hot-spots identified in or adjacent to the project area and traffic generated by development in the growth area is not expected to approach the threshold. The build out traffic forecasts for the identified intersections in the project area show that levels are well below what would be needed to require modeling. Some roadway construction within the project area may receive federal funding. If this occurs, the roadway construction will be subject to federal Transportation Conformity rules and additional analysis may be required pursuant to these rules.

The development pattern assumed for the project area is not unlike development patterns occurring in other areas of the Fargo-Moorhead metro area and is anticipated to take place over an extended period of time (50 years or more). Mitigation measures to reduce or minimize the amount of air pollutants generated by development related traffic will be identified in the Mitigation Plan. It is recommended that projects of a magnitude that would trigger a mandatory EAW conduct more detailed air quality testing to ensure consistency with NAAQS.

23. STATIONARY SOURCE AIR EMISSIONS

This item is not applicable to an AUAR. Any stationary air emissions source large enough to merit environmental review requires individual review.

No response required.

24. DUST, ODORS, NOISE

Dust, odors, and construction noise need not be addressed in an AUAR, unless there is some unusual reason to do so. The RGU might want to discuss as part of the mitigation plan, however, any dust control or construction noise ordinances in effect. If the area will include or adjoin major noise sources a noise analysis is needed to determine if any noise levels in excess of standards would occur, and if so, to identify appropriate mitigation measures. With respect to traffic-generated noise, the noise analysis should be based on the traffic analysis of item 21.

New development in the project area is not anticipated to generate any unusual dust, odors or noise that is inconsistent with MPCA standards. Dust and noise may be associated with demolition, grading of the site, and construction of roadways, buildings, driveways, and parking areas. Noise may also be associated with mechanical equipment as well as traffic accessing the site.

No noise modeling or testing was completed as part of this AUAR. It is anticipated that future traffic noise levels will likely exceed MPCA's maximum allowable levels for the residential areas adjacent to major collector and arterial roadways where speeds approach or exceed 40 mph. The City of Moorhead has the obligation to ensure that daytime and nighttime noise levels are below the MPCA thresholds. Future development patterns occurring adjacent to major roads will need to provide design mechanisms such as berming, landscaping or fencing to attenuate noise levels. As properties develop, specific noise analysis may be needed during subdivision design to better address noise conditions. Policies established in the Comprehensive Plan and the design character described in the Growth Area Plan for Scenario Two are in place to ensure design mechanisms to mitigate potential noise pollution.

25. SENSITIVE RESOURCES

Archeological, historic, and architectural resources. For an AUAR, contact with the State Historic Preservation Office is required to determine whether there are areas of potential impacts to these resources. If any exist, an appropriate site survey of high probability areas is needed to address the issue in more detail. The mitigation plan must include mitigation for any impacts identified. Prime or unique farmlands. The extent of conversion of existing farmlands anticipated in the AUAR should be described. If any farmland will be preserved by special protection programs, this should be discussed. Designated parks, recreation areas, or trails. If development of the AUAR will interfere or change the use of any existing such resource, this should be described in the AUAR. The RGU may also want to discuss under this item any proposed parks, recreation areas, or trails to be developed in conjunction with development of the AUAR area.
Scenic views and vistas. Any impacts on such resources present in the AUAR should be addressed. This would include both direct physical impacts and impacts on visual quality or integrity. "EAW Guidelines: contains a list of possible scenic resources (page 20).

Archeological, historic and architectural resources

Throughout history waterways, such as the Red River, have been an important location for human settlement. Archaeological artifacts have been found near the banks of the Red River in various parts of the Fargo-Moorhead area. Discussions with the Clay County Historical Society and Dr. Michlovic, the Chair of Anthropology and Earth Sciences Department at Minnesota State University-Moorhead, indicate that there has not been a systematic survey in the Moorhead area. Since the Red River has meandered throughout its history, the potential for archaeological sites exist within about an eighth to a quarter mile of the river, as shown in Figures 25.1 and 25.2.

In the mid-1800s the Red River Valley was an important part of the travel route linking St. Paul to Winnipeg. Navigating on the Red River typically began a little north of present day Georgetown, which is north of Moorhead. To reach Georgetown travelers used one of many oxcart paths that wound through western Minnesota. One of these routes followed the Red River bank south through Moorhead towards Breckenridge. This Red River trail has been identified by the Minnesota State Historic Preservation Office (SHPO) to be in the project area. SHPO records indicate that the Red River Trail is generally located within the sections highlighted in yellow on Figures 25.1 and 25.2. Additional information on the Red River Trails can be found in *The Red River Trails: Oxcart Routes Between St. Paul and the Selkirk Settlement 1820-1870* by Rhonda R. Gilman, Carolyn Gilman, and Deborah M. Stultz. Further investigation would be needed to determine whether the Red River Trail remains in the project area. It is likely that due to modern roads, like Highway 75, urban development and plowing of agricultural fields, little remains of the trail through the project area.

MB Johnson Park, a regional park in North Moorhead, has been identified as an archaeological site in the SHPO inventory. The inventory identifies the park as a location for scattered artifacts as well as a burial site or cemetery. East of MB Johnson Park has been identified the Probstfield Post. This site has been identified through historical documents but not field surveyed. Also identified on the archaeological inventory is the Everet Kopperud property in the far northwest corner of the project area. This property is also anticipated to contain scattered artifacts.

Within the study area, the Randolph M. Probstfield House, part of the Probstfield Farm, is listed on the National Register Historic Properties. Located on the Red River, the property consists of 118 acres of crop land, woodlands, and several outbuildings. The property is managed by the Probstfield Farm Living History Foundation. This organization was founded in 1995 to maintain the property as a living history farm with most of the surrounding property remaining intact to provide its historic context.

In addition to the Probstfield House, there are two bridges identified in the SHPO History/Architecture Inventory. These bridges are both located over drainage ditch #41. One is located on 11th Street N and the other on 15th Avenue N.

To best protect potential archaeological, historic and architectural resources within the project area, a survey by a qualified archaeologist or historian should be completed. Consultation with SHPO only identified recorded archaeological sites and historic architectural properties. Since the majority of archaeological sites and many historic architectural properties have not been recorded, important sites or structures may exist and be affected by development in the project area.

A survey of the area may be needed depending on the source of funding for public improvements within the project area. Federal funding or permitting generally requires a Section 106 review; state funding requires compliance with the Minnesota Field Archaeology Act, Minnesota Historic

Sites Act, and Minnesota Private Cemeteries Act. Consultation with SHPO and the State Archaeologist will ensure compliance when federal or state funding is used.

Prime or unique farmland

It is not anticipated that existing farmlands will be protected through special programs, deed restrictions, conservation easements or other means. As anticipated in both the City's and County's Comprehensive Plans, the project area will ultimately be fully developed.

Designated parks, recreation areas or trails

Parks and open spaces are limited in the study area, especially in Oakport Township. A small area along 11th Street N next to the Crystal Creek Subdivisions, envisioned for a future park, has not yet been built.

Two major park and open space facilities, MB Johnson Park and Centennial Athletic Complex, are in the study area. MB Johnson, in north Moorhead, is a regional park of over 100 acres. It includes playground equipment, biking/walking trails, cross country ski trails, snowmobile trails, and a boat launch. Centennial Athletic Complex includes fields for baseball, softball and football, as well as a dog park. Also located in the study area is Moorhead Country Club, a private club with golf, swimming and tennis facilities.

Trails are limited in the project area. In addition to trails in MB Johnson and Centennial Athletic Complex, a shared use path was recently expanded on 34th Street N from Highway 10 to 28th Avenue N. There are also bicycle lanes on 11th Street N, Wall Street Avenue, 28th Avenue N, 28th Street N and 15th Avenue N.

A limited amount of new parks are identified in Scenario One. The Dilworth Growth Area Plan identified a future park in the study area. Moorhead's Comprehensive Plan does not specifically identify park locations, but envisions the creation of parks as development occurs so all homes are within walking distance.

The Growth Area Plan (GAP) developed for Scenario Two was developed recognizing the value of parks, open space and trails. Almost 10% of the land in the project area has been designated for parks, open spaces and stormwater ponding. The GAP recommends that the park and open space system should be well integrated into the street system and a comprehensive system of bike and walking paths should link areas together. The park and open space system is also designed to incorporate the needed stormwater ponds as an amenity and natural feature.

The City of Moorhead will need to complete additional planning for the parks and open spaces. Further exploration of the long-term vegetation of the open spaces is needed. One area of particular importance is along the Red River. Preserving the existing vegetation will help to minimize erosion of the banks and ongoing maintenance costs.

Scenic view and vistas

Natural areas are an important part of Moorhead's Vision. The Red River is the most visible part of the natural environment in the project area. Preservation of scenic views and vistas will be accomplished through the creation of park and open space areas along the Red River.

26. ADVERSE VISUAL IMPACTS

If any non-routine visual impacts would occur from the anticipated development, this should be discussed here along with appropriate mitigation.

The AUAR anticipates a development pattern similar to those uses in the surrounding area and does not anticipate any adverse visual impacts as a result of the development scenario.

27. COMPATIBILITY WITH PLANS

The AUAR must include a statement of certification from the RGU that its comprehensive plan complies with the requirements set out at 4410.3610, subpart 1. The AUAR document should discuss the proposed AUAR area development in the context of the comprehensive plan. If this has not been done as part of the responses to items 6,9,18,21, and others, it must be addressed here; a brief synopsis should be presented here if the material has been presented in detail under other items. Necessary amendments to comprehensive plan elements to allow for any of the development scenarios should be noted. If there are any management plans of any other local, state, or federal agencies applicable to the AUAR area, the document must discuss the compatibility of the plan with the various development scenarios studied, with emphasis on any incompatible elements.

The City of Moorhead adopted its most recent Comprehensive Plan in 2004. This Comprehensive Plan, in concert with the City's public facilities plans and capital improvement program, complies with the requirements set out in 4410.3610, subpart 1.

Scenario One evaluated in this AUAR reflects the 2004 City of Moorhead Comprehensive Plan, 2002 Clay County Comprehensive Plan and 2006 Dilworth Growth Area Plan. No changes to the comprehensive plans are needed to implement this scenario.

Scenario Two reflects the North Moorhead/Oakport Township Growth Area Plan (GAP). The development of this growth area plan implements one of the initiatives of the 2004 City of Moorhead Comprehensive Plan. Growth area planning was recommended for emerging neighborhoods, including a portion of the North Moorhead/Oakport Township Growth Area Plan study area, to demonstrate how a larger area with multiple owners develops in a cohesive manner.

Changes to multiple comprehensive plans will be needed to implement the North Moorhead/Oakport Township Growth Area Plan as proposed. The primary change will be to the City of Moorhead Comprehensive Plan as most of the project area falls within the city's jurisdiction. The City of Dilworth would also need to change their Comprehensive Plan for the GAP to be implemented as proposed.

While the land uses proposed are different, the policies of the 2004 Comprehensive Plan were used in the creation of the GAP. The Growth Area Plan promotes connected street networks, regionalized stormwater infrastructure, connected park and open space systems, and detailed land use plans. Parks are located as central parts of neighborhoods, creating a system linking parks and major activity areas of the community, and using infrastructure features such as ditches and stormwater ponds as natural amenities.

Transportation planning is done in conjunction with the Fargo-Moorhead Council of Governments (Metro COG), the primary transportation planning agency for the metropolitan area. Transportation planning not only includes roadway networks, but also transit and bicycle routes. Consultation with Metro COG was part of the development of the GAP so the proposed system is compatible with existing plans.

28. IMPACT ON INFRASTRUCTURE AND PUBLIC SERVICES

This item should first of all summarize information on physical infrastructure presented under items (such 6, 17, 18 and 21). Other major infrastructure or public services not covered under

other items should be discussed as well — this includes major social services such as schools, police, fire, etc. The RGU must be careful to include project-associated infrastructure as an explicit part of the AUAR review if it is to exempt from project-specific review in the future.

Water

Moorhead Public Service (MPS) will be conducting a detailed water system plan in 2009 to identify and prioritize future treatment, pumping, storage, and water supply needs. MPS did conduct a detailed water distribution system master plan in 2006. It is anticipated at this time that this master plan will be updated every five years to address changing growth of the City. Although initial phases of development can occur without major investments, both scenarios will require improvements for full build-out. In addition to infrastructure improvements, additional water supply will be needed over the long-term. MPS is already working with other communities and regional partners to identify and protect potential water sources.

Wastewater

Additional wastewater system investments will be needed to serve full build out of either scenario. Following full build out of the existing sanitary sewer area, the system will be at capacity. Both scenarios will require the construction of lift stations, sewers and forcemains. The Sanitary/Storm Sewer Preliminary Master Plan identifies phasing for the logical and cost-efficient expansion of the wastewater system. The existing Wastewater Treatment facility is currently operating under its design capacity, an expansion will be needed in about 20 years to serve new development in the project area.

Electricity

The only improvement identified was the construction of a substation along Highway 75 for Scenario Two.

Storm Water Management

Storm water runoff is anticipated to increase as development occurs in the growth area and a system of regional detention facilities will be needed. The Sanitary Sewer/Storm Water Preliminary Master Plans illustrated a conceptual storm water system with enough storm water runoff capacity to handle a 100 year, 24-hour event (5.26 inches of rain in a 24-hour period). The City of Moorhead will work with property owners and developers to construct and manage the storm water system.

Transportation

The City of Moorhead coordinates with Clay County, Fargo-Moorhead Council of Government (Metro COG), and the Minnesota Department of Transportation on transportation initiatives. The City and Metro COG maintain a long range transportation planning system that is poised to handle the increased traffic demands generated by new growth. The proposed roadway network includes a system of arterials, collectors, local roads and parkways to facilitate traffic movement. For either scenario additional roadways will need to be constructed. A list of roadways to be expanded can be found in Question 21. As development occurs in the project area, level of service analysis will need to be conducted periodically to monitor operations and to project improvement needs for 5 year capital improvement planning purposes.

Transit

Fargo Moorhead Metro Area Transit currently provides two regular routes to the edges of the project area. Both routes intersect the edges of the project area in two places, at the intersection of 15th Avenue N and 11th Street N, as well as at 34th Street N and 8th Avenue N. Transit services will need to be expanded as the project area develops. The City of Moorhead will work with Metro COG to plan for future route expansions to serve the project area. The development pattern established in Scenario Two's Growth Area Plan concentrates higher density, mixed use development patterns in nodes near major roadway corridors that can be more efficiently served by public transit.

Police and Fire Services

Additional community facilities will be needed to house expanded police and fire protection services. Most of the project area is currently served by Oakport Township Volunteer Fire Department and Clay County Sheriff's Office. As areas are annexed into the City of Moorhead, the city's police and fire services will be expanded. Scenario Two specifically identifies an area for community facilities like police and fire services. An additional facility will not be needed for a number of decades.

School District

The growth of the project area will impact how many additional schools Moorhead School District will need. Over the past decade the school district has opened additional facilities to serve the community's expansion. Based on anticipated population growth, it is likely that there will be a need for two more schools in Scenario One and four more in Scenario Two. Anticipating future growth in North Moorhead/Oakport Township, Moorhead School District has already purchased an 80-acre site at the intersection of 57th Avenue N and 28th Street N. This 80-acre site will be sufficient in size for one to two schools. In addition to the site already purchased, the GAP for Scenario Two has identified three other school sites. Even though the next school facility may not be built within the project area, the identification of potential sites allows the Scenario Two Growth Area Plan to incorporate needed infrastructure and make connections to the park and open space system for potential future sites.

Telephone and Cable

As with other infrastructure, telephone and cable infrastructure will need to be expanded as development occurs in the project area. Planning for growth is generally based on plans submitted and discussions with City staff. In general, the infrastructure needed to provide telephone and cable services can be placed into the right-of-way; small structures and boxes are usually placed within easements. Discussions with company representatives will ensure that they are aware of development plans and that there is sufficient room in the right-of-way for infrastructure.

29. CUMULATIVE IMPACTS

This item does not require a response for an AUAR with respect to cumulative impacts of potential developments within the AUAR boundaries, since the entire AUAR process is intended to deal with cumulative impacts from related developments within the AUAR area; it is presumed that the responses to all items on the EAW form encompass the impacts from all anticipated developments within the AUAR area. However, the questions of this item should be answered with respect to the cumulative impacts of development within the AUAR boundaries combined with past, present, and reasonably foreseeable future projects outside of the AUAR area, where such

cumulative impacts may be potentially significant. (As stated on the EAW form, these cumulative impact descriptions may be provided as part of the responses to other appropriate EAW items, or in response to this item).

The North Moorhead/Oakport Township AUAR encompasses more than 10,000 acres. Based on demographic projections for the entire City it is likely that development in the AUAR study area within the next 50 years will occur only in Phase One areas (see Figure 6.4). Complete development of the Phase One area is unlikely as the City of Moorhead is also growing to the south and the east. Thus, the pace of growth in North Moorhead and Oakport Township will be dependent on its ability to successfully compete for development interest and respond to market demands.

The growth in the AUAR area represents only a portion of the growth to be experienced in the entire Fargo-Moorhead Metropolitan Area. Impacts associated with the region's growth will likely be typical of any urbanizing metropolitan area and require cooperation amongst the various jurisdictions. While not insignificant, the impacts associated with growth in the project area are continually being studied and planned for through various comprehensive planning, infrastructure planning, and flood mitigation efforts. In addition, the various jurisdictions have numerous codes and ordinances in place to minimize to the extent possible negative impacts associated with growth.

Planning for growth in the metropolitan area is done cooperatively amongst the cities through the Fargo-Moorhead Metropolitan Council of Governments (Metro COG). Participating jurisdictions include Fargo, Moorhead, West Fargo, Dilworth and eight townships in both Cass and Clay Counties. Metro COG has the following goals:

- To provide a forum in which public officials, citizens and other interest groups can participate in the establishment of policies and plans that effectively deal with various metropolitan issues.
- To provide technical and planning assistance in completing studies and identifying solutions to common metropolitan problems.
- To disseminate information.
- To promote sound planning throughout the area.
- To harmonize the activities of federal, state and local agencies.
- To encourage the public to participate in shaping the way the area develops.

The North Moorhead/Oakport Township Growth Area Plan, which was the basis for this AUAR, is an example of the cooperative planning efforts in the Fargo-Moorhead Metropolitan Area. The development of the Growth Area Plan involved members of the public as well as staff and elected/appointed representatives from Oakport Township, the City of Dilworth, Metro COG, and Buffalo-Red River Watershed District. The Growth Area Plan provides city officials and staff with a guide for reviewing proposed developments, planning for the public infrastructure, and ensuring growth occurs in an efficient and logical manner.

30. OTHER POTENTIAL ENVIRONMENTAL IMPACTS

If applicable, this item should be answered as requested by the EAW form.

The development scenarios described in Question 6 will not generate any environmental impacts beyond those described in this AUAR.

31. SUMMARY OF ISSUES

The RGU may answer this question as asked by the form, or instead may choose to provide an Executive Summary to the document that basically covers the same information. Either way, the major emphasis should be on: potentially significant impacts, the differences in impacts between major development scenarios, and the proposed mitigation.

See the Executive Summary.

Mitigation Initiatives

Mitigation Plan. *The final AUAR document must include an explicit mitigation plan. At the RGU's option, a draft plan may be included in the draft AUAR document; of course, whether or not there is a separate item for a draft mitigation plan, proposed mitigation must be addressed throughout the document.*

It must be understood that the mitigation plan in the final document takes on the nature of a commitment by the RGU to prevent potentially significant impacts from occurring from specific projects. It is more than just a list a ways to reduce impacts – it must include information about how the mitigation will be applied and assurances that it will. Otherwise, the AUAR may not be adequate, and/or specific projects may lose their exemption from individual review. The RGU's final action on the AUAR must specifically adopt the mitigation plan; therefore, the plan has a "political" as well as technical dimension.

This Mitigation Plan identifies initiatives that address potential impacts resulting from future development within the AUAR project area. This mitigation plan specifies the controls, procedures, and other steps that may be implemented to protect or minimize potential negative impacts. In order to mitigate the potential environmental impacts identified in the North Moorhead/Oakport Township AUAR, the City of Moorhead will commit to implementing the mitigation initiatives identified in this plan.

INTENT OF MITIGATION PLAN

The development of the AUAR project area could have impacts on the environment and existing development. This plan identifies existing tools and policies that the City of Moorhead has in place, as well as additional initiatives that will need to be implemented to mitigate potential impacts. Multiple ways in which Mitigation Initiatives may be implemented include:

- Enforcing existing zoning and subdivision ordinances and other development regulations at the time of development concept submittals, preliminary and final platting, site planning and during construction monitoring activities.
- Referencing and implementing policy directions provided in the Comprehensive Plan and the North Moorhead/Oakport Township Growth Area Plan during the review and approvals of development projects.
- Planning and building public infrastructure (local roads, parks, trunk sewer and water systems) in conjunction with private development initiatives.
- Maintaining and updating existing plans and studies for the community.
- Requiring additional field work/investigation as part of pre-development planning where potential environmental or cultural resources may exist but have not been verified or where more detailed air quality testing or noise monitoring may be needed.

GENERAL MITIGATION INITIATIVES

This section identifies a series of mitigation initiatives that are general in nature and apply to all public and private development within the AUAR.

1. All permits identified in the AUAR (see Question 8), as well as other necessary permits that may be required will be secured by private parties or the City, as appropriate, for all development activities within the project area.

2. The City will follow its own regulations, ordinances, plans, and policies currently in place in the review and approval of all development activities within the project area. These items include the *Comprehensive Plan*, the *North Moorhead/Oakport Township Growth Area Plan*, and the official *zoning* and *subdivision ordinances*. In addition, the appropriate *Sanitary/Storm Sewer Preliminary Master Plan* and any future water system master plans, will be used as technical resources in reviewing development activities and developing associated public infrastructure.

3. The City will provide for adequate regional and local stormwater ponds and trunk facilities so as to protect water resources and water quality as guided by the *Sanitary/Storm Sewer Preliminary Master Plan*.

4. The City will extend public sewer and water services in a manner consistent with existing plans and policies. The City will monitor capacities, update plans, and extend services as necessary to ensure sufficient supply and quality of services.

5. The City will implement a development tracking mechanism to monitor development within the AUAR project area and its conformance with the development scenario using Geographic Information System (GIS) Software and mapping.

6. The City will enforce its parkland dedication policies consistent with the goals and policies of the *Comprehensive Plan* and *North Moorhead/Oakport Township Growth Area Plan*, as well as the requirements of the subdivision ordinance.

7. The City will work with Oakport Township, Dilworth, Clay County and the Fargo-Moorhead Metropolitan Council of Governments to monitor traffic and regional development initiatives that may impact the project area to ensure sufficient transportation level of services.

8. The City will work in cooperation with the Clay Soil and Water Conservation District (SWCD) on expansion plans to ensure compliance with the Minnesota Wetland Conservation Act (WCA).

FOCUSED MITIGATION INITIATIVES

Mitigation initiatives that are explicitly intended to mitigate or minimize impacts on a particular resource or action are outlined by topic in this section.

Natural and Physical Resources

The most significant natural feature in the project area is the Red River. In order to minimize the potential for ground movement, development should be restricted on the banks of the Red River. Developments should also maintain the natural vegetation to help stabilize the river banks. To best protect private and public investment, development should be restricted immediately adjacent the Red River to proper setback distances and land should remain natural in protected park or open space areas.

Cultural Resources

The strongest for potential for archaeological, historic, and/or architectural resources is within an eighth to a quarter mile of the Red River or Oakport Coulee. To best protect these resources, a survey by a qualified archeologist or historian will be considered for the project area prior to new

development. Additional surveys needed as part of public improvements will be done in consultation with SHPO and the State Archaeologist to comply with federal and state regulations.

Parks, Trails and Open Spaces

The City intends to create a contiguous park, trail and open space system to serve the needs of future development and protect the natural ecosystem. The system will provide habitat, connect recreation resources, provide stormwater management resources, and serve as a buffer between land uses. A next step in the planning process is the creation of a Park, Trail and Open Space Master Plan to identify the system in more detail.

- The park system plan, for example, would identify the location and function of different types of parks including regional, community, and neighborhood. It would also differentiate between active and passive areas, as well as where infrastructure such as stormwater measures can be integrated.
- The trail system plan would be equally detailed looking at trails by purpose, including walking, biking, horseback riding, cross country skiing and atv/snowmobiling.
- The open space system would consider purposes such as buffering, habitat protection, and wetland restoration. Access and use of the areas would need to be considered for trails or fishing.

The Park, Trail and Open Space Master Plan would also need to identify future ownership and management of the system. While many areas will be owned by the City or Township, it is likely that portions will be governed by regional agencies such as the Buffalo Red River Watershed District or Minnesota DNR. Others may also be owned by non-profit organizations, such as the Probstfield Living History Farm Foundation, or by a private owner with protective covenants or easements.

As with other planning projects initiated by the City of Moorhead, the development of the Park, Trail and Open Space Master Plan is intended to involve public outreach. Many of the discussions will likely be "kitchen table level," gatherings of a property owner or two to discuss their future interests or plans for their properties. In addition to guiding the overall planning of the area, this information will be used to identify phasing of public improvements and for guiding park dedication investments.

Land Use Management

Amendments to the City's Comprehensive Plan will be needed to implement the North Moorhead/Oakport Township Growth Area Plan. As development occurs, the City will maintain consistency with the Comprehensive Plan and the Growth Area Plan. Development projects requiring an amendment should be evaluated based on its consistency with the City's overall Vision and Guiding Principles as outlined in the Comprehensive Plan and should be considered if they meet the general intent. Development will be encouraged to occur contiguously to ensure utilities are extended in an efficient manner and minimize potential conflicts between new development and existing agricultural operations. Developers and property owners will be encouraged to be in contact with the Minnesota Farm Bureau Federation and make use of their brochure "Moving to the Country" to help lessen potential conflicts. If the magnitude of the project would be substantially greater than what was estimated in the AUAR, an update to the AUAR would be necessary as provided for under Minnesota Rules 4410.3610 Subp. 7.

The AUAR identifies several properties with actual or potential soil and/or ground water contamination. State law requires that persons properly manage contaminated soil and water they

uncover or disturb, even if they are not the party responsible for the contamination. Property owners or developers on or near contaminated properties should work with the Minnesota PCA to receive technical assistance in managing contamination, including investigating, remediating or mitigating. Minnesota PCA programs include the Petroleum Brownfields Program or Voluntary Investigation and Cleanup (VIC) program.

Erosion Control and Sedimentation

The potential for wind erosion of soil during construction of the project area will be minimized using best management practices (BMPs) outlined in various resources such as by the Minnesota Pollution Control Agency (MPCA) and practiced by the City Engineering Department in permitting development projects.

Water Supply and Appropriation

The City of Moorhead and Moorhead Public Service will monitor the water system to determine when additional improvements are needed. A detailed water system master plan system will be completed in 2009 to analyze long-term needs of the treatment, pumping and storage areas of the water system. MPS will also continue to update is water distribution system master plan to address the changing needs of the City. MPS will continue to update its capital budget to plan accordingly for these investments. The City of Moorhead and MPS will continue to work with regional partners to identify and protect current and future water supplies that may fall outside of the City's corporate boundaries.

Each development will be responsible for the following:

- Minnesota Department of Health permit(s) for the extension of water supply systems
- Water Access Charges (WAC) related to their development
- Proportional share of the costs for the Trunk Water Supply lines
- Proportional share of the costs for the future storage needs of the area
- Construction of local water supply lines

Wastewater System

The City of Moorhead will monitor the wastewater system to determine when additional improvements are needed and will continue to update its capital budget to plan accordingly for these investments. Through its site development plan review process, the City of Moorhead will monitor and verify estimated wastewater flows for general conformance to the *Sanitary/Storm Sewer Preliminary Master Plan*. Each development will be responsible for the following:

- Sanitary sewer connection fees related to their proposed development
- Proportional share of the costs of the Trunk Sanitary Sewer Main
- Construction of local sewer mains to serve the development
- MPCA/NPDES sanitary sewer extension permit

The analysis of sanitary sewer needs found that significant, expensive improvements were needed to serve sanitary sewer districts 6 and 3-A as proposed in Scenario Two by the North Moorhead/Oakport Township Growth Area Plan. Currently the existing infrastructure in this area serves 512 hookups. With no additional improvements 150 more hookups can occur. The analysis found the need for $4.7 million in improvements in order to serve almost 2,200 new households. As this was determined to be cost prohibitive, the North Moorhead/Oakport Township Growth Area Plan was amended to reduce the level of development in sanitary sewer district 6. This was accomplished through the guiding of property north of Wall Street Avenue as rural residential instead of low density residential, as well as changing a small portion of property guided medium

density residential to low density residential. Figure M.1 shows the revised land use plan for Scenario Two. Table M.1 provides the revised project magnitude data as was generally shown in Question 7 of the AUAR.

Table M.1
Revised Scenario Two Project Magnitude Data

Land Use	Net Acres	Maximum Intensity of Development	Project Magnitude Data
Agricultural	450	0.025 units per acre	11 units
Rural Residential	1,165	0.2 units per acre	233 units
Low Density Residential	2,592	4 units per acre	10,370 units
Medium Density Residential	553	12 units per acre	6,640 units
High Density Residential	312	30 units per acre	9,370 units
Mixed Use/Walkable Street	54	30 units per acre & 0.2 FAR & 11.04 jobs per acre	1,294 units & 93,950 square feet & 119 jobs
Commercial	250	0.2 FAR & 11.04 jobs per acre	2.1 million square feet & 2,763 jobs
Office/Technology Park	767	0.25 FAR & 11.04 jobs per acre	8.4 million square feet & 30,944 jobs
Industrial	205	0.25 FAR & 5.33 jobs per acre	2.2 million square feet & 1,093 jobs
Civic	162	0.15 FAR & 5.13 jobs per acre	1.1 million square feet & 834 jobs
Parks and Open Space	1,003		
Right-of-Way	661		
Total	**7,931**		**27,918 units & 13.9 million square feet & 35,753 jobs**

Storm Water Management

Development within the project area will increase the amount of storm water runoff. The City will ensure the development of a storm water management system which limits flooding and negative impacts on water quality in the Red River. Key strategies will include:

- Maintaining discharge rates at or below pre-development levels
- Treatment of runoff prior to discharge into the Red River
- Enforcement of a Storm Water Ordinance
- Cooperation with MPCA and other partners in development and implementation of strategies to meet the Total Maximum Daily Load (TDML) standard yet to be determined
- Design ponds based on principles of MPCA's *Protecting Water Quality in Urban Areas – Best Management Practices for Dealing with Storm Water Runoff from Urban, Suburban and Developing Areas of Minnesota and the State of Minnesota Stormwater Manual*

- Conformance to National Pollution Discharge Elimination System (NPDES) Phase II requirements as outlined in the EPA Clean Water Act.

Developments within the AUAR project area which impact wetlands will be subject to regulation under the Wetland Conservation Act, Chapter 103G Waters of the State (i.e. Department of Natural Resources), and possibly Section 404 of the Clean Water Act (i.e. Army Corps of Engineers). The City of Moorhead will work with the Clay County Soil and Water Conservation District, the local government unit responsible for administering the MN Wetlands Conservation Act, on any development impacting wetlands. Should wetland impacts be part of a development within the project area, these regulatory programs have sequencing requirements which require applicants to demonstrate that wetlands impacts have been avoided and minimized to the extent practical and, if impacts cannot be avoided, these program require replacement of wetlands impacted by fill or excavation.

The City has an existing ordinance and Stormwater Pollution Prevention Plan that enforces and ensures compliance with NPDES requirements. As NPDES Construction Stormwater Permit requirements change with each permit re-issuance, relevant requirements are, and will be, incorporated into stormwater system design. This includes best management practices for projects with a discharge within one mile of an impaired water (already a permit requirement) and consideration of access points for monitoring (a potential future requirement), As non-degradation rule changes are implemented, the City will incorporate these requirements into the City-wide Stormwater Pollution Prevention Program, and as appropriate, local ordinance.

Traffic

Increased traffic generation in the project area will require construction of new roads to serve the development and improvements to existing roadways and intersections to accommodate growing traffic volumes. Full build out of the project area is not anticipated for more than 50 years. Ongoing monitoring and analysis will need to occur to determine when additional roadway improvements are needed. The City identifies projects through its 5 year capital improvement program and will continue to plan and budget for necessary roadway improvements associated with new development in the growth areas. Specific traffic mitigation measures will include the following:

- Update and maintain the 5 year Capital Improvement Plan (CIP)
- Continue close collaboration with Metro COG to monitor traffic volumes and update projections to inform the CIP.
- Incorporate design strategies such as berming, landscaping, or increased setbacks along new major roadways that mitigate noise impacts.
- Work with Moorhead Metropolitan Area Transit to plan for new route alignments to serve future development in the Growth Area when demand is sufficient to support bus service.
- Encourage development projects to design with consideration given to transit services including incorporation of future bus stops, development of sidewalk and trail connections, and other site design features.

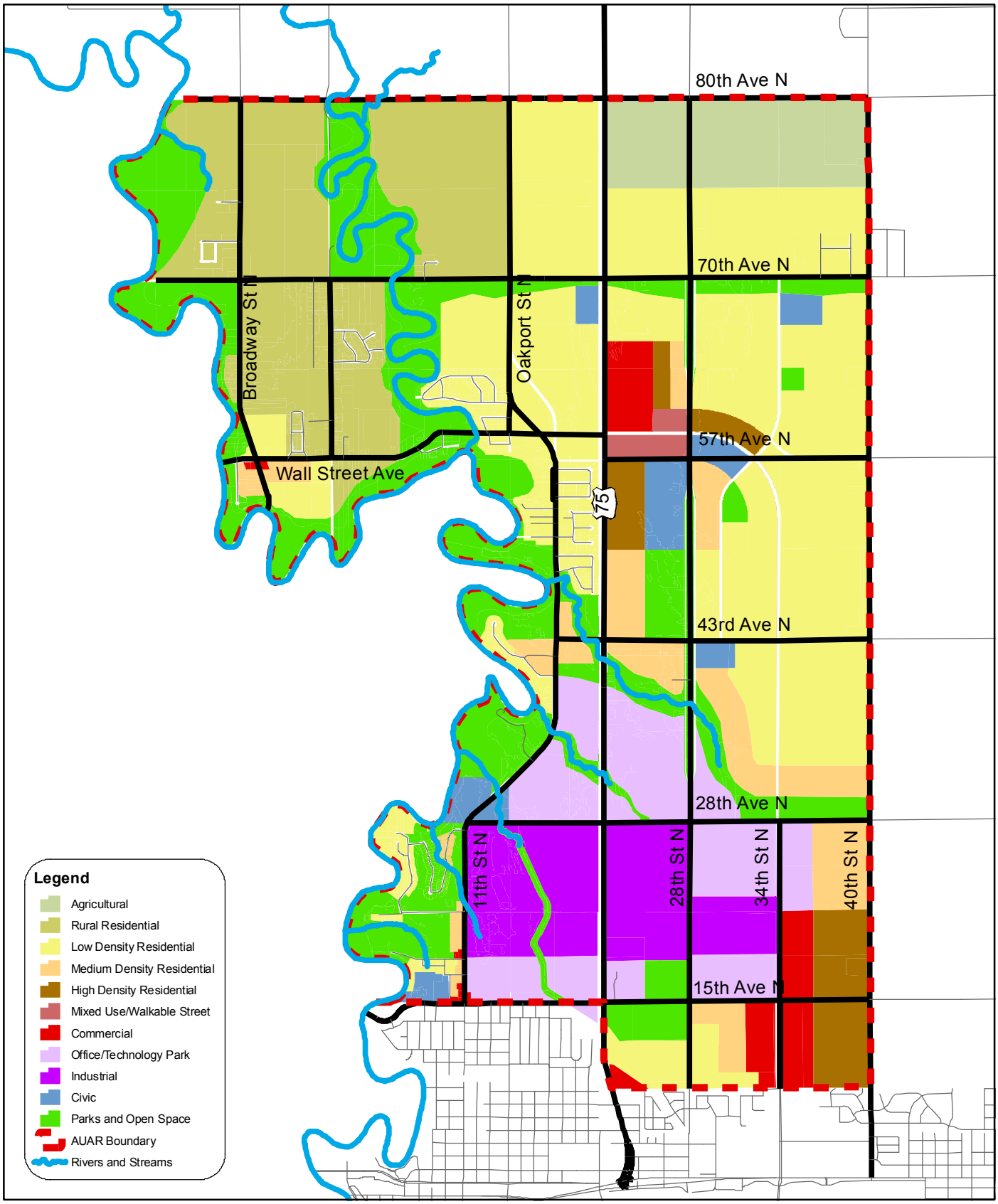
MONITORING OF DEVELOPMENT AND FUTURE UPDATES TO THE AUAR

The AUAR assumes a hypothetical development scenario. Since it is based on assumptions it is important that actual development be monitored and compared to the development that was assumed in the development of the AUAR. Tracking of this development will be done through the City's existing GIS system. As part of the final plat process the developer will submit electronic plats consistent with city development requirements in a compatible form to the City's

GIS system. This data will enable the City to maintain an ongoing inventory of platted lots and the ability to tie building permits to the lots so that occupied housing units can tracked in the development area. The City's existing GIS system has the capacity to perform this task.

As required by Minnesota Rule 4410.3610 Subpart 7, to remain valid, the AUAR must be updated if any of the following events should occur:

- Five years have passed since the AUAR and mitigation plan were adopted and all development within the project area has not been given final approval.
- A comprehensive plan amendment is proposed that would allow an increase in development than what was assumed in the development scenario.
- Total development within the area would exceed the maximum levels assumed in the environmental analysis document.
- Development within any subarea delineated in the AUAR would exceed the maximum levels assumed for that subarea in the document.
- A substantial change is proposed in public facilities intended to service development in the area that may result in increased adverse impacts on the environment.
- Development or construction of public facilities will occur differently than assumed in the development scenario such that it will postpone or alter mitigation plans or increase the development magnitude.
- New information demonstrates that important assumptions or background conditions used in the analysis presented in the AUAR are substantially in error and that environmental impacts have consequently been substantially underestimated.
- The RGU determines that other substantial changes have occurred that may affect the potential for, or magnitude of, adverse environmental impacts.



August 2008

0 0.25 0.5 1 Miles

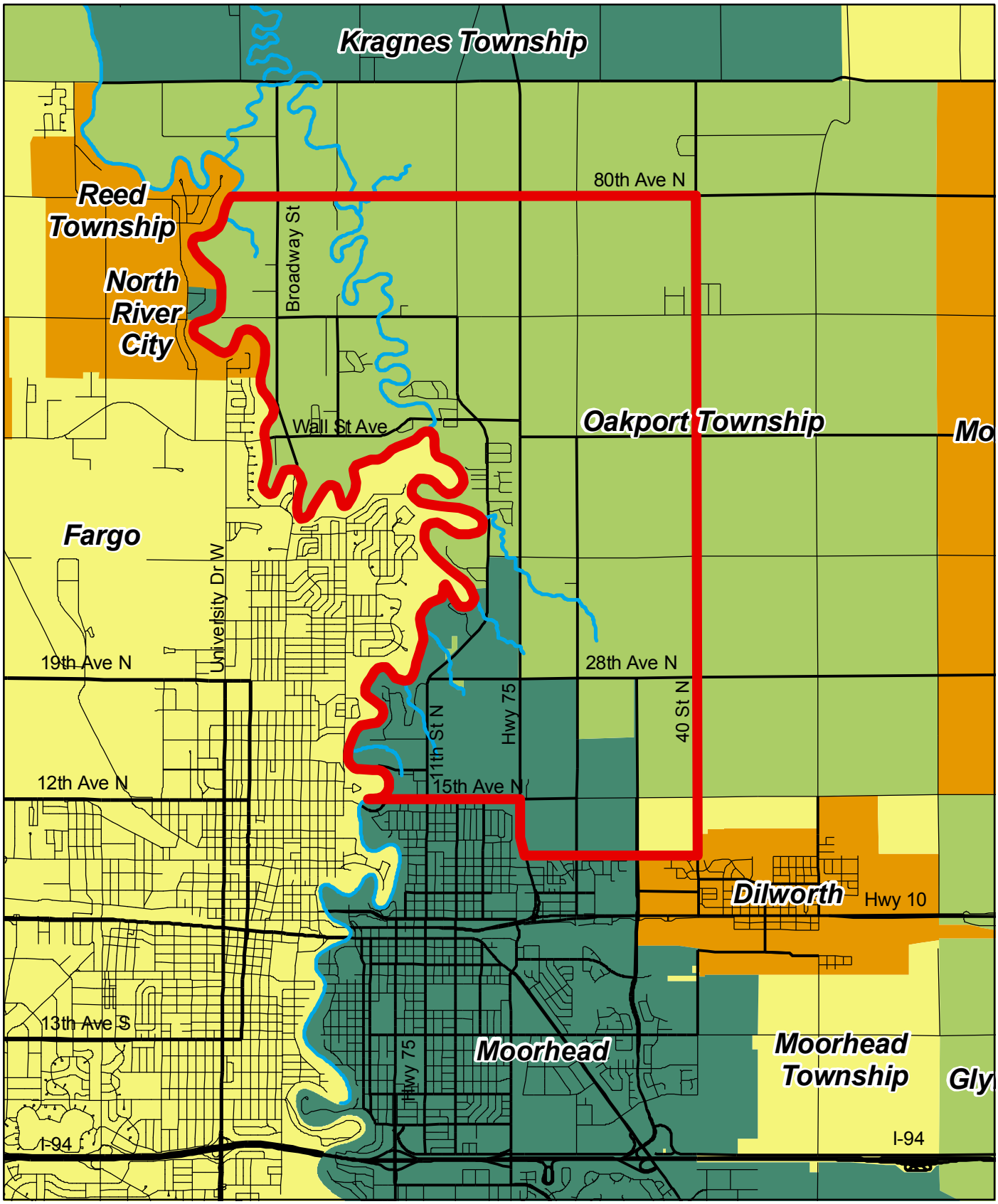
Figure M.1

Source: Mn/DOT, Clay County, Cass County and City of Moorhead

Hoisington Koegler Group, Inc

Revised Scenario Two Land Use Plan

North Moorhead/Oakport Township Growth Area
Alternative Urban Areawide Review (AUAR)



August 2008

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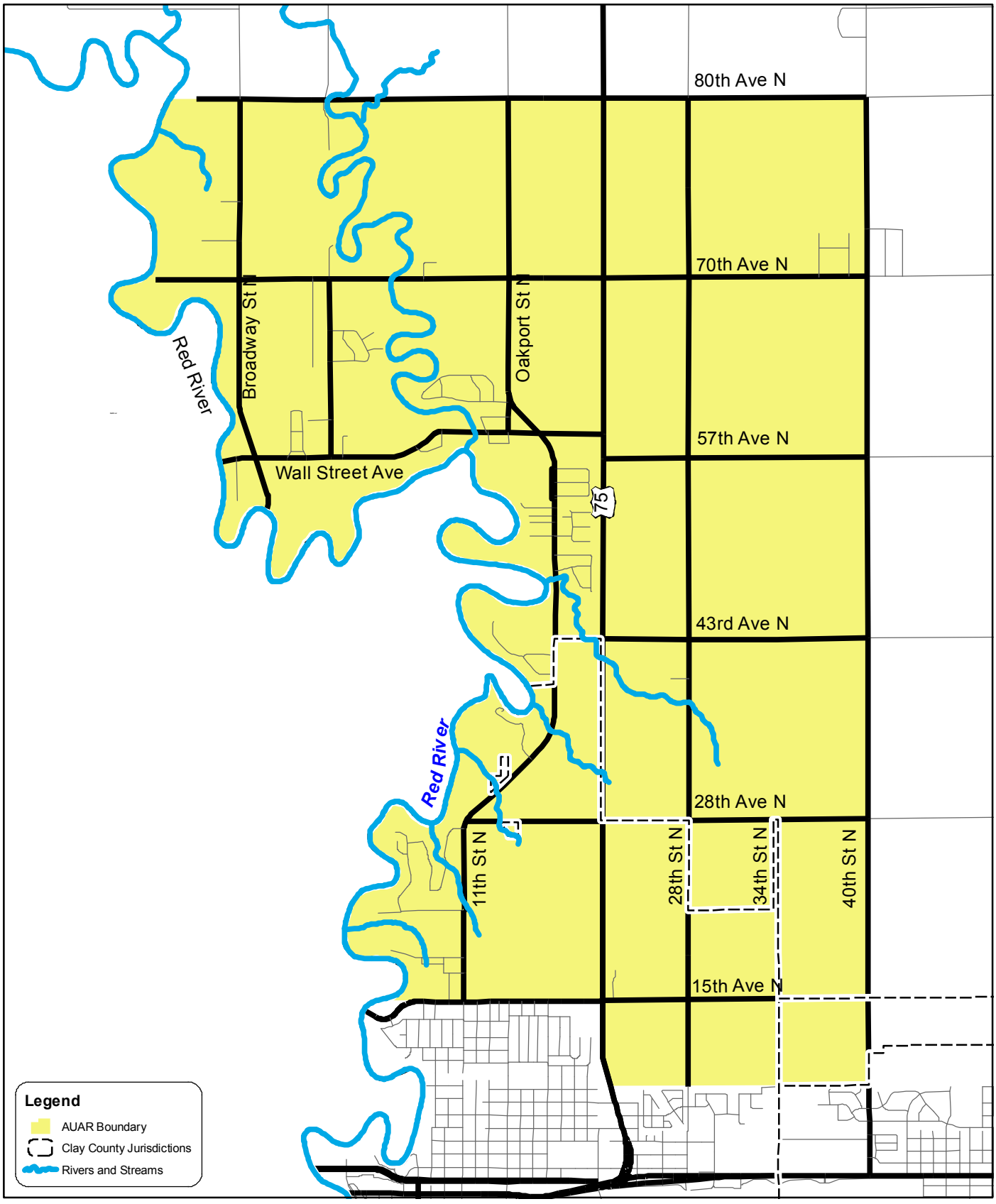
Figure 5.1

Source: Mn/DOT, Clay County, Cass County and City of Moorhead

Hoisington Koegler Group, Inc

Project Location

North Moorhead/Oakport Township Growth Area
Alternative Urban Areawide Review (AUAR)



August 2008

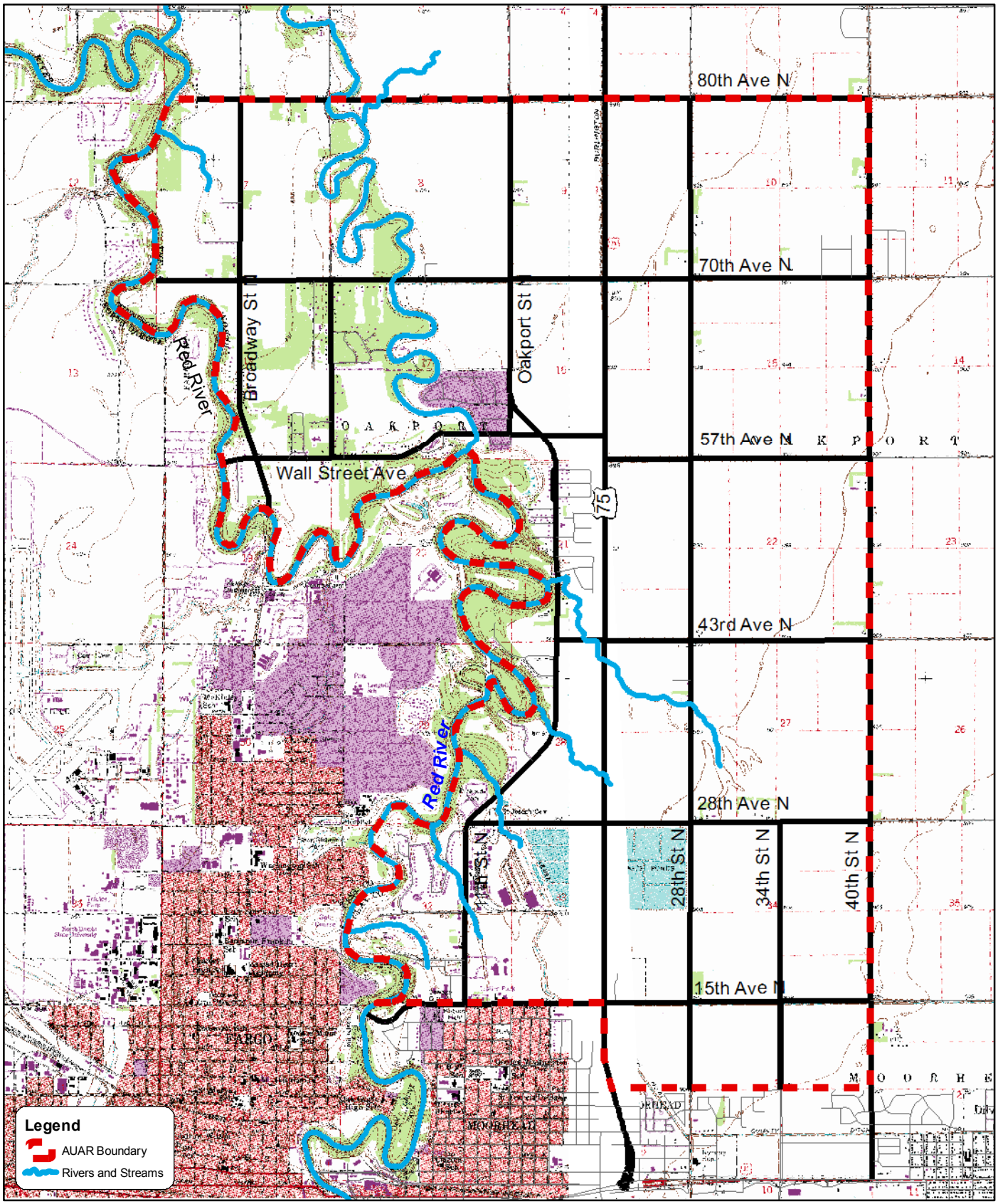
Figure 5.2

AUAR Boundary

North Moorhead/Oakport Township Growth Area
Alternative Urban Areawide Review (AUAR)

Source: Mn/DOT, Clay County,
Cass County and City of Moorhead

Hoisington Koegler Group, Inc



August 2008

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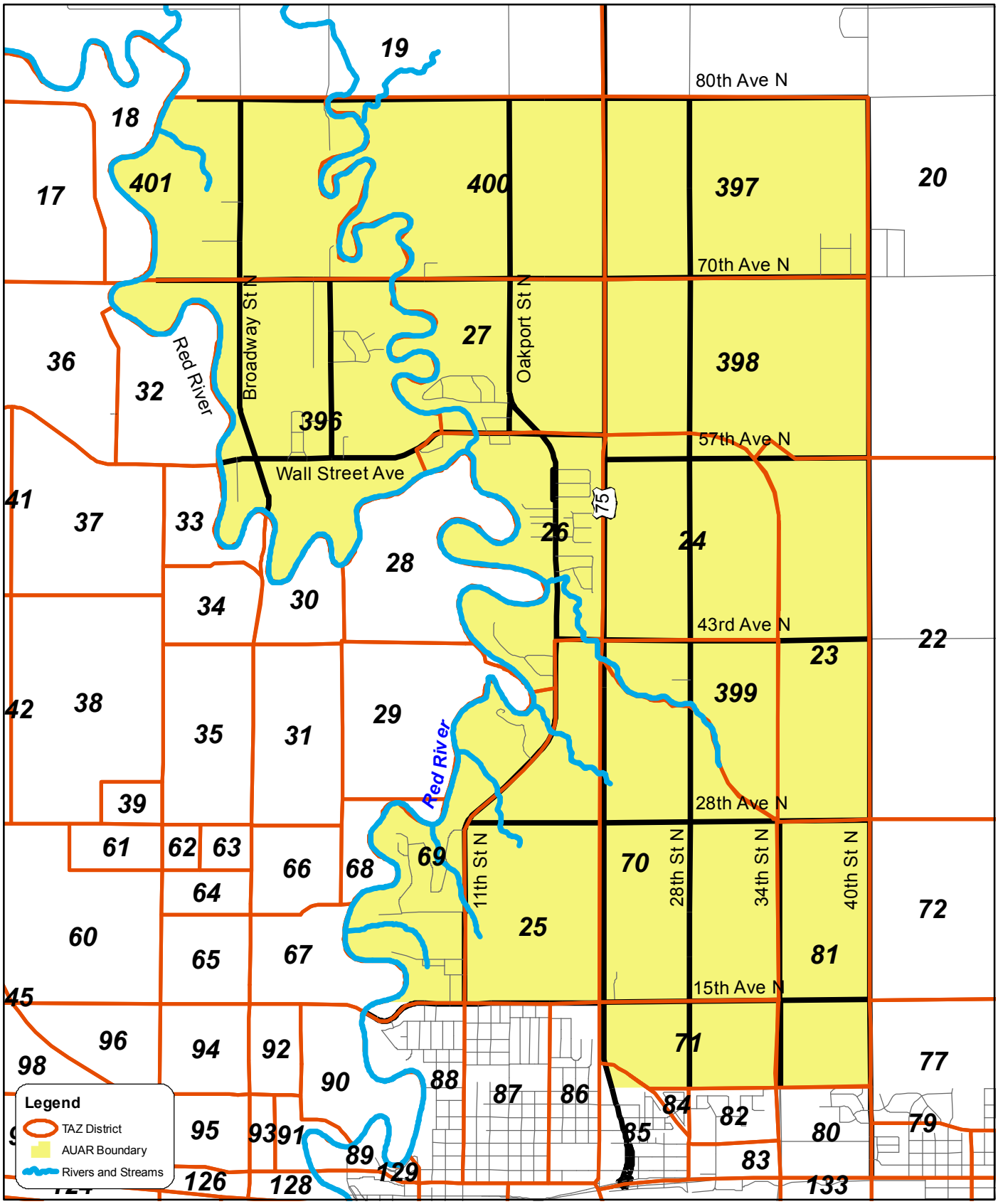
Figure 5.3

Source: Mn/DOT, Clay County, Cass County and City of Moorhead

Hoisington Koegler Group, Inc

USGS Map

North Moorhead/Oakport Township Growth Area
Alternative Urban Areawide Review (AUAR)



August 2008

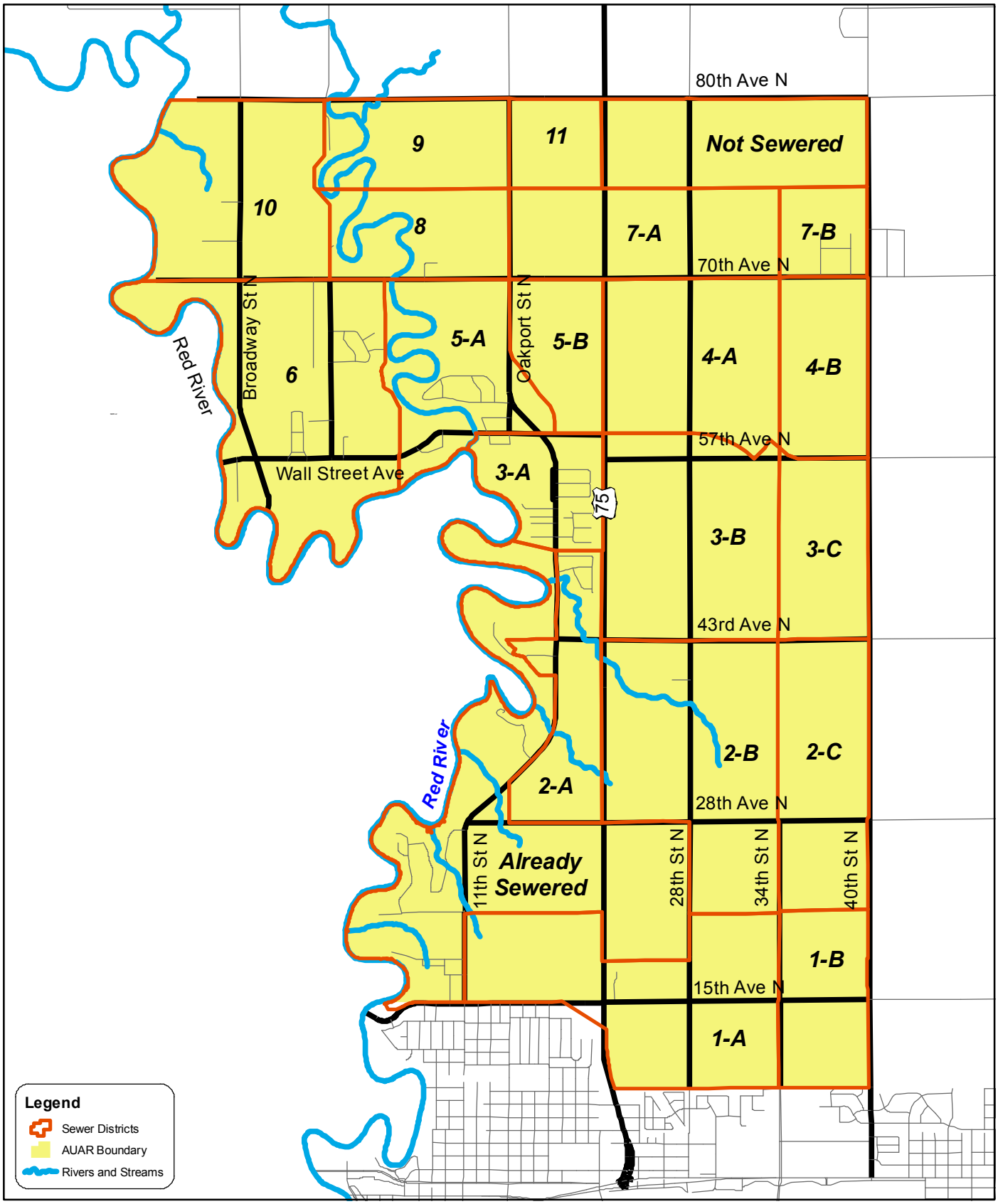
Figure 5.4

Source: Mn/DOT, Clay County, Cass County and City of Moorhead

Hoisington Koegler Group, Inc

Traffic Analysis Zone (TAZ) Districts

North Moorhead/Oakport Township Growth Area
Alternative Urban Areawide Review (AUAR)



August 2008

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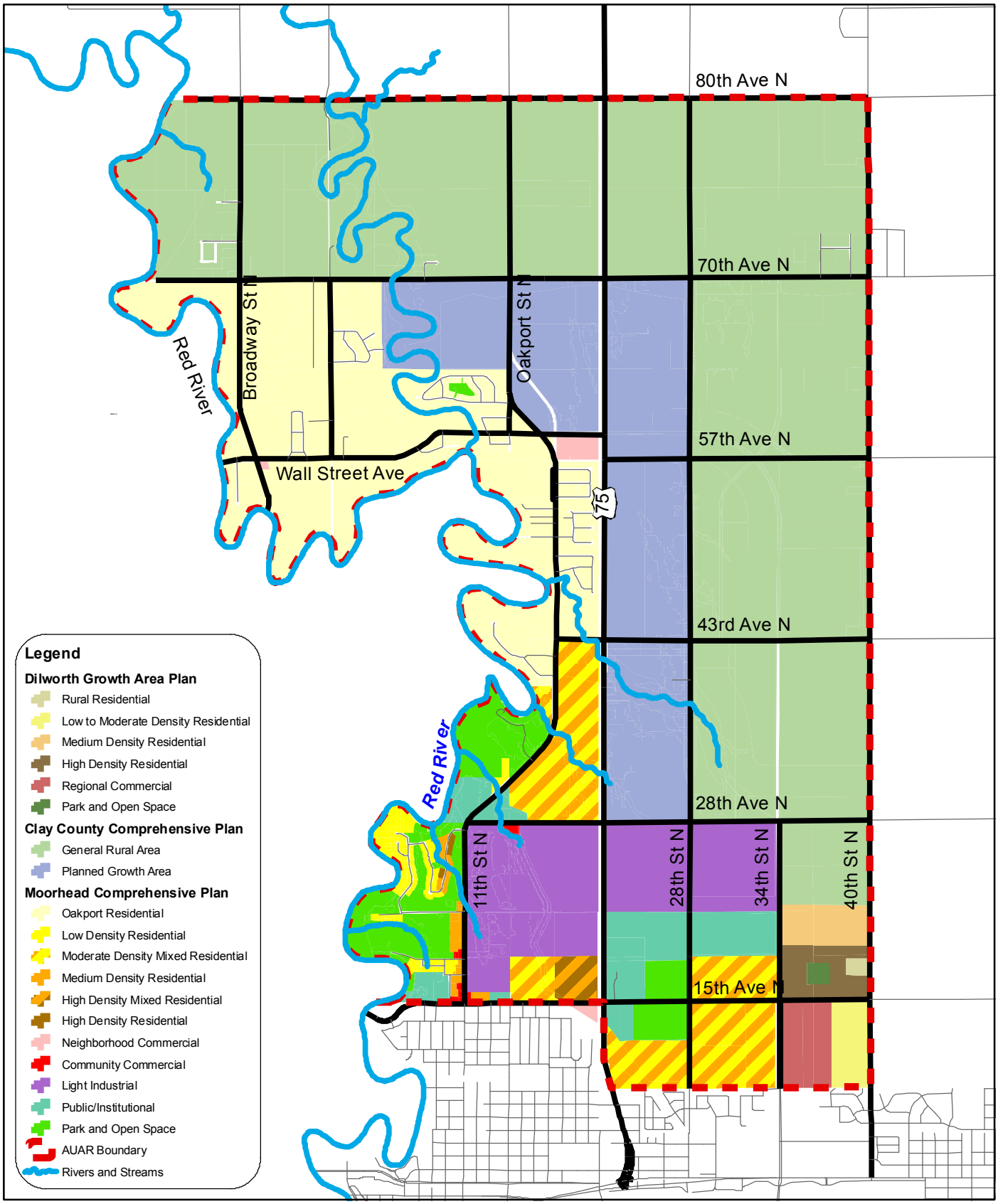
Figure 5.5

Source: Mn/DOT, Clay County, Cass County and City of Moorhead

Hoisington Koegler Group, Inc

Sanitary/Storm Sewer Districts

North Moorhead/Oakport Township Growth Area
Alternative Urban Areawide Review (AUAR)



August 2008

0 0.25 0.5 1 Miles

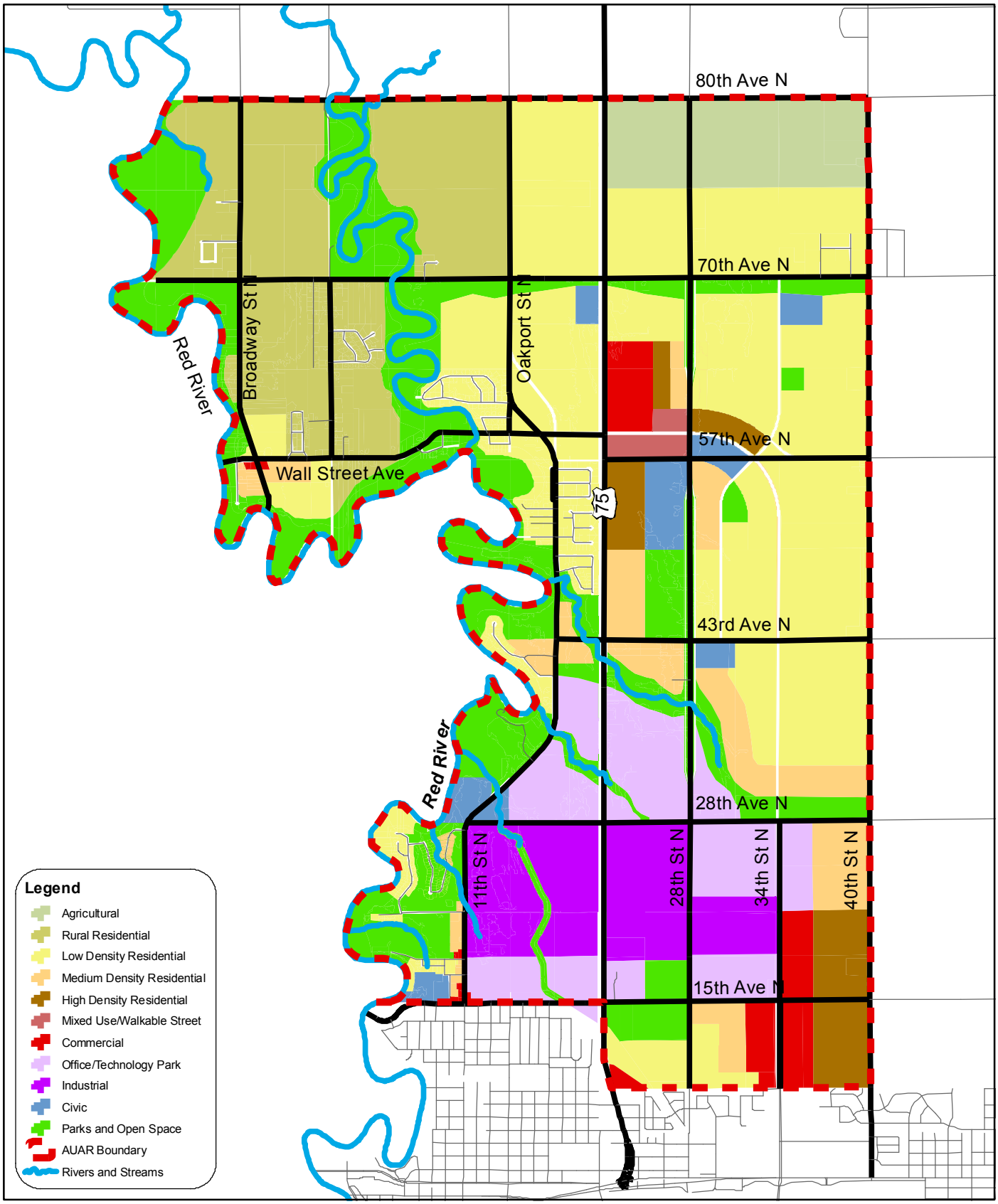
Figure 6.1

Source: Mn/DOT, Clay County, Cass County and City of Moorhead

Hoisington Koegler Group, Inc

Scenario One Land Use Plan

North Moorhead/Oakport Township Growth Area
Alternative Urban Areawide Review (AUAR)



August 2008

0 0.25 0.5 1 Miles

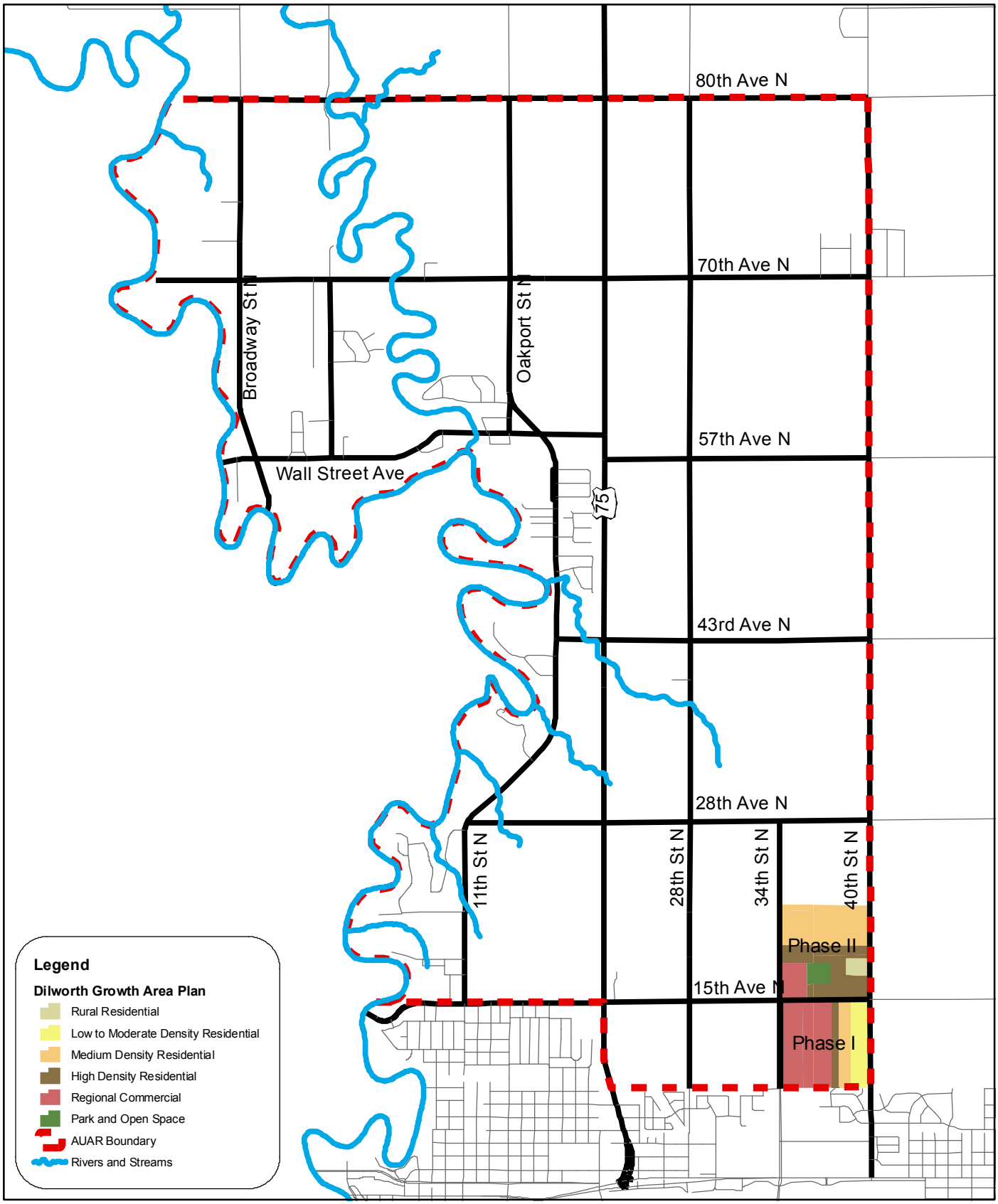
Figure 6.2

Source: Mn/DOT, Clay County, Cass County and City of Moorhead

Hoisington Koegler Group, Inc

Scenario Two Land Use Plan

North Moorhead/Oakport Township Growth Area
Alternative Urban Areawide Review (AUAR)



September 2008

0 0.25 0.5 1 Miles

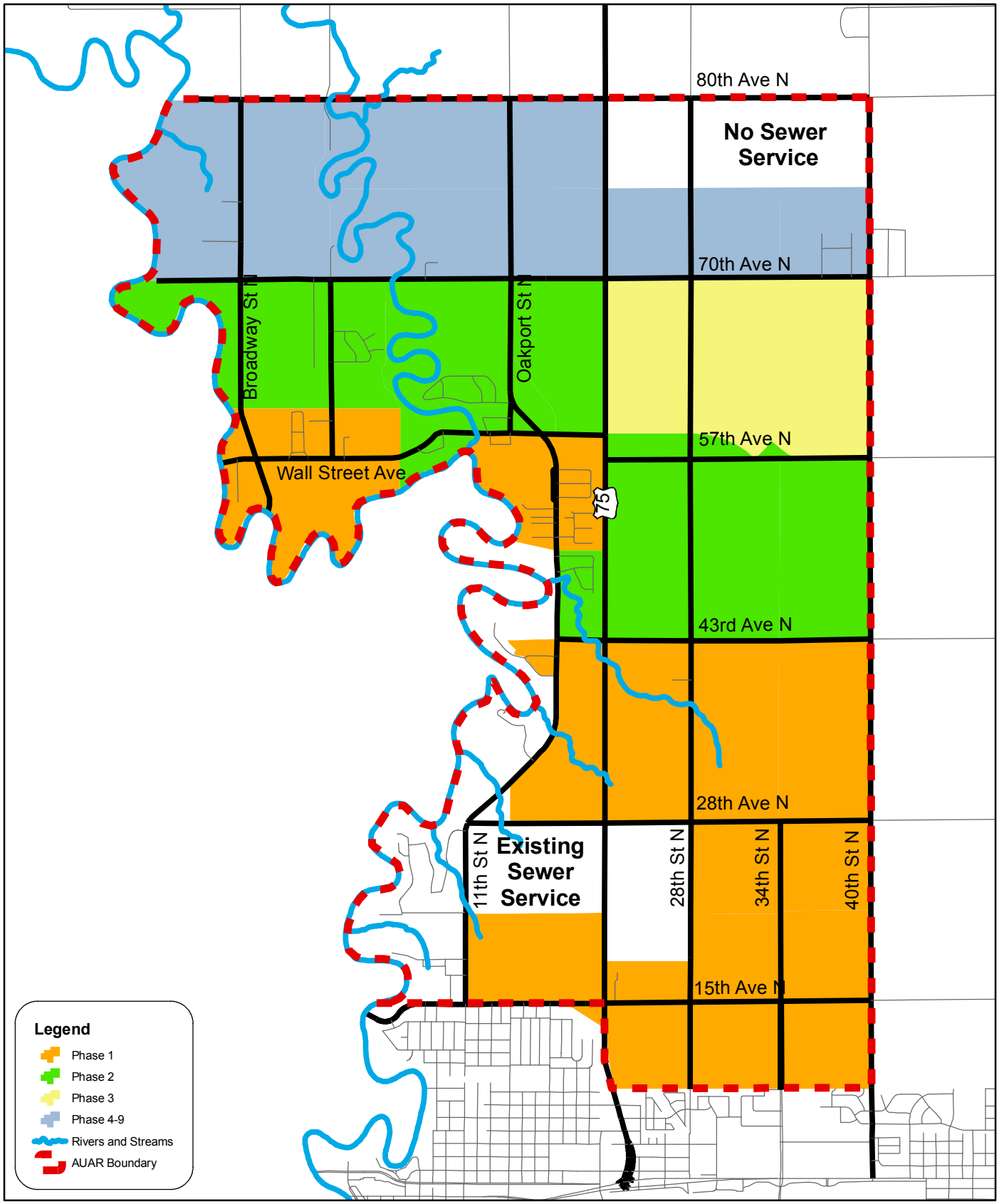
Figure 6.3

Source: Mn/DOT, Clay County, Cass County and City of Moorhead

Hoisington Koegler Group, Inc

Dilworth Growth Area Plan Phasing

North Moorhead/Oakport Township Growth Area
Alternative Urban Areawide Review (AUAR)



January 2009

0 0.25 0.5 1 Miles

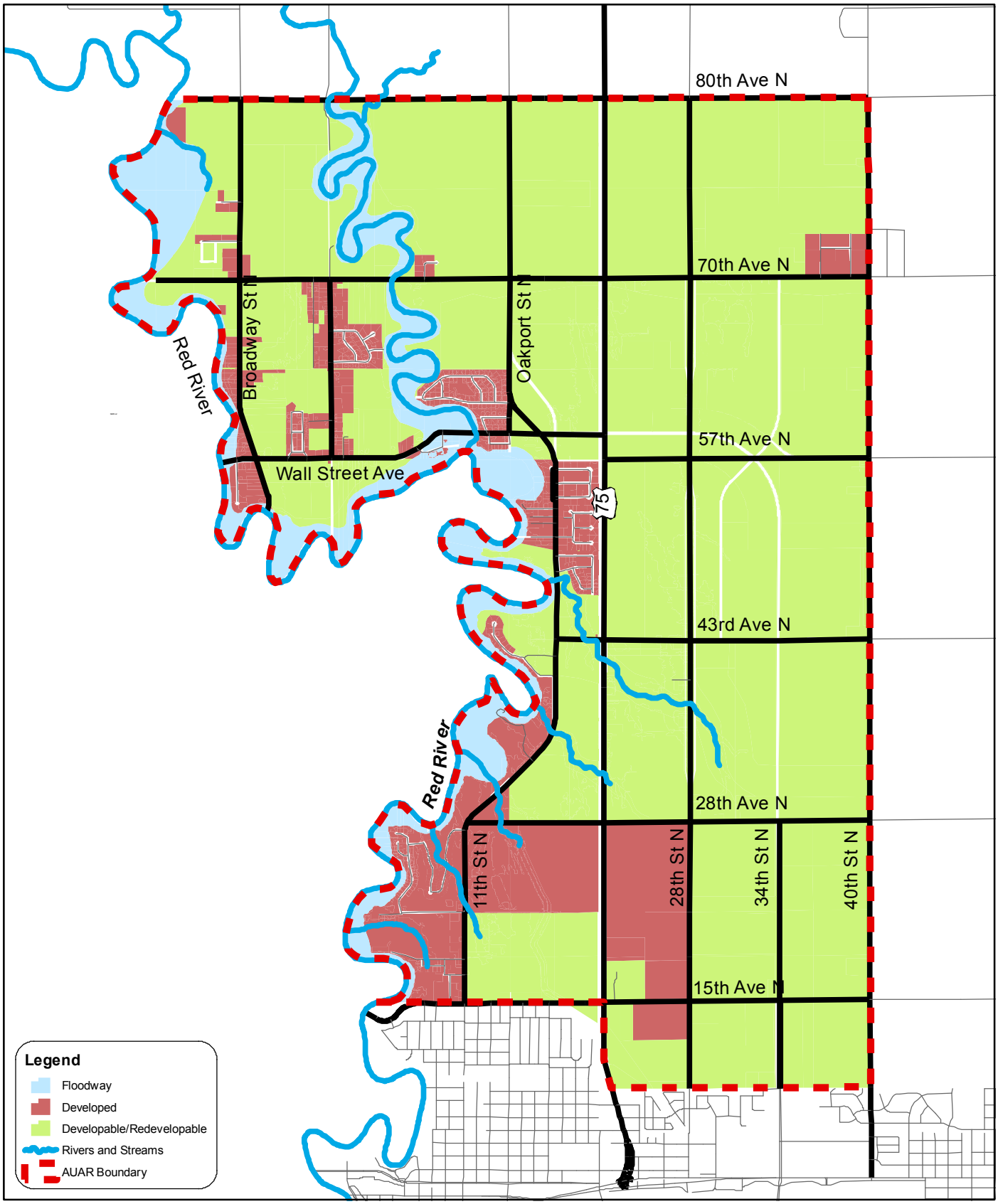
Figure 6.4

Source: Mn/DOT, Clay County, Cass County and City of Moorhead

Hoisington Koegler Group, Inc

Scenario Two - Development Staging

North Moorhead/Oakport Township Growth Area
Alternative Urban Areawide Review (AUAR)



August 2008

0 0.25 0.5 1 Miles

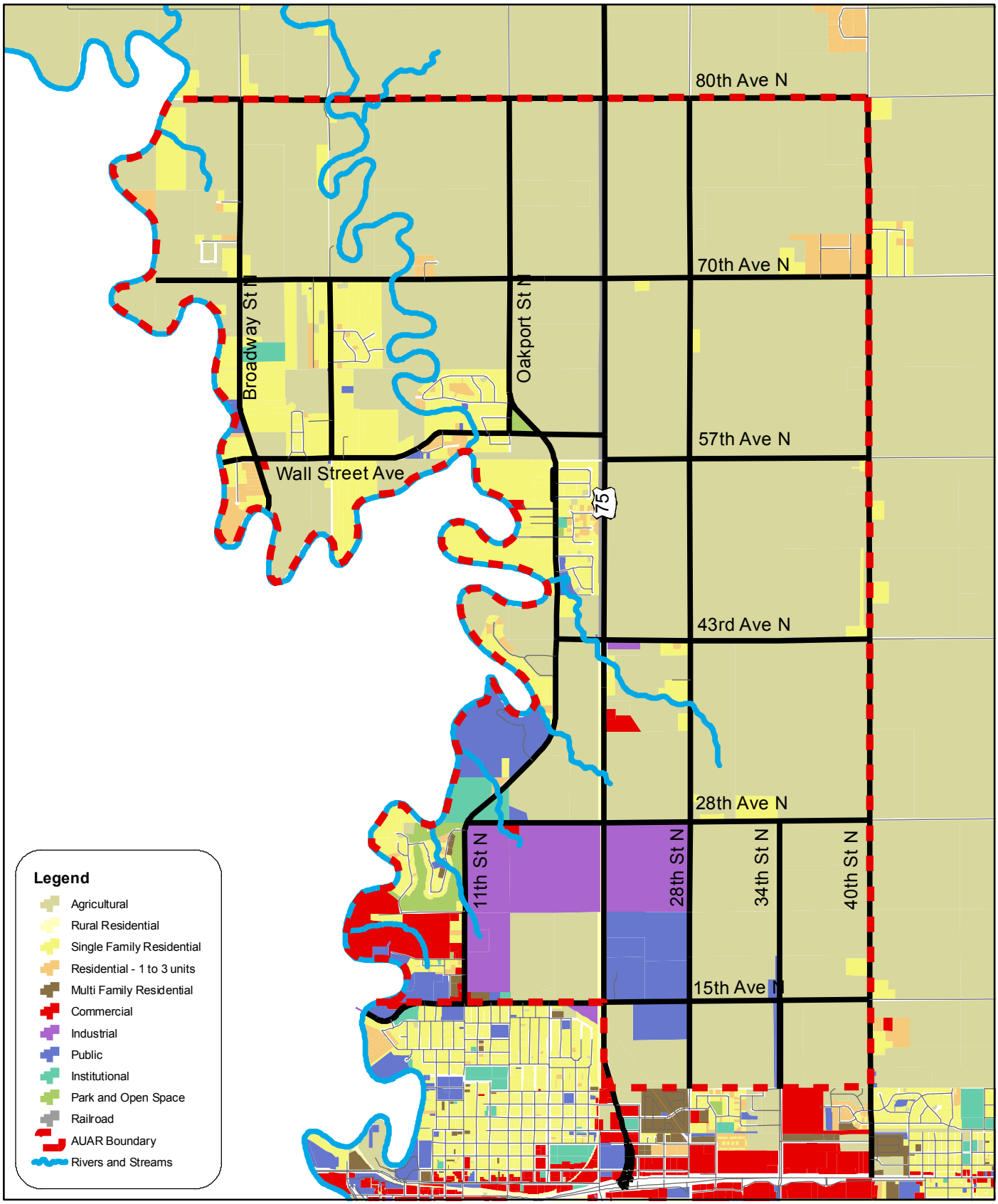
Figure 7.1

Source: Mn/DOT, Clay County, Cass County and City of Moorhead

Hoisington Koegler Group, Inc

Development Potential

North Moorhead/Oakport Township Growth Area
Alternative Urban Areawide Review (AUAR)



September 2008

0 0.25 0.5 1 Miles

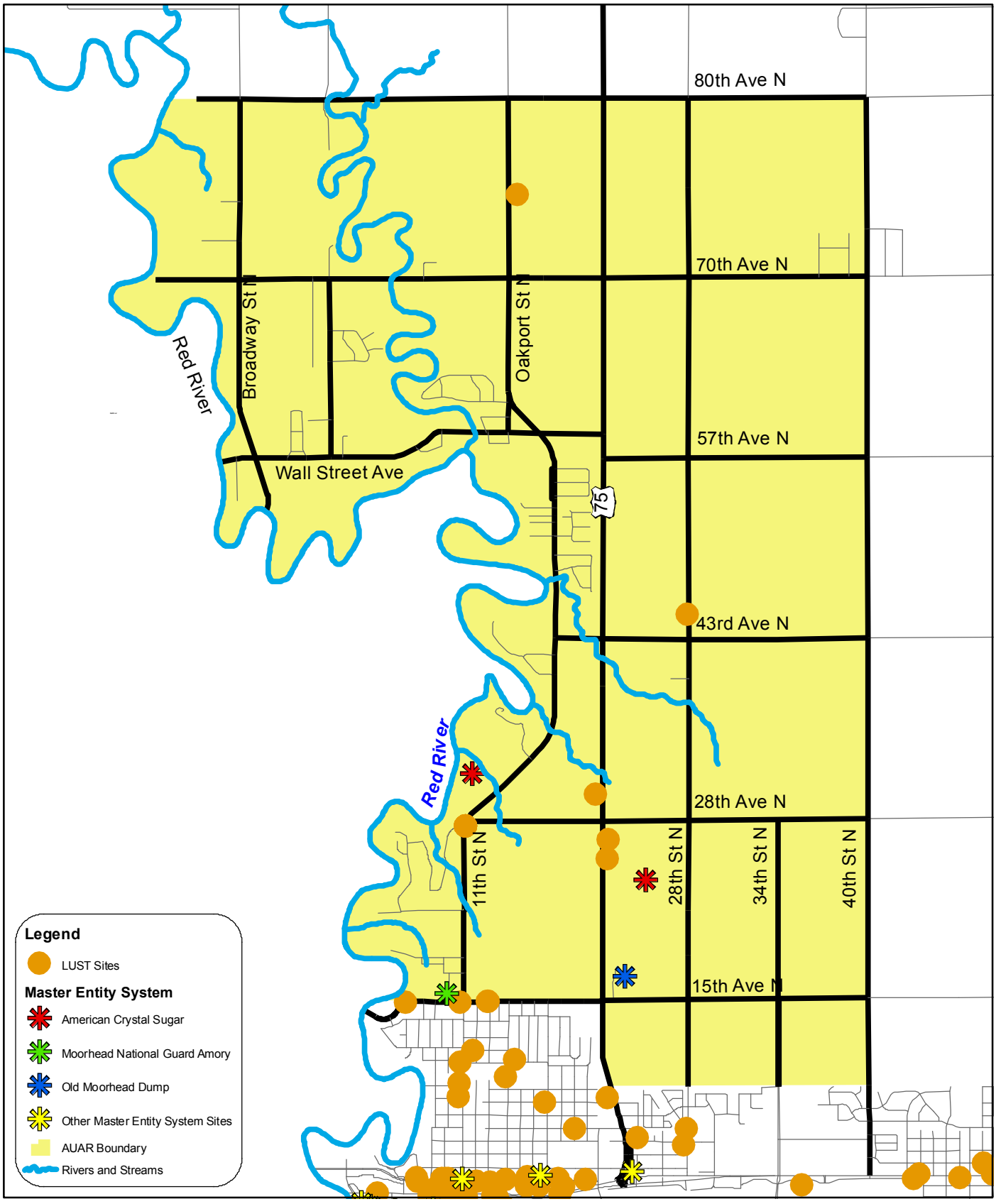
Figure 9.1

Source: Mn/DOT, Clay County, Cass County and City of Moorhead

Hoisington Koegler Group, Inc

Existing Land Use

North Moorhead/Oakport Township Growth Area
Alternative Urban Areawide Review (AUAR)



August 2008

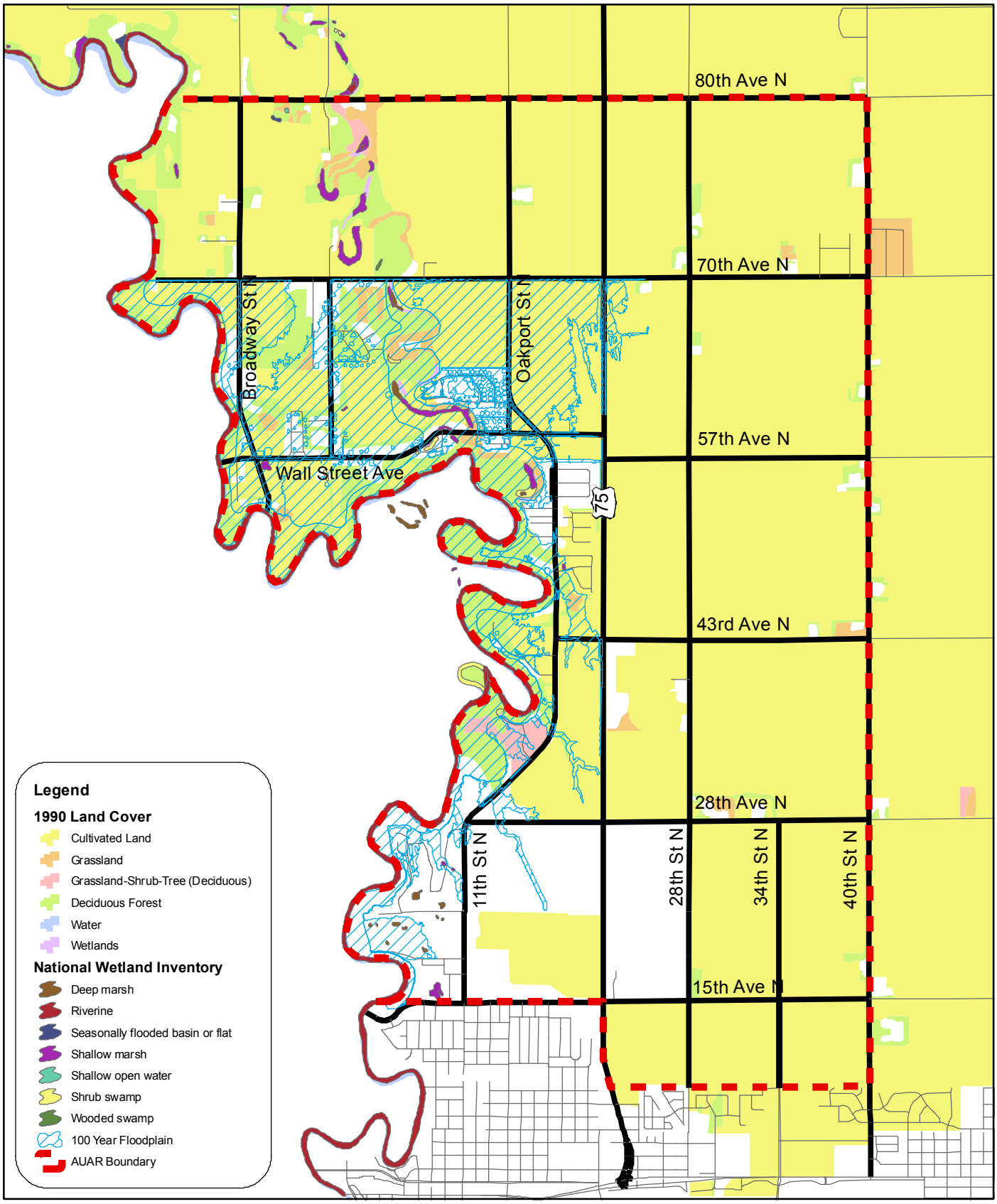
Figure 9.2

Source: Mn/DOT, Clay County, Cass County and City of Moorhead

Hoisington Koegler Group, Inc

Sites of Environmental Concern

North Moorhead/Oakport Township Growth Area
Alternative Urban Areawide Review (AUAR)



September 2008

0 0.25 0.5 1 Miles

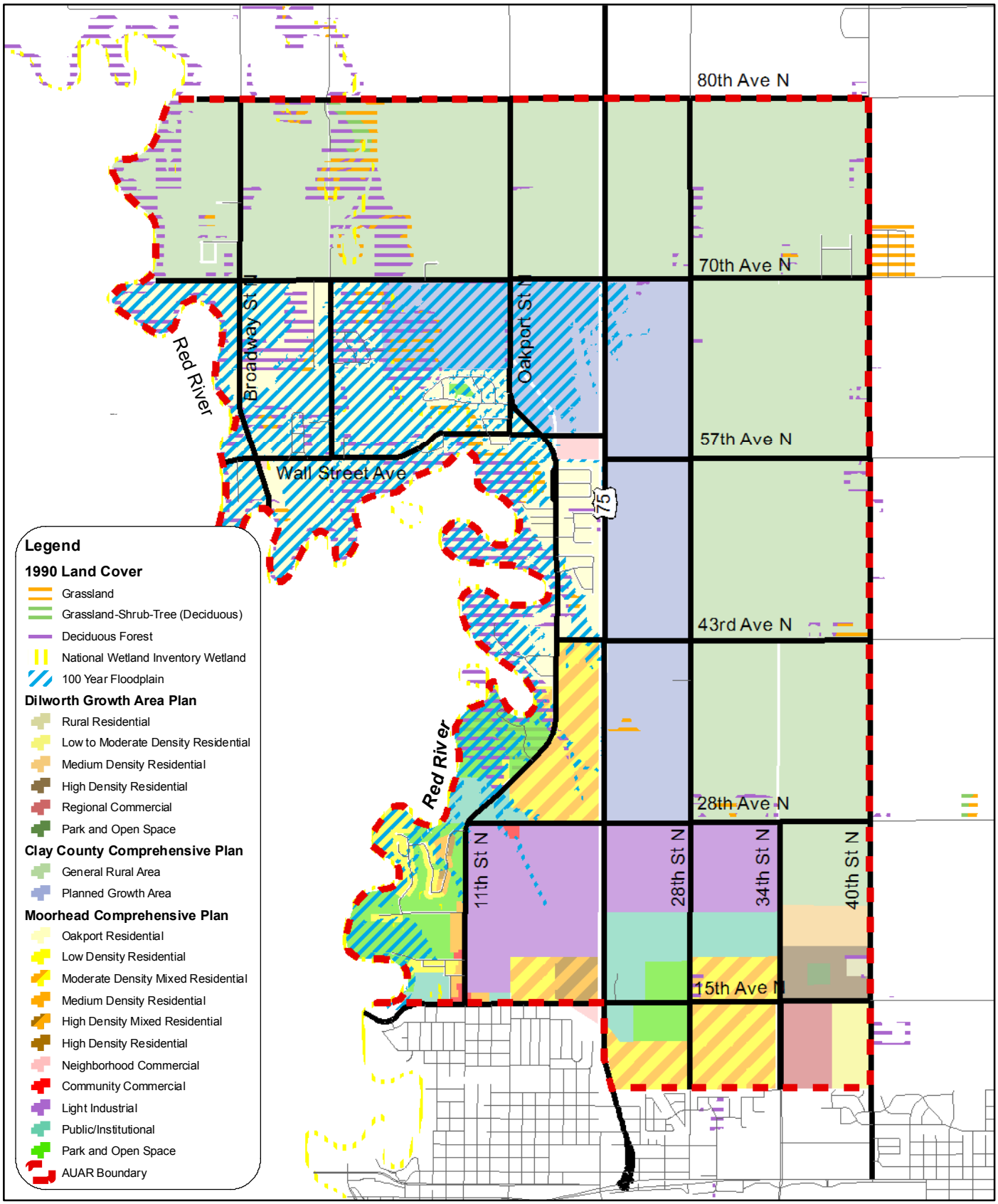
Source: Mn/DOT, Clay County, Cass County and City of Moorhead

Hoisington Koegler Group, Inc

Figure 10.1

Land Cover

North Moorhead/Oakport Township Growth Area
Alternative Urban Areawide Review (AUAR)



August 2008

0 0.25 0.5 1 Miles

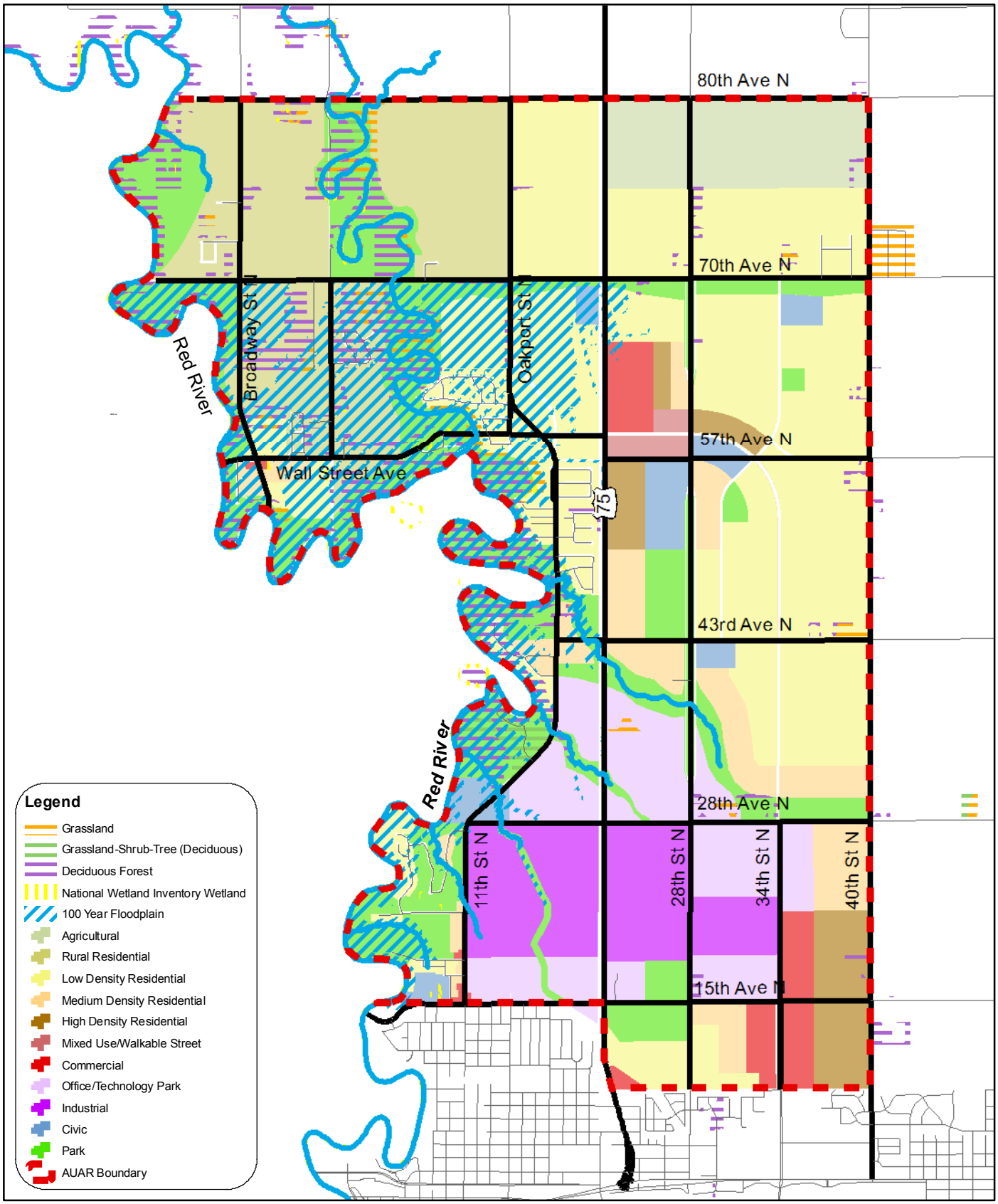
Figure 10.2

Source: Mn/DOT, Clay County, Cass County and City of Moorhead

Hoisington Koegler Group, Inc

Natural Resources Overlay - Scenario One

North Moorhead/Oakport Township Growth Area
Alternative Urban Areawide Review (AUAR)



August 2008

0 0.25 0.5 1 Miles

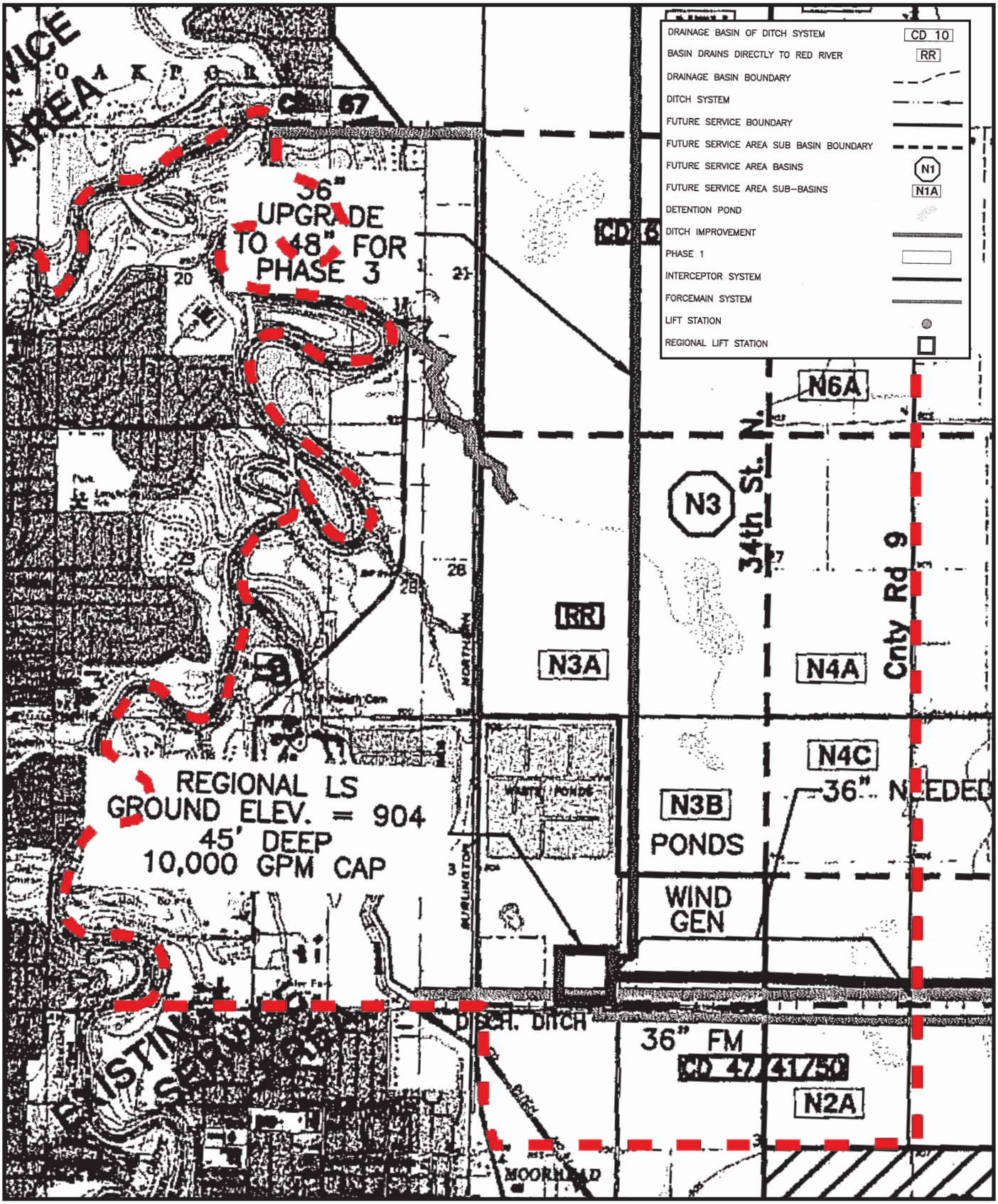
Figure 10.3

Source: Mn/DOT, Clay County, Cass County and City of Moorhead

Hoisington Koegler Group, Inc

Natural Resources Overlay - Scenario Two

North Moorhead/Oakport Township Growth Area
Alternative Urban Areawide Review (AUAR)



September 2008

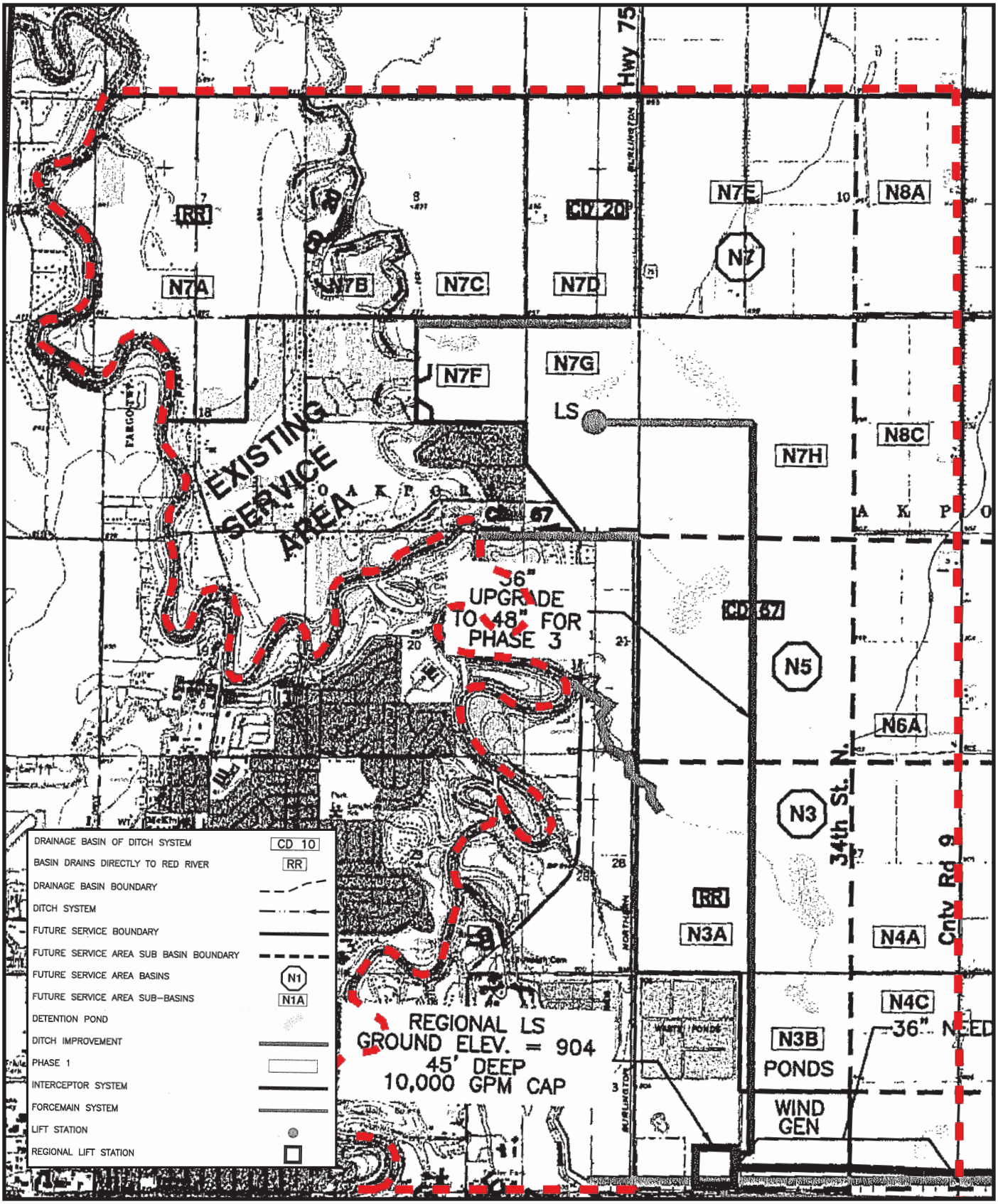
Figure 17.1-South

Source: Figure 2 of 2006 Sanitary/Storm Sewer Preliminary Master Plan

Hoisington Koegler Group, Inc.

Proposed Stormwater/Sanitary System - Scenario One

North Moorhead/Oakport Township Growth Area
Alternative Urban Areawide Review (AUAR)



September 2008

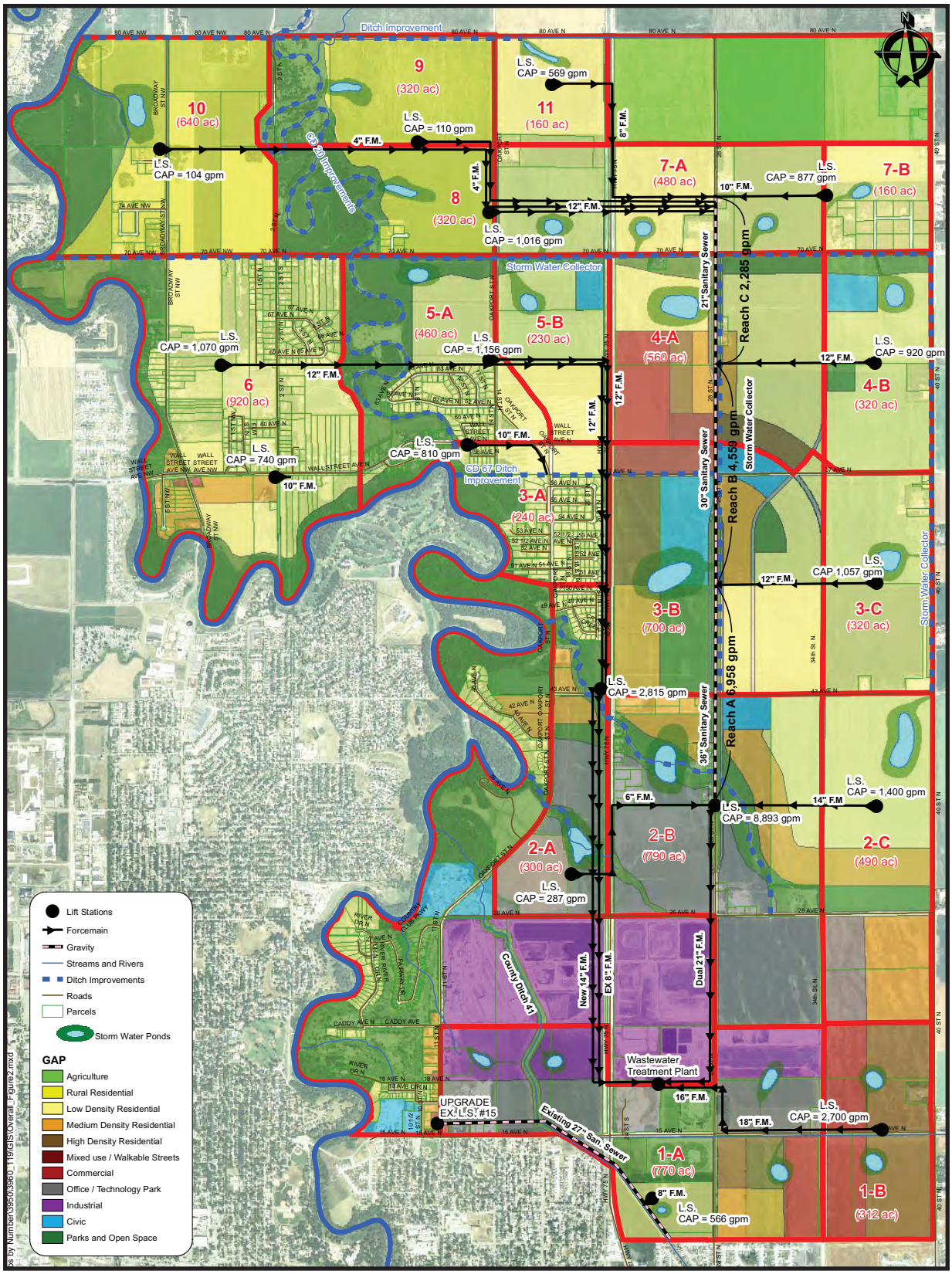
Figure 17.1-North

Source: Figure 2 of 2006 Sanitary/Storm Sewer Preliminary Master Plan

Hoisington Koegler Group, Inc.

Proposed Stormwater/Sanitary System - Scenario One

North Moorhead/Oakport Township Growth Area
Alternative Urban Areawide Review (AUAR)



September 2008

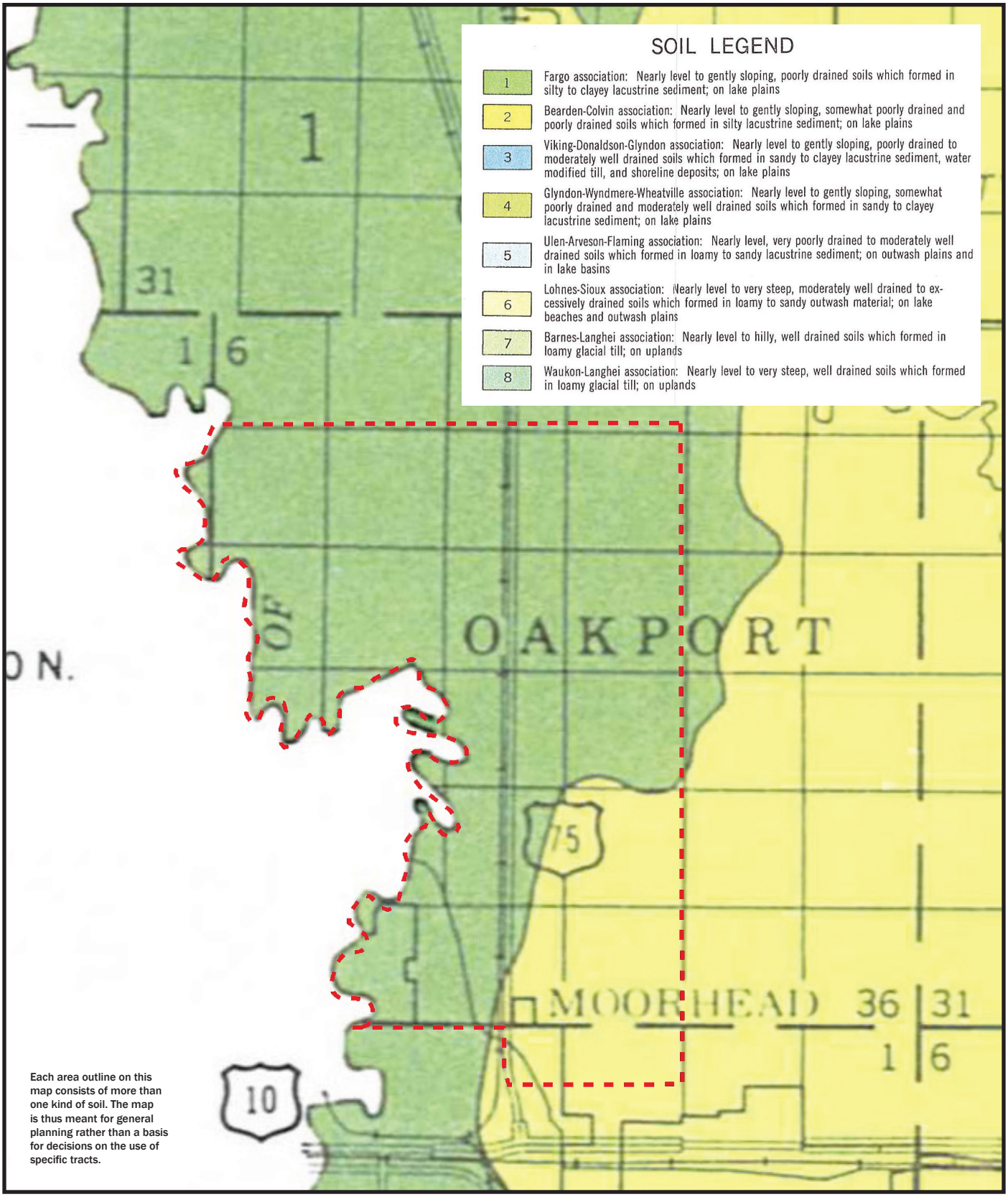
Figure 17.2

Source: Figure 2 of 2008 Sanitary/Storm Sewer Preliminary Master Plan

Hoisington Koegler Group, Inc.

Proposed Stormwater/Sanitary System - Scenario Two

North Moorhead/Oakport Township Growth Area
Alternative Urban Areawide Review (AUAR)



September 2008

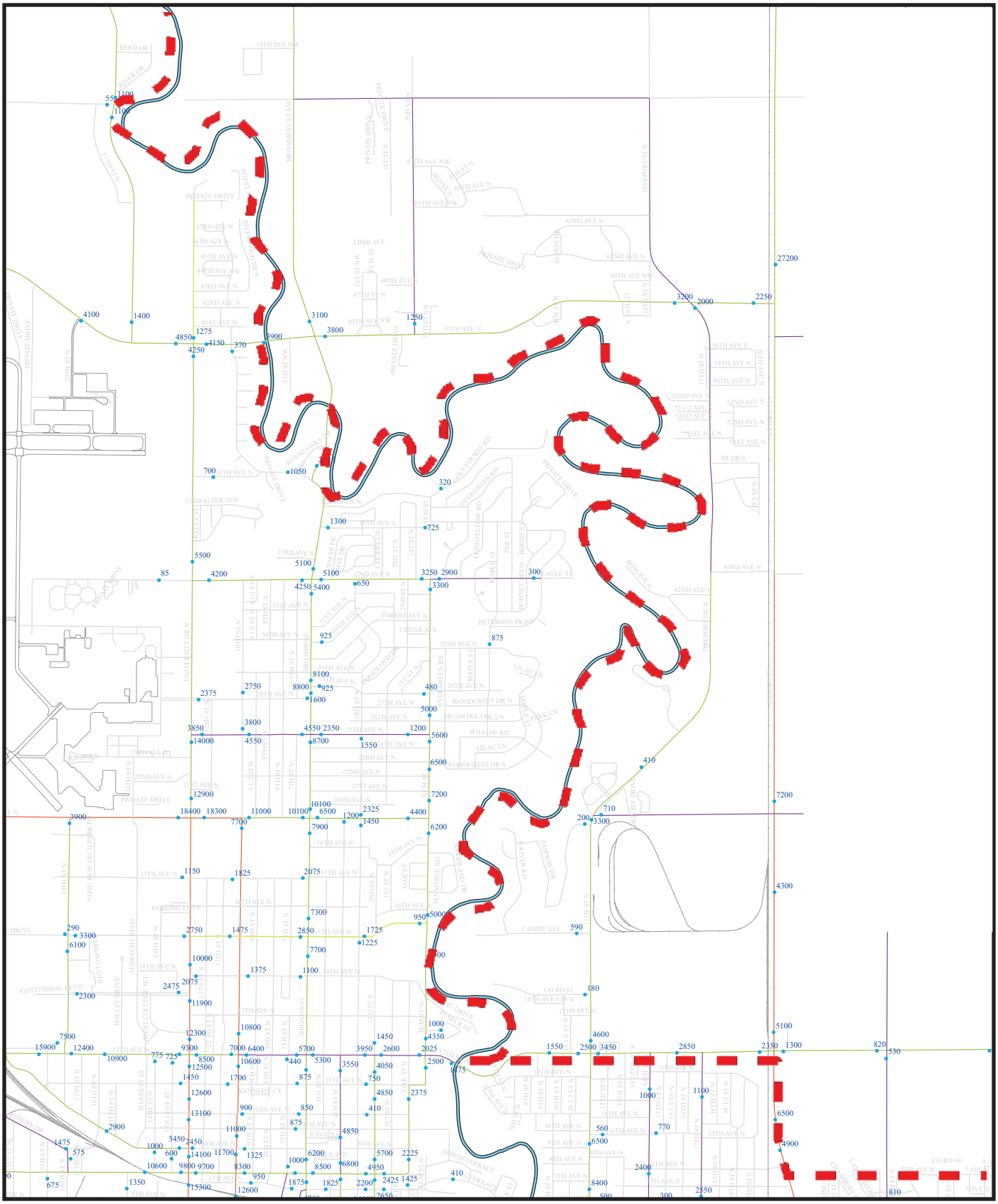
Figure 19.1

Soils Map

North Moorhead/Oakport Township Growth Area
Alternative Urban Areawide Review (AUAR)

Source: Figure 2-7 from Clay County's 2002 Comprehensive Plan

Hoisington Koegler Group, Inc.



September 2008

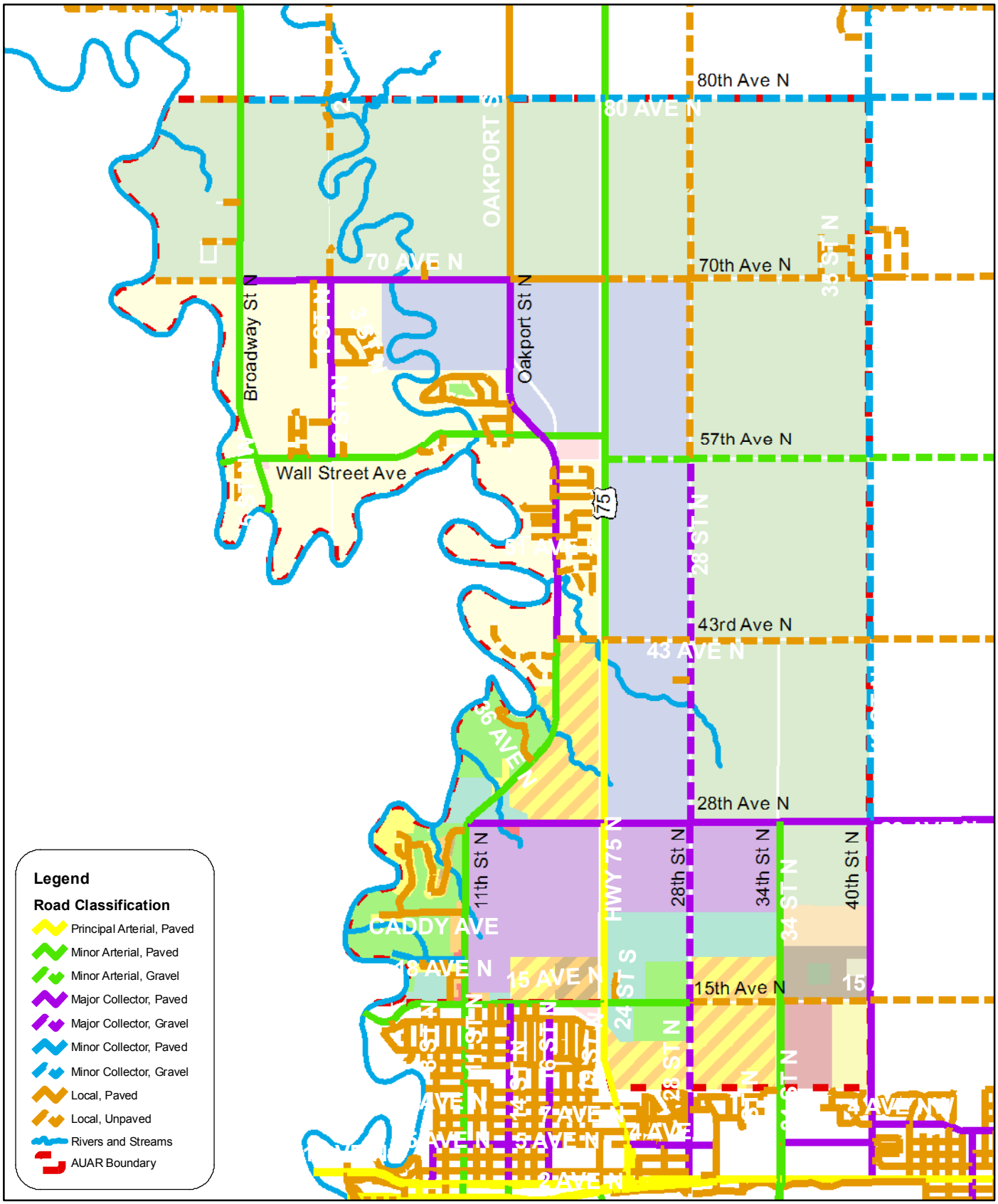
Source: FMCOG & ATAC

Hoisington Koegler Group, Inc.

Figure 21.1

2006 Average Daily Traffic

North Moorhead/Oakport Township Growth Area
Alternative Urban Areawide Review (AUAR)



September 2008

0 0.25 0.5 1 Miles

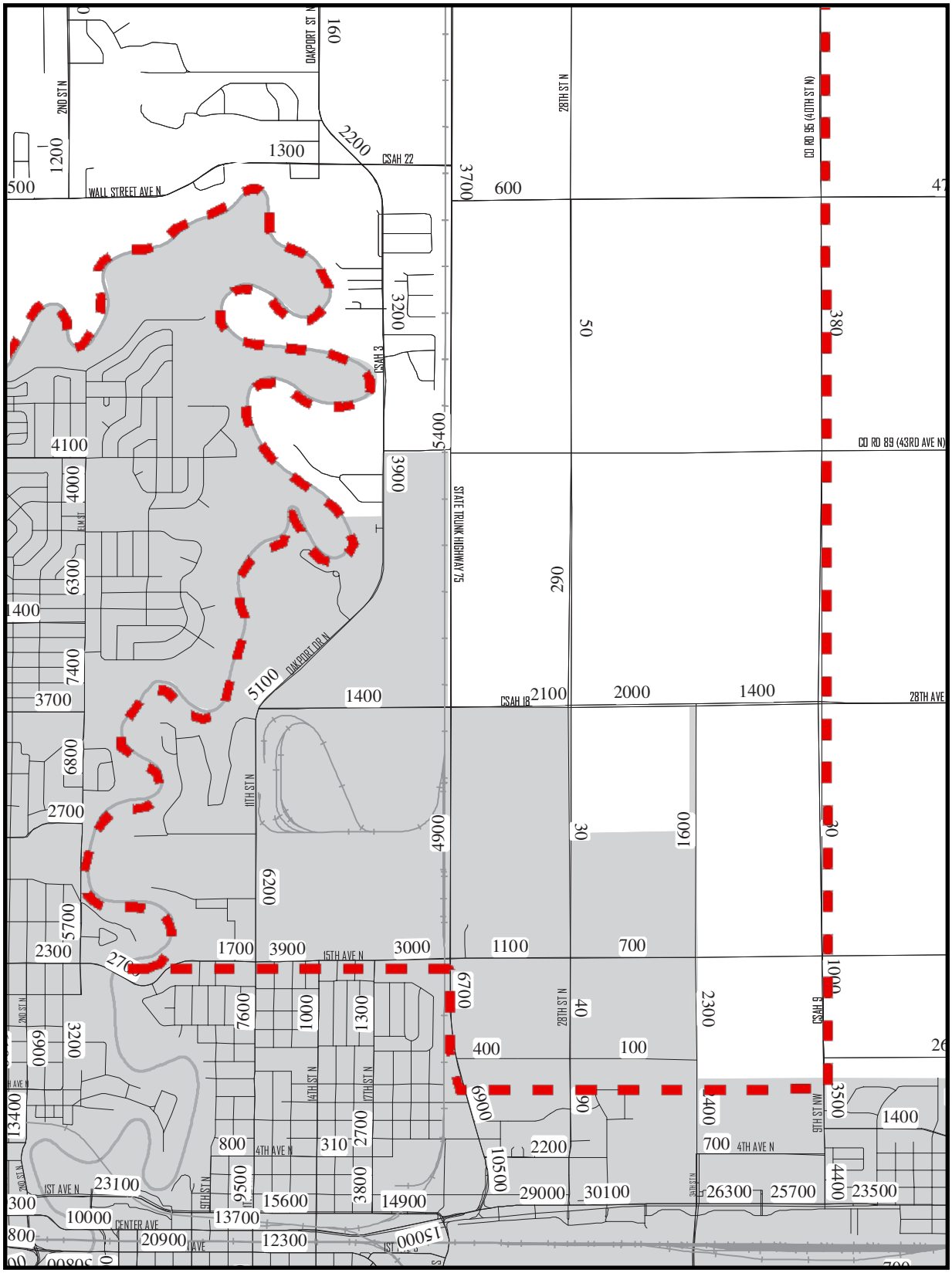
Figure 21.2

Source: Mn/DOT, Clay County, Cass County and City of Moorhead

Hoisington Koegler Group, Inc

Proposed Roadway System - Scenario One

North Moorhead/Oakport Township Growth Area
Alternative Urban Areawide Review (AUAR)



August 2008

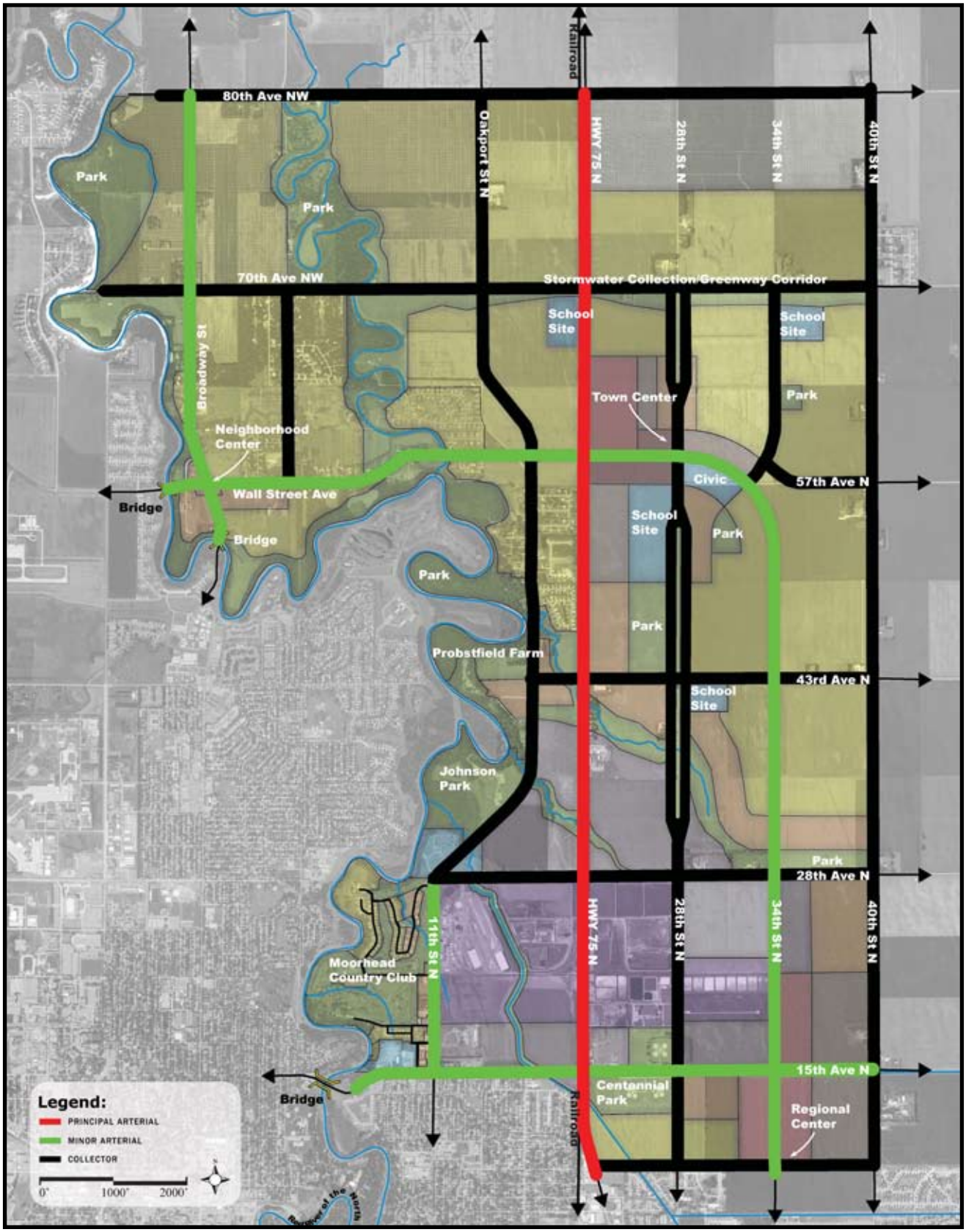
Figure 21.3

Source: FMCOG Short and Long Range Transportation Plan (2004-2030)

Hoisington Koegler Group, Inc.

2030 Modeled Traffic Volumes - Scenario One

North Moorhead/Oakport Township Growth Area
Alternative Urban Areawide Review (AUAR)



August 2008

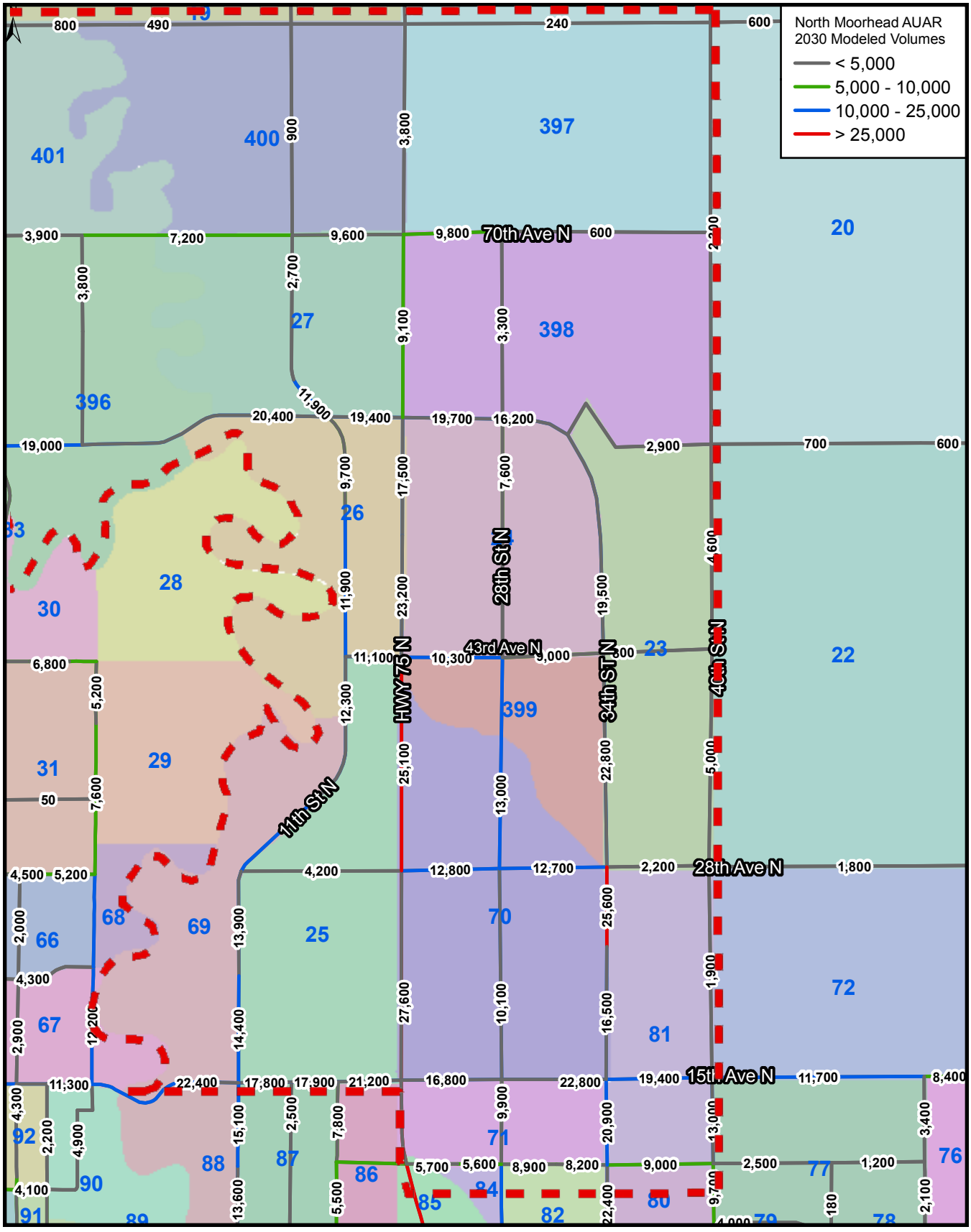
Figure 21.4

Source: North Moorhead/Oakport Township Growth Area Plan

Hoisington Koegler Group, Inc.

Proposed Street System - Scenario Two

North Moorhead/Oakport Township Growth Area
Alternative Urban Areawide Review (AUAR)



August 2008

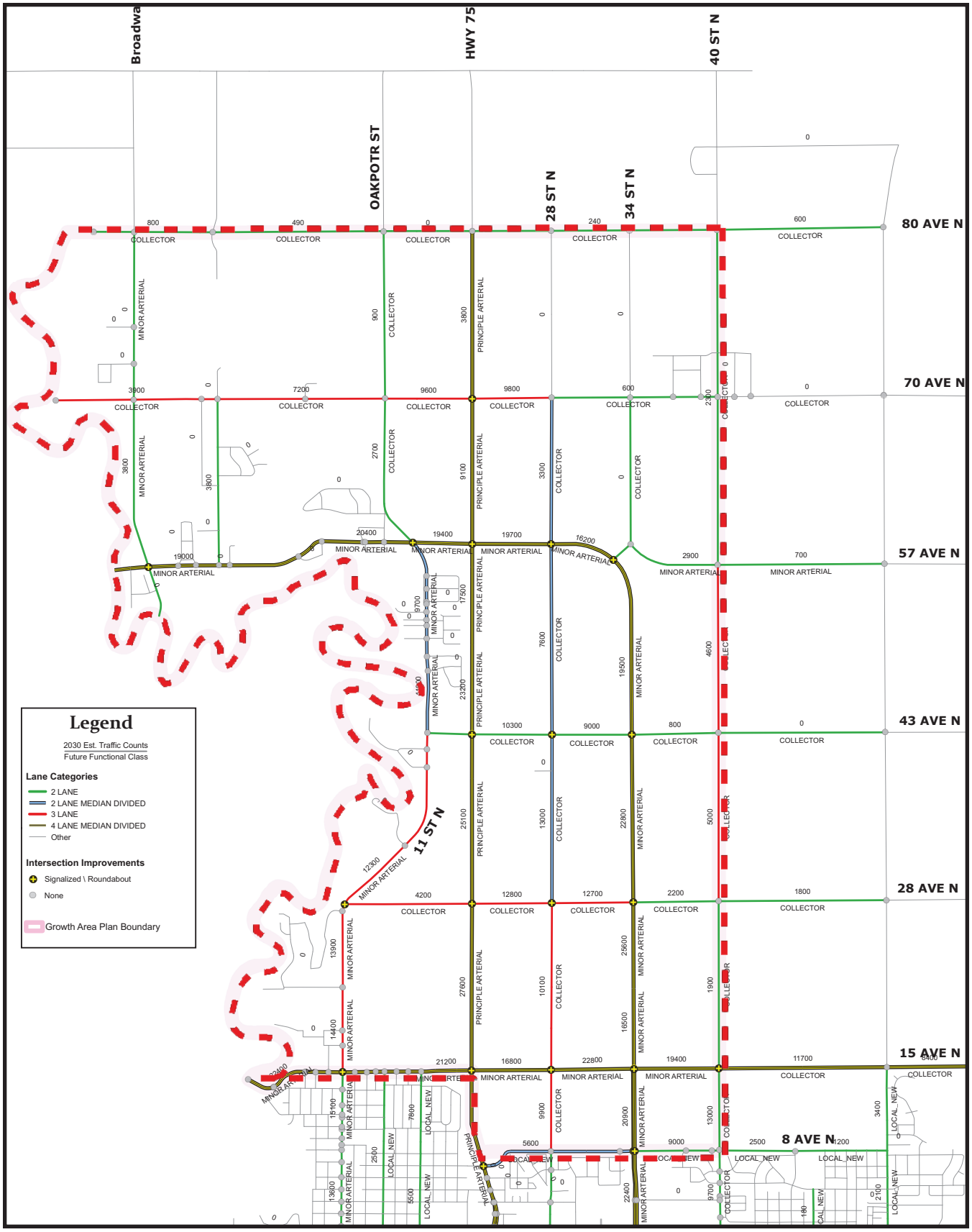
Figure 21.5

Source: FMCOG & ATAC

2030 Modeled Traffic Volumes

Hoisington Koegler Group, Inc.

North Moorhead/Oakport Township Growth Area
Alternative Urban Areawide Review (AUAR)



September 2008

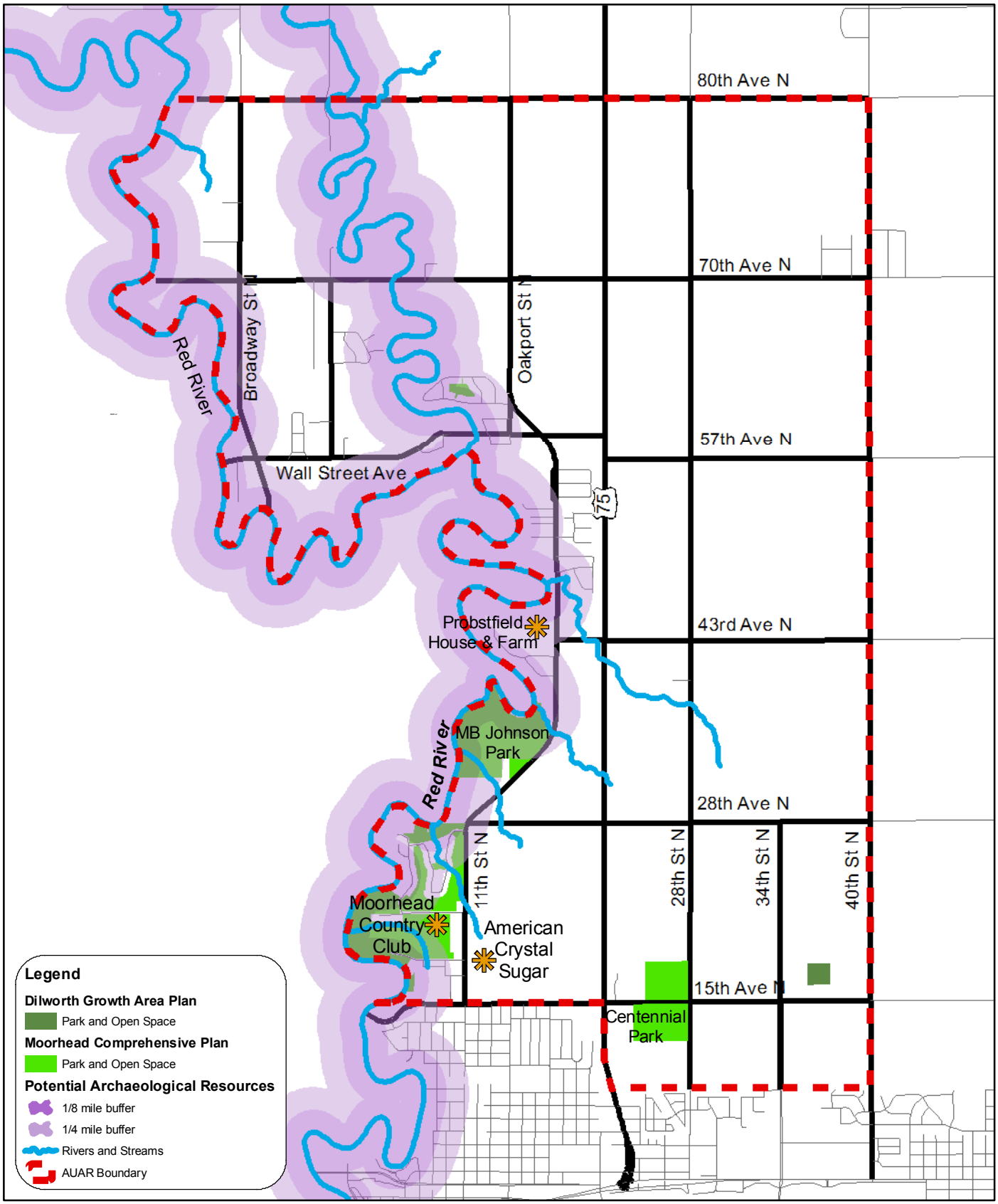
Source: FMCOG, ATAC & City of Moorhead

Hoisington Koegler Group, Inc.

Figure 21.6

Transportation Improvements - Scenario Two

North Moorhead/Oakport Township Growth Area
Alternative Urban Areawide Review (AUAR)



August 2008

0 0.25 0.5 1 Miles

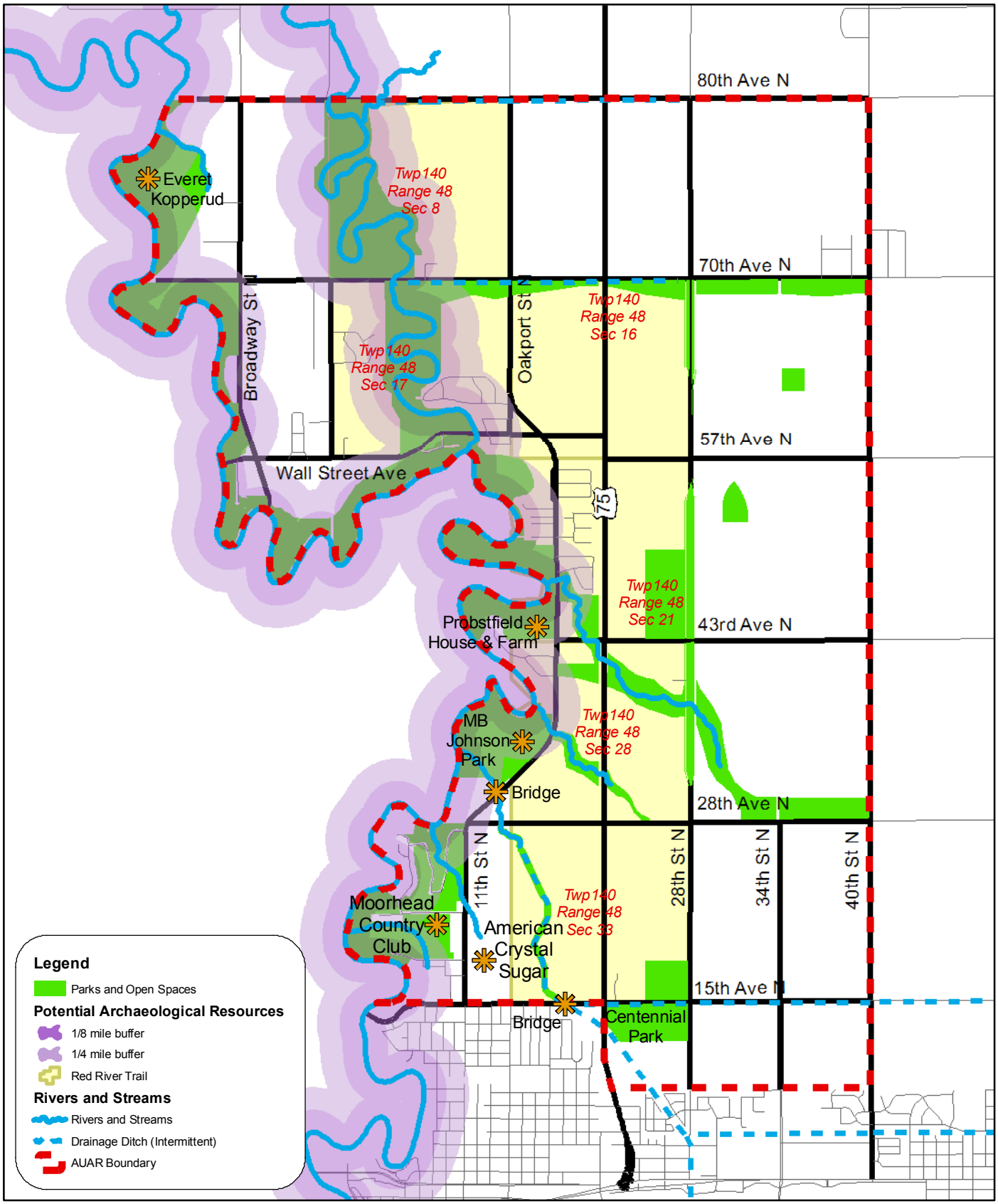
Figure 25.1

Source: Mn/DOT, Clay County, Cass County and City of Moorhead

Hoisington Koegler Group, Inc

Sensitive Resources - Scenario One

North Moorhead/Oakport Township Growth Area
Alternative Urban Areawide Review (AUAR)



September 2008

0 0.25 0.5 1 Miles

Figure 25.2

Source: Mn/DOT, Clay County, Cass County and City of Moorhead

Hoisington Koegler Group, Inc

Sensitive Resources - Scenario Two

North Moorhead/Oakport Township Growth Area
Alternative Urban Areawide Review (AUAR)

APPENDIX A

Resolutions

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RESOLUTION

WHEREAS, the City of Moorhead adopted a Comprehensive Plan in July 2004 that recommended more detailed land use planning for growing areas of the community; and

WHEREAS, the City recognized the need to begin planning for the future development of land identified in its growth areas to ensure a coherent community results over the long term and infrastructure facilities are utilized in the most efficient manner; and

WHEREAS, the City's Growth Area Plans establish a more detailed land use pattern to implement the vision of the Comprehensive Plan and identify appropriate levels of open space and needed infrastructure that is capable of meeting future growth demands; and

WHEREAS, an Alternative Urban Areawide Review (AUAR) is a substitute form of environmental review that replaces an Environmental Assessment Worksheet (EAW) or Environmental Impact Statement, as provided for in Minnesota Rules Chapter 4410.3600, and is a more appropriate form of environmental review that evaluates cumulative impacts over a larger area; and

WHEREAS, the Alternative Urban Areawide Review (AUAR) process can be used for the project area as stipulated in Minnesota Rules Chapter 4410.3610, subpart 1, since the City of Moorhead adopted a Comprehensive Plan in 2004, Clay County adopted a Comprehensive Plan in 2006, the City of Dilworth adopted a Growth Area Plan in 2006 that updates its 1998 Comprehensive Plan and the Fargo-Moorhead Council of Government adopted the Fargo-Moorhead Transportation Improvement Program 2008-2011 addressing region-wide transportation facilities; and

WHEREAS, the City of Moorhead is the Responsible Governmental Unit (RGU) assigned the responsibility of conducting the AUAR; and

WHEREAS, Minnesota Rule 4410.3610 (AUAR Process) Subpart 3 requires an "order for review" to define the review area boundaries and the "anticipated nature, location and intensity" of projected future development; and

WHEREAS, the project area includes over 10,000 acres in north Moorhead and southwestern Oakport Township and is further identified on the project area map; and

WHEREAS, the AUAR will explore the impacts of growth for two scenarios: one reflecting existing Comprehensive Plans and the other following the North Moorhead and Oakport Township Growth Area Plan; and

WHEREAS, the Comprehensive Plan and Growth Area Plan land use designations for the project area include a combination of agricultural, residential, commercial, office, industrial, public, institutional, park and open space;

NOW, THEREFORE, BE IT RESOLVED that the City of Moorhead hereby adopts this Order for Review for the North Moorhead and Oakport Township AUAR.

PASSED by the City Council of the City of Moorhead this 5th day of May, 2008.

APPROVED BY:

MARK VOXLAND, Mayor

ATTEST:

KAYE BUCHHOLZ, City Clerk

(SEAL)

#2008-501-A
(Consent Agenda)

RESOLUTION

WHEREAS, the City of Moorhead adopted a resolution ordering an alternative urban areawide review (AUAR) for North Moorhead and Oakport Township on May 5, 2008 for a period of 120 days; and

WHEREAS, staff needed additional time to complete the review of the impacts of the proposed scenarios on infrastructure; and

WHEREAS, the City of Moorhead is the Responsible Governmental Unit (RGU) assigned the responsibility of conducting the AUAR; and

WHEREAS, Minnesota Rule 4410.3610 Subpart 7 allows the RGU to extend the time limit for adoption of the environmental analysis document and plan for mitigation beyond the 120 days after the date on which the RGU ordered review.

NOW, THEREFORE, BE IT RESOLVED that the City of Moorhead hereby extends the time limit for adoption of the Alternative Urban Areawide Review (AUAR) for the North Moorhead and Oakport Township AUAR for 120 more days.

PASSED by the City Council of the City of Moorhead this 22nd day of September, 2008.

APPROVED BY:

MARK VOXLAND, Mayor

ATTEST:

BECKY JAHNKE, Deputy City Clerk

(SEAL)

#2008-951-D

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RESOLUTION

WHEREAS, over the past two years, the City has worked with consultants Hoisington-Koegler Group, Inc. to prepare the North Moorhead/Oakport Township Growth Area Plan and Alternative Urban Areawide Review (AUAR); and

WHEREAS, the final draft was presented to the Planning Commission and a large audience in a public hearing on October 7, everyone present had an opportunity to speak and no one voiced opposition; and

WHEREAS, the Planning Commission unanimously recommended to continue the adoption process; and

WHEREAS, Minnesota Rules Chapter 4410.3600 requires a 30-day distribution period for comment and review prior to adoption of the AUAR by the City Council;

NOW, THEREFORE, BE IT RESOLVED by the City Council of the City of Moorhead that the Mayor and City Manager are herein directed and authorized to distribute the North Moorhead/Oakport Township Growth Area Plan and Alternative Urban Areawide Review for review and comment.

PASSED by the City Council of the City of Moorhead this 27th day of October, 2008.

APPROVED BY:

MARK VOXLAND, Mayor

ATTEST:

KAYE BUCHHOLZ, City Clerk

(SEAL)

#2008-1052

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APPENDIX B

Traffic Analysis Zones (TAZ) &
Sewer District Land Use Breakdowns

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North Moorhead/Oakport Township Growth Area Scenario Two Project Magnitude Analysis by Traffic Analysis Zone (TAZ) District December 2007

TAZ	Full Build-Out Acres								Full Build-Out Allocations		Land Use			
	Commercial	Office	Industrial	Public (Schools, etc)	Low Density Residential	Rural Residential	Medium Density Residential	High Density Residential	HH	Jobs	Total TAZ Acres Available	Required 25% (ROW, water, utilities, etc.)	TAZ Acres Comm, Ind, Office, Public, SF, RR, or MF	TAZ Acres Other (Vacant, Open Space, etc)
23					421		42		2,188	0	655	164	463	28
24	30			78	158		122	55	3,746	731	713	178	443	92
25		207	160	15			11		132	4,656	738	185	393	161
26					188		27		1,076	0	573	143	215	215
27				13	312				1,248	67	593	148	325	120
69	4			45	85		23		616	280	525	131	157	236
70		438							0	7,884	951	238	438	275
71	42				88		36		784	464	285	71	166	48
81	88	47					76	147	5,322	1,818	482	121	358	4
85	22	4	12	25	14		50		654	500	187	47	126	14
86	2	6	12	8	72		4		381	347	178	45	103	31
396	3				467		48		2,444	34	1,063	266	518	279
397					350				1,400	0	922	231	350	342
398	80			20	421		30	46	3,424	986	875	219	597	59
399				16	65		104		1,508	82	303	76	185	42
400					254	317			1,079	0	852	213	571	68
401						368			74	0	795	199	368	228
Totals	**272**	**702**	**184**	**219**	**2,895**	**685**	**573**	**248**	**26,076**	**17,848**	**10,690**	**2,673**	**5,777**	**2,241**

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North Moorhead/Oakport Township Growth Area Plan Scenario Two Project Magnitude Analysis by Sewer District September 2007

Sewer District	Agricultural			Rural Residential			Low Density Residential			Medium Density Residential				High Density Residential			Mixed Use/Walkable Street		
	Gross Acres	Net Acres	Residential Single Family Units	Gross Acres	Net Acres	Residential Single Family Units	Gross Acres	Net Acres	Residential Single Family Units	Gross Acres	Net Acres	Residential Single Family Units	Multi-Family Units	Gross Acres	Net Acres	Residential Multi-Family Units	Gross Acres	Net Acres	Residential Units
1-A							120.96	120.96	484	45.68	45.68	274	274						
1-B														188.02	188.02	5,641			
2-A							21.93	0.02	0	47.01	47.00	282	282						
2-B							82.31	82.31	329	135.62	135.62	814	814						
2-C							219.97	219.97	880	150.49	150.49	903	903	0.03	0.03	1			
3-A							154.89	36.95	148										
3-B							207.09	207.09	828	114.00	114.00	684	684	66.03	66.03	1,981	37.37	37.37	897
3-C							310.83	310.83	1,243										
4-A							280.14	280.14	1,121	38.17	38.17	229	229	58.26	58.26	1,748	16.55	16.55	397
4-B							243.19	243.19	973										
5-A							199.19	134.34	537										
5-B							184.67	184.67	739										
6							584.24	422.72	1,691	56.75	28.21	169	169						
7-A							447.78	447.78	1,791										
7-B							146.53	101.22	405										
8				169.40	161.73	32													
9				239.84	238.59	48													
10				466.04	430.68	86													
11							154.01	154.01	616										
Outside Analysis	450.44	0.00	0				123.00	0.00	0	24.95	0.01	0	0						
Total	450.44	0.00	0	875.28	830.99	166	3,480.74	2,946.18	11,785	612.67	559.19	3,355	3,355	312.33	312.33	9,370	53.93	53.93	1,294

Sewer District	Mixed Use/Walkable Street			Commercial			Office/Technology Park			Industrial			Civic			Parks and Open Space*	Right-of Way	Total Gross Acres
	Gross Acres	Net Acres	Jobs	Gross Acres	Net Acres	Jobs	Gross Acres	Net Acres	Jobs	Gross Acres	Net Acres	Jobs	Gross Acres	Net Acres	Jobs			
1-A				50.8874	50.8874	562	219.975	219.975	8,874	175.756	175.756	937				103.3396917	49.5801	766.1805
1-B				111.702	111.702	1,233											12.3874	312.1097
2-A							154.482	154.474	6,231							64.09000579	39.1169	326.6302
2-B							334.858	334.858	13,508	28.6814	28.6814	153	20.71836783	20.7184	106	132.0556716	56.2255	790.466
2-C							57.7337	57.7337	2,329							37.43495094	15.1146	480.7742
3-A																49.21637839	42.4139	246.5245
3-B	37.3728	37.3728	83										99.09665859	99.0967	508	112.6637772	64.4168	700.6689
3-C																	9.28025	320.1142
4-A	16.5533	16.5533	37	80.728	80.728	891										57.68898667	41.7956	573.3306
4-B													25.50684937	25.5068	131	36.13436714	8.67997	313.5107
5-A																222.6869858	37.6523	459.5342
5-B													17.15963115	17.1596	88	15.31248413	23.5782	240.7167
6				3.14123	1.53933	17										208.7211246	59.9375	912.7897
7-A																	31.3284	479.1037
7-B																	7.88119	154.414
8																143.2761015	8.39188	321.0652
9																89.10149026	4.10579	333.0437
10																145.925913	23.547	635.5174
11																	8.71441	162.7234
Outside Analysis				4.48657	0	0				434.262	0	0	68.38874945	0	0	438.2541646	101.766	1645.54
Total	53.93	53.93	119	250.95	244.86	2,703	767.05	767.04	30,942	638.70	204.44	1,090	230.87	162.48	834	1,855.90	645.91	10,174.76

**Parks and Open Space includes floodway area.*

***Project Magnitude data reflects new units and jobs to be created on the net developable acres. See Question 7 response for more information and assumptions.*

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North Moorhead/Oakport Township Growth Area Plan Mitigation Plan Land Use Scenario Project Magnitude Analysis by Sewer District October 2008

	Agricultural			Rural Residential			Low Density Residential			Medium Density Residential				High Density Residential			Mixed Use/Walkable Street		
Sewer District	Gross Acres	Net Acres	Residential Single Family Units	Gross Acres	Net Acres	Residential Single Family Units	Gross Acres	Net Acres	Residential Single Family Units	Gross Acres	Net Acres	Residential Single Family Units	Multi-Family Units	Gross Acres	Net Acres	Residential Multi-Family Units	Gross Acres	Net Acres	Residential Units
1-A							112.95	112.95	452	48.24	48.24	289	289						
1-B														188.02	188.02	5,641			
2-A							21.92	0.01	0	46.99	46.99	282	282						
2-B							82.30	82.30	329	135.66	135.66	814	814						
2-C							219.97	219.97	880	150.49	150.49	903	903	0.03	0.03	1			
3-A							154.87	36.93	148										
3-B							207.10	207.10	828	114.00	114.00	684	684	66.02	66.02	1,981	37.37	37.37	897
3-C							310.83	310.83	1,243										
4-A							280.13	280.13	1,121	38.17	38.17	229	229	58.25	58.25	1,748	16.55	16.55	397
4-B							243.18	243.18	973										
5-A							196.59	132.99	532										
5-B							184.66	184.66	739										
6				493.51	334.13	67	80.34	78.37	313	32.81	19.81	119	119						
7-A							447.79	447.79	1,791										
7-B							146.50	101.22	405										
8				169.40	161.72	32													
9				239.84	238.58	48													
10				466.04	430.67	86													
11							154.01	154.01	616										
Outside Analysis	450.44	0.00	0.00				122.96	0.00	0	24.93	0.00	0	0						
Total	450.44	0.00	0.00	1,368.79	1,165.10	233	2,966.10	2,592.44	10,370	591.29	553.36	3,320	3,320	312.32	312.32	9,370	53.92	53.92	1,294

	Mixed Use/Walkable Street			Commercial			Office/Technology Park			Industrial			Civic			Parks and Open Space*	Right-of-Way	Total Gross Acres
Sewer District	Gross Acres	Net Acres	Jobs	Gross Acres	Net Acres	Jobs	Gross Acres	Net Acres	Jobs	Gross Acres	Net Acres	Jobs	Gross Acres	Net Acres	Jobs			
1-A				56.32	56.32	622	220.00	220.00	8,875	175.76	175.76	937				103.33	49.58	766.18
1-B				111.70	111.70	1,233											12.39	312.11
2-A							154.46	154.45	6,231							64.06	39.05	326.48
2-B							334.88	334.88	13,509	28.67	28.67	153	20.73	20.73	106	132.05	56.22	790.51
2-C							57.73	57.73	2,329							37.44	15.12	480.78
3-A																49.21	42.39	246.47
3-B	37.37	37.37	83										99.08	99.08	508	112.66	64.43	700.66
3-C																	9.29	320.12
4-A	16.55	16.55	37	80.73	80.73	891										57.67	41.78	573.28
4-B													25.51	25.51	131	36.13	8.68	313.50
5-A																225.23	37.62	459.44
5-B													17.16	17.16	88	15.31	23.61	240.74
6				3.13	1.53	17										242.85	59.94	912.58
7-A																	31.32	479.11
7-B																	7.87	154.37
8																143.27	8.37	321.04
9																89.09	4.11	333.04
10																145.93	23.52	635.49
11																	8.71	162.72
Outside Analysis				4.48	0.00	0				434.24	0.00	0	68.39	0.00	0	438.13	101.72	1,645.28
Total	53.92	53.92	119	256.36	250.28	2,763	767.07	767.06	30,943	638.67	204.43	1,090	230.87	162.48	834	1,892.36	645.72	10,173.90

**Parks and Open Space includes floodway area.*
***Project Magnitude data reflects new units and jobs to be created on the net developable acres. See Question 7 response for more information and assumptions.*

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APPENDIX C

Summary of Review Process

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Moorhead North/Oakport Township
Growth Area Plan and Alternative Urban Areawide Review

The AUAR review and adoption process involved the following steps to ensure all interested parties were able to comment:

1. The following was published in the Environmental Quality Board Monitor on November 3, 2008. Notice was also published in the official newspaper of the City of Moorhead.

   Draft AUAR Available

   Project Title: North Moorhead/Oakport Township AUAR

   Description: The North Moorhead/Oakport Township AUAR is being prepared to address the cumulative impacts of future development. The AUAR explores the impacts of development based on the City's Comprehensive Plan and the North Moorhead/Oakport Township Growth Area Plan. Both plans propose a mix of residential, commercial, industrial, public/institutional, and parks/open spaces. The Draft AUAR examines impacts to natural and cultural resources, surface water drainage, roadway systems and traffic, utilities and other infrastructure systems.

   RGU: City of Moorhead

   Contact Person: Scott Hutchins, Director of Community Services, 500 Center Avenue, Box 779, Moorhead, MN, 56561; phone (218) 299-5376; fax (218) 299-5399; email scott.hutchins@ci.moorhead.mn.us.

2. The public comment period occurred between November 3 and December 17, 2008. Comments were received from the following entities:
   - Probstfield Living History Farm Foundation dated and received November 25, 2008
   - Clay Soil & Water Conservation District dated December 2, 2008 – received December 4, 2008
   - Dr. Michlovic, Minnesota State University Moorhead dated December 4, 2008 – received December 9, 2008
   - City of Dilworth dated – dated December 6, 2008 and received December 8, 2008
   - Minnesota DNR dated December 16, 2008 – received December 16, 2008
   - Minnesota PCA dated December 16, 2008 – received December 17, 2008

3. The AUAR was revised based on the comments received. The revised document, dated January 27, 2009, was distributed for final review. During the 10-day comment period comments were received from the Probstfield Living History Farm Foundation and the Minnesota Department of Agriculture. The AUAR was revised slightly based on these comments.

4. The final AUAR is to be considered for adoption by the Moorhead City Council on April 24, 2009.

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Formal response to comments

North Moorhead/Oakport Township Alternative Urban Areawide Review (AUAR)

Prepared on: January 27, 2009

The following is a summary of the comments received during the 30-day review and comment period for the North Moorhead/Oakport Township AUAR Draft Document dated October of 2008. Following the general comments, the preparers of the document have provided a response to comments that warrant a response. The response is provided in *italics*. Responses that require changes to the draft AUAR are also *underlined*.

The public comment period occurred between November 3 and December 17 of 2008. Notice was published in the official newspaper of the City of Moorhead and in the EQB Monitor Vol. 32, No. 22.

Comments were received from the following entities:

- Probstfield Living History Farm Foundation dated and received November 25, 2008
- Clay Soil & Water Conservation District dated December 2, 2008 – received December 4, 2008
- Dr. Michlovic, Minnesota State University Moorhead dated December 4, 2008 – received December 9, 2008
- City of Dilworth dated – dated December 6, 2008 and received December 8, 2008
- Minnesota DNR dated December 16, 2008 – received December 16, 2008
- Minnesota PCA dated December 16, 2008 – received December 17, 2008

Full copies of the comment letters are included following this summary.

Jay Leitch, Probstfield Living History Farm Foundation:

A) Mr. Leitch provided two comments which corrected errors in the document:

1) *The amount of land Probstfield Living History Farm Foundation owns has been revised from over 75 acres to 118 acres.*

2) *Question 11 on page 23 has been revised to remove the reference to pheasants being in the study area and add references to eagles, beavers and river otters.*

B) A concern was raised regarding the future of ATV/snowmobile use in the study area as the foundation currently has trouble with trespassers on their property and would like to see organized/signed trails.

The draft mitigation plan of the AUAR has been revised to include the development of a Master Park, Trail and Open Space Plan which will address future trail corridors and uses. Additional information about the planning process for this master plan can be found in the response to the Minnesota DNR comment.

Lynn Foss, Clay Soil and Water Conservation District (Clay SWCD):

Clay Soil and Water Conservation District comments focused on a request for inclusion of the Clay SWCD in the planning process so potential Minnesota Wetland Conservation Act (WCA) impacts can be addressed earlier in any planning process.

Page 47 of the Mitigation Plan of the draft AUAR has been modified to add an 8th general mitigation initiative: "The City will work in cooperation with the Clay Soil and Water Conservation District (SWCD) on expansion plans to ensure compliance with the Minnesota Wetland Conservation Act (WCA)."

Dr. Michael Michlovic, Minnesota State University Moorhead:

No response needed.

Stan Thurlow, City of Dilworth:

Comments provided seek to clarify planning for portions of the AUAR project area that overlap with the City of Dilworth. These areas were considered during the Growth Area Planning process using best available data at the time of the planning efforts. The City of Moorhead acknowledges the comments from the City of Dilworth.

No changes needed.

Ronald Wieland, Minnesota DNR:

The DNR's comments highlight concerns regarding impacts to natural resources including water, wildlife, habitat and recreation resources. Comments and suggestions are to add more specific language that will strengthen the mitigation measures.

1. Item 8 - *Table 8.1 was revised to remove wetlands as a permit that is needed from the Minnesota DNR. The table was further revised to identify the need for a Public Waters Work Permit.*

2. Items 9 & 10 - *The following was added to question 10:*
   An analysis was conducted to determine the pre- and post- development land cover using the 1990 International Coalition Land Use/Land Cover dataset. The results of this analysis are shown in Table 10.1 below. The assumptions used in creating this table included:

   a. *In Scenario One, Cultivated Land was assumed to remain if it was designated in the Clay County Comprehensive Plan as General Rural Area or Planned Growth Area. As noted in Question 6 on pages 10 and 11, these areas are planned for low densities with General Rural Areas designated as 1 unit per 40 acres and Planned Growth Areas as 1 unit per 20 acres.*
   b. *In Scenario Two, Cultivated Land is assumed to remain if it is designated as Agricultural.*

c. *In both scenarios, Grassland and Grassland – Shrub – Tree (deciduous) is assumed to remain if it is designated as Park and Open Space. It is anticipated that the Park, Trail and Open Space Master Plan described in the Mitigation Plan will determine exactly what remains.*

d. *In both scenarios, it is assumed that approximately 80% of the existing Deciduous Forest will remain through implementation of existing ordinances, conservation design techniques, and designation of areas as park and open space land use.*

e. *In both scenarios, it is assumed that all existing water and wetlands will remain no matter its future land use designation. It should be noted that the National Wetland Inventory provides a more accurate location of wetlands.*

Table 10.1 Land Cover

Land Cover	Existing (1990)	Scenario One	Scenario Two
Cultivated Land	7,420	5,240	439
Grassland	162	0	82
Grassland – Shrub – Tree (deciduous)	55	41	54
Deciduous Forest	919	735	735
Water	19	19	19
Wetlands	20	20	20
Developed (urban, industrial, farmsteads, rural residential, rural development & right-of-way)	1,580	4,121	8,827
Total	10, 175	10,175	10,175

An estimate of imperviousness was also developed for both scenarios and shown in Table 10.2. Assumptions for amount of imperviousness are based on general knowledge of Moorhead development.

Table 10.2 Imperviousness

Land Use	Assumed Imperviousness	Scenario One		Scenario Two	
		Acres	Acres Impervious	Acres	Acres Impervious
Agricultural	5%	5,796	290	450	23
Rural Residential	10%	7	1	1,369	137
Low Density Residential	30%	2,094	628	2,966	890
Medium Density Residential	55%	171	94	591	325
High Density Residential	70%	77	54	312	219
Mixed Use	80%	0	0	54	43
Commercial	80%	133	106	1,018	814

Land Use	Assumed Imperviousness	Scenario One		Scenario Two	
		Acres	Acres Impervious	Acres	Acres Impervious
Industrial	75%	658	493	639	479
Civic	75%	278	208	231	173
Park and Open Space	10%	360	36	1,893	189
Right-of-Way	75%	602	451	651	488
Total	-	10,175	2,362	10,175	3,781

3. Items 12 & 14
    a. *Additional discussion requested regarding flood mitigation projects planned or underway in or near the project area has been added as follows to question 12:*
        i. *There are a number of flood mitigation projects in or near the AUAR study area which may impact development over the long-term. One project, the Oakport Township Flood Mitigation Project being undertaken by the Buffalo Red River Watershed District (BRRWD), was considered during the planning process for Scenario Two. This project which will be constructed in phases between 2009 and 2011 involves the construction of over 43,000 lineal feet of FEMA certified dike system. According to the BRRWD, computer modeling shows that the project will not have an impact on the water surface levels during a 100 year flood in the Red River or Oakport Coulee. The project will also result in over 90 acres of project right-of-way being maintained as parkway, natural resource habitat and/or biking/walking trails.*
        ii. *The United States Army Corps of Engineers, in conjunction with the cities of Fargo and Moorhead, is currently conducting the Fargo-Moorhead Metropolitan Flood Risk Management Study to assess the feasibility of measures to reduce flood risk in the metropolitan area. The study will consider potential measures such as nonstructural flood proofing, diversion channels, levee/floodwall systems and flood storage. The study is scheduled for completion in December 2010. The impacts of this study on future development in the study area will need to be reevaluated after the study's conclusion.*
        iii. *At the same time, the City of Fargo and Southeast Cass Water Resources District are also undertaking a Southside Flood Protection project. This project is examining what measures can be taken to provide protection from overland flooding that threatens most properties south of Interstate 94. Measures being examined include FEMA levees/floodwalls, pump stations, control structures, floodwater storage within the project and channel expansions. The project is still at the early stages with one of the next steps being the Environmental Assessment. While outside of this AUAR study area, it is important that the City of Moorhead and Oakport Township ensure that any measures undertaken in the Southside Flood Protection project do not result in the water surface levels being raised during a flood upstream.*

    b. *The following has been added to Question 14 to reflect applicable shoreland management regulations: The Red River and Oakport Coulee are public waters and are subject to shoreland management regulations. These regulations are administered by Clay County. The City will be reviewing and*

revising its floodway and floodplain overlay district ordinances within the next two years to include the new regulatory flood protection elevations and additional regulations for river and riverbank protection. Shoreland regulations will be reviewed at the same time to ensure adequate protection of these public waters is provided.

c. *The minor correction has been made to the DNR General Permit number for construction dewatering (in question 13).*

4. Item 13 – A question was raised about whether the City anticipates the need for Red River Valley Water Supply project water. *The City does not anticipate the need at this time.*

5. Mitigation Plan – Additional discussion regarding future use and protection of open space areas was requested. *A mitigation initiative has been added regarding the development of a Park, Trail and Open Space Master Plan in a new section titled "Parks, Trails and Open Spaces"*

The City intends to create a contiguous park, trail and open space system to serve the needs of future development and protect the natural ecosystem. The system will provide habitat, connect recreation resources, provide stormwater management resources, and serve as a buffer between land uses. A next step in the planning process is the creation of a Park, Trail and Open Space Master Plan to identify the system in more detail.
- The park system plan, for example, would identify the location and function of different types of parks including regional, community, and neighborhood. It would also differentiate between active and passive areas, as well as where infrastructure such as stormwater measures can be integrated.
- The trail system plan would be equally detailed looking at trails by purpose, including walking, biking, horseback riding, cross country skiing and atv/snowmobiling.
- The open space system would consider purposes such as buffering, habitat protection, and wetland restoration. Access and use of the areas would need to be considered for trails or fishing.

The Park, Trail and Open Space Master Plan would also need to identify future ownership and management of the system. While many areas will be owned by the City or Township, it is likely that portions will be governed by regional agencies such as the Buffalo Red River Watershed District or Minnesota DNR. Others may also be owned by non-profit organizations, such as the Probstfield Living History Farm Foundation, or by a private owner with protective covenants or easements.

As with other planning projects initiated by the City of Moorhead, the development of the Park, Trail and Open Space Master Plan is intended to involve public outreach. Many of the discussions will likely be "kitchen table level", gatherings of a property owner or two to discuss their future interests or plans for their properties. In addition to guiding the overall planning of the area, this information will be used to identify phasing of public improvements and for guiding park dedication investments.

Jessica Ebertz, Minnesota PCA:

The PCA's comments highlight concerns regarding impacts to natural resources including water, wildlife, habitat and recreation resources. Comments and suggestions are to add more specific language that will strengthen the mitigation measures.

1. Permits & Approvals – *a reference to the need for a MPCA Clean Water Act Section 401 Water Quality Certification was added to Table 8.1*

2. Contaminated Properties – comment was made for the need for proper management of contaminated soil and water if it is uncovered or disturbed. *Information about this was added to the Land Use Management section of the Focused Mitigation Initiatives.*
   The AUAR identifies several properties with actual or potential soil and/or ground water contamination. State law requires that persons properly manage contaminated soil and water they uncover or disturb, even if they are not the party responsible for the contamination. Property owners or developers on or near contaminated properties should work with the Minnesota PCA to receive technical assistance in managing contamination, including investigating, remediating or mitigating. Minnesota PCA programs include the Petroleum Brownfields Program or Voluntary Investigation and Cleanup (VIC) program.

3. Stormwater and Water Quality
   a. The City is encouraged to use Low Impact Design (LID) practices to aid in the minimization of stormwater impacts. *The City will explore the use of LID where site conditions are appropriate. Use of LID is one of the stormwater system recommendations listed on page 43 in the North Moorhead and Oakport Township Growth Area Master Plan.*

   b. *Additional information was added to the Natural, Cultural and Physical Resources section regarding protecting the area's water resources. Reference was added regarding the NPDES Municipal Separate Storm Sewer System Permit requirements. In addition, references to working with other water quality programs were added to the section referencing the Minnesota PCA's Total Maximum Daily Load process.*

   c. The City is encouraged to provide additional information in the AUAR on the stormwater management system to go further in meeting water quality goals. *The City has an existing ordinance and Stormwater Pollution Prevention Plan that enforces and ensures compliance with NPDES requirements. Although supportive of innovative and more advanced stormwater treatment techniques (e.g. the treatment train approach) that might be required by future NPDES regulations, nondegredation rules, or TMDL studies/allocations, the City is concerned with the potential (real or perceived) economic disadvantages associated with adopting them only for the North Moorhead/Oakport Township Growth Area Plan. Until these more advanced techniques are considered comprehensively on a region-wide basis, these disadvantages and challenges may hinder Moorhead's ability to compete in a challenging economic climate. In addition, the practicality of some of these innovative stormwater techniques is limited due to the physical limitations of the region (e.g. infiltration practices are not practical in the Red River Valley).*

      Individual stormwater measures will be evaluated on a project by project. Where practical and feasible, more comprehensive and innovative solutions will be considered. As NPDES Construction Stormwater Permit requirements change with each permit reissuance, relevant requirements are, and will be, incorporated into stormwater system design. This includes best management practices for projects with a discharge within one mile of an impaired water (already a permit requirement) and consideration of access points for monitoring (a potential future requirement). The stormwater monitoring plan should be a comprehensive City-wide effort and not necessarily specific to the area covered by the Growth Area

Plan. As non-degradation rule changes are implemented, the City will incorporate these requirements into the City-wide Stormwater Pollution Prevention Program, and as appropriate, local ordinance. For practical considerations, these issues will not be developed and applied exclusively to the North Growth Area Plan.

The following will be added to the Stormwater Management section of the Mitigation Plan:
The City has an existing ordinance and Stormwater Pollution Prevention Plan that enforces and ensures compliance with NPDES requirements. As NPDES Construction Stormwater Permit requirements change with each permit reissuance, relevant requirements are, and will be, incorporated into stormwater system design. This includes best management practices for projects with a discharge within one mile of an impaired water (already a permit requirement) and consideration of access points for monitoring (a potential future requirement). As non-degradation rule changes are implemented, the City will incorporate these requirements into the City-wide Stormwater Pollution Prevention Program, and as appropriate, local ordinance.

4. Wastewater
   a. *Average daily flow assumptions were derived in the Sanitary Sewer Master Plan completed for the project area. These assumptions were applied to the development scenarios in order to generate future waste water flows and system improvement needs. This document is incorporated into the AUAR by reference.*

   b. *The City recognizes that additional environmental study may be needed for the expansion of the wastewater treatment facility.*

   c. A concern was raised regarding the reuse of the lime sludge storage ponds as referenced in the AUAR. *The lime sludge ponds being referenced are for water treatment purposes not wastewater treatment. This area was identified for potential redevelopment recognizing that the lime sludge would need to be removed before any development could occur. The City is aware that technology is advancing where this reclamation may be feasible, both from a technological and economic standpoint. If that should occur the City would encourage the redevelopment of the site rather that the maintenance of the site as open space.*

5. Cumulative Impacts
   a. *Question 29 has been revised to include the following response:*
   The North Moorhead/Oakport Township AUAR encompasses more than 10,000 acres. Based on demographic projections for the entire City it is likely that development in the AUAR study area within the next 50 years will occur only in Phase One areas (see Figure 6.4).Complete development of the Phase One area within the 50 year time frame is unlikely as the City of Moorhead is also growing to the south and the east. Thus, the pace of growth in North Moorhead and Oakport Township will be dependent on its ability to successfully compete for development interest and respond to market demands.

   The growth in the AUAR area represents only a portion of the growth to be experienced in the entire Fargo-Moorhead Metropolitan Area. Impacts associated with the region's growth will likely be typical of any urbanizing metropolitan area and require cooperation amongst the various jurisdictions. While

not insignificant, the impacts associated with growth in the project area are continually being studied and planned for through various comprehensive planning, infrastructure planning, and flood mitigation efforts. In addition, the various jurisdictions have numerous codes and ordinances in place to minimize to the extent possible negative impacts associated with growth.

Planning for growth in the metropolitan area is done cooperatively amongst the cities through the Fargo-Moorhead Metropolitan Council of Governments(Metro COG). Participating jurisdictions include Fargo, Moorhead, West Fargo, Dilworth and eight townships in both Cass and Clay Counties. Metro COG has the following goals:

- *To provide a forum in which public officials, citizens and other interest groups can participate in the establishment of policies and plans that effectively deal with various metropolitan issues.*
- *To provide technical and planning assistance in completing studies and identifying solutions to common metropolitan problems.*
- *To disseminate information.*
- *To promote sound planning throughout the area.*
- *To harmonize the activities of federal, state and local agencies.*
- *To encourage the public to participate in shaping the way the area develops.*

The North Moorhead/Oakport Township Growth Area Plan, which was the basis for this AUAR, is an example of the cooperative planning efforts in the Fargo-Moorhead Metropolitan Area. The development of the Growth Area Plan involved members of the public as well as staff and elected/appointed representatives from Oakport Township, the City of Dilworth, Metro COG, and Buffalo-Red River Watershed District. The Growth Area Plan provides city officials and staff with a guide for reviewing proposed developments, planning for the public infrastructure, and ensuring growth occurs in an efficient and logical manner.

-----Original Message-----
From: jay.leitch@ndsu.edu [mailto:jay.leitch@ndsu.edu]
Sent: Tuesday, November 25, 2008 9:15 AM
To: Scott Hutchins
Cc: mark.harvey@ndsu.edu
Subject: GAP/AUAR for N Moorhead/Oakport

Mr. Hutchins:

As a representative of Probstfield Living History Farm Foundation, I have reviewed the GAP/AUAR for N Moorhead/Oakport and have the following
comments:

(1) The two Plans report that Probstfield Living History Farm Foundation owns 'over 75 acres' in the planning area. Actually PLHFF owns approximately 118 acres.

(2) On p. 23 of the AUAR, section 11: there are several bald eagles that hang around the study area, largely preying on the lagoon waterfowl.
Also, the River is home to many beaver and an occassional river otter. There are no pheasants in the planning area.

(3) While some planning area residents commented they want ATV/snowmobile use to continue to be permitted; PLHFF frequently has trouble with ATV/snowmobile trespassers on our property. We have no issue with organized/developed/signed trails, but do not support the current free-for-all with respect to ATV/snowmobile riders.

Thank you for the opportunity to comment.

Jay A. Leitch, Professor and
Emeritus Dean
Walster 210
School of Natural Resources
North Dakota State University
Fargo, ND 58105
701-231-7577 (office)

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Clay Soil and Water Conservation District

1615 30th Avenue South ❖ Moorhead MN 56560 Phone: (218)287-2255
Fax: (218)287-1787

Our 63rd Anniversary

1945 - 2008

December 2, 2008

Scott Hutchins, Director of Community Services
500 Center Avenue, Box 779
Moorhead, MN 56560

Scott,

The Clay Soil and Water Conservation District (SWCD) has the following comment regarding the Growth Area Plan and AUAR for North Moorhead and Oakport. We request the Clay SWCD be a part of the planning process in the expansion plans as the Clay SWCD is the Local Government Unit (LGU) responsible for administering the Minnesota Wetland Conservation Act (WCA) in the proposed expansion area.

It would be of benefit to both parties to include the Clay SWCD in the planning process as we can address potential WCA impacts early on in the planning process. Addressing these potential issues early could reduce costs by avoiding impacts if possible and by mitigating impacts prior to initiating the development process. WCA rules require higher wetland replacement ratios if the impact is revealed after development has occurred. Please contact the Clay SWCD office if you have any questions regarding WCA and how it may impact the development plans slated for this area of North Moorhead and Oakport.

Sincerely,

Lynn Foss
Water Resources Management Technician
Clay SWCD

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MINNESOTA STATE UNIVERSITY
moorhead

Department of Anthropology and Earth Science
218-477-2035

December 4, 2008

Scott Hutchins
City of Moorhead
500 Center Avenue
Moorhead, MN. 56561

Dear Scott:

Debra Martzahn sent me a CD with the Growth Area Plan and AUAR for North Moorhead and Oakport. I reviewed the plan from an archaeologist's point of view, and feel that you have identified the areas most sensitive in terms of archaeological sites. Thanks for the opportunity to review your plans.

Sincerely,

Michael Michlovic
Professor of Anthopology

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From: Stan Thurlow [mailto:sthurlow@loretel.net]
Sent: Saturday, December 06, 2008 8:58 AM
To: Deb Martzahn
Cc: Ken Parke
Subject: GAP/AUAR - North Moorhead and Oakport

Deb-

I have had occasion to briefly review the Growth Area Plan and AUAR for North Moorhead and Oakport. The planning and review area within this study includes areas within the City of Dilworth and other areas that will eventually be annexed into the city limits of Dilworth (i.e. the area between 34th and 40th street). My comments are intended to relate to those areas. There is some jurisdictional confusion regarding this area (East of 34th Street) apparent within your compendium of documents. This study and review was initiated prior to the orderly annexation agreements between the Cities of Moorhead and Dilworth and the Oakport, Moorhead and Glyndon townships as well as the interjurisdictional agreement on the development of twelfth avenue south. So, these agreements take precedence with regard to jurisdictional annexations and boundaries.

We appreciate this effort by the City of Moorhead and this document examines future development and their associated impacts to review the cumulative (rather than incremental) effect of those developments and impacts. With respect to future infrastructure development within Dilworth's city limits, the city has examined alternative development scenarios for provision of water, sanitary sewer, storm sewer, park and other public improvements and has not officially adopted plans with the level of specificity for precise locational analysis. Future transportation improvements will typically see corridors developed along section/half-section lines. Land use is proposed to be heavy on commercial adjacent to 34th Street and buffered to the east by higher density residential with reduction in residential density as development occurs further to the east.

Thanks again for this opportunity for review. Should you have additional comments or concerns, please contact me either here or at Dilworth City Hall 287-2313.

Stan Thurlow
Dilworth City Planner

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Minnesota Department of Natural Resources
500 Lafayette Road · St. Paul, Minnesota · 55155-4025

December 16, 2008

Scott Hutchins
Director of Community Services
500 Center Avenue, Box 799
Moorhead, MN 56561
scott.hutchins@ci.moorhead.mn.us

Re: North Moorhead / Oakport Township Alternative Urban Areawide Review (AUAR)

Dear Mr. Hutchins:

The Department of Natural Resources (DNR) has reviewed the Draft Alternative Urban Areawide Review (AUAR) for the North Moorhead / Oakport Township project, Moorhead, Minnesota. The DNR offers the following comments for your consideration.

The DNR would like to thank the City of Moorhead for initiating this long-term planning process to accommodate the urban growth needs of the City. Based on our experience with some well-done AUAR projects, the DNR would like to emphasize its importance and value to the City in meeting its goals of improving living standards of the citizens while protecting and enhancing the natural resources of the area. Approximately two miles of Oakport Coulee and more than 6 miles of the Red River are within the planning area. The DNR promotes the development of open space for a growing community, and is supportive of parkland, reestablishment of natural areas, and the development of trails in a scheme that protects water quality of the Red River and Oakport Coulee. The DNR considers this an opportunity to increase the City government's efficiency in the development process but also to enhance livability in the neighborhoods and business districts.

The DNR considers the AUAR process to be a planning forum to be used for developing partnerships that enable funding, retention/enhancement of natural resources and development of recreational features and uses as is reasonable and desirable for City residents. Preferably, the DNR should be active in the process early on in development of the draft AUAR. Nevertheless, a review of the draft AUAR provides an opportunity for collaboration between the City and DNR. The DNR would like the City to maintain a dialogue with the DNR in the future for weighing potential opportunities for providing better enhancement/development/retention of its natural resources. Mr. Dave Friedl, Cleanwater Legacy Regional Representative at Fergus Falls (218-739-7576x264), and Jim Wolters, Area Fisheries Supervisor at Detroit Lakes (218-846-8340), are delegated representatives of the DNR to serve as departmental liaisons for addressing on-going resource planning issues with the City.

The DNR is committed to offering additional DNR staff time to work with the City on development of the Final AUAR. The DNR would like to highlight important policy issues early in the process such as consideration of future partnerships with the DNR and others for assistance with planning and for seeking funding for grant and program financial assistance, i.e. Clean Water Legacy Grants for buffers to protect water quality, considering the Red River is presently impaired due to excessive sedimentation. Other opportunities may exist for, trails, ecosystem restoration, and other natural resource protection or enhancement efforts. The DNR would like to bring to your attention two quality examples of recently completed AUARs and final mitigation plans by the Cities of Lino Lakes and Winona (see links below). The examples include partnerships with the DNR in several implementation efforts:

http://www.linolakes.govoffice2.com/index.asp?Type=B_BASIC&SEC={73EB3D9E-AC06-49F6-9E1E-E20204C921B1}

http://www.cityofwinona-mn.com/se3bin/clientgenie.cgi

Item No. 8. Permits and Approvals Required

The report discusses permitting reviews in Table 8.1. Under DNR it discusses Utility Crossings Permits, Natural Heritage Program Coordination and Wetland Permits. There are no public water wetlands in this area; therefore DNR (Division of Waters) would not have regulatory authority over these wetlands and no permits from DNR would be required for wetland activity. A local authority would be responsible for wetland mitigation. However, the Red River and the Oakport Coulee are both public waters and any activity below their ordinary high water level may require a DNR-Waters public waters work permit (if not included within the Utility Crossing Permits).

Item No. 9 & 10. Land Use and Land Cover

Although the City is only responsible for providing a map of land use/land cover types that presently exist and for each development scenario, the complexity of the cover types as diagrammed in each scenario's land use map behooves the City to include a table listing pre- and estimated post-project land use/land cover type acreages. General ranges of impervious surface percentage for each development category, i.e., low-density residential, medium-density residential, industrial, etc, can be applied.[1] Using the impervious percentage estimates for each of the development categories, it would be beneficial to estimate acreage of impervious surface for each land use and for the project area under each scenario, or as determined through modeling the City's stormwater management plan. Also, the cover type and impervious surface change estimates could be sequenced over the fifty-year period, possibly based on 5-year, or at least 15-year intervals.

Item No. 12 & 14. Physical Impacts on Water Resources & Water-related Land Use Management Districts

There is a lack of discussion in the draft AUAR on the flood mitigation projects planned or underway in/near the project area. The AUAR should include discussions on the relationship and developmental effects on the project area of three flood control projects or studies as follows: 1) The Oakport Township Flood mitigation project has been finalized with construction expected to start soon. The project includes phased construction of 6 miles of earthen dike, a stormwater collection system and a stormwater treatment system. 2) The Fargo Southside Flood control project is another flood mitigation project proposed for the region. 3) Additional flood risk information is available from the US Corps of Engineers' Fargo-Moorhead Metropolitan Flood Risk Management Study.

The City states that there are no shoreland areas in the in the AUAR project area. It is true, there are no shoreland zones around lakes in the area, however, shoreland regulations also apply to the public waters of the Red River and Oakport Coulee.

A minor correction is noted for the number listed for the DNR General permit for construction dewatering. The permit number is 1997-0005 not 97-005.

Item No. 13. Water Use

The DNR found discussions on water use issues to be accurate and complete. The DNR appreciates the inclusion of information on useful wells, source aquifers, pollution sensitivity, the river water treatment

[1] Dougherty, M., L.D. Randel, J.G. Scott, A.J. Claire, and G. Normand. 2004. Evaluation of impervious surface estimates in a rapidly urbanizing watershed. Photogrammetric Engineering and Remote Sensing 70:1275-1284.
Giannotti, L., and S. Prisloe, 1999, Do it yourself! Impervious surfaces buildout analysis, NEMO Technical Paper #4, University of Connecticut, Haddam Cooperative Extension Center.

plant, future studies, and ground water supply expansion needs. As noted by the City, it is reasonable to expect additional infrastructure and water resources will be required in the future. Does the City anticipate the need for Red River Valley Water Supply project water, which is proposed through interbasin transfer from the Missouri River basin?

Mitigation Opportunities and Planning for the Future

The DNR recommends that the City establish a commitment to open space (green space) acreage goals in the mitigation plan and employs conservation developments with adequate natural areas. DNR encourages the City to reserve and allocate ample permanent open space for stormwater management and retention, restoration of wetlands, buffering water systems, trail corridors for connecting with trails and natural features to the east, and for the creation of a river-connected park, perhaps similar to the Greenway in Grand Forks. Potential areas could be drafted into the plan and the range of acreage of land dedicated to such purposes or multiple uses could be estimated, with a firm commitment to minimum acceptable acreage allotments.

Lanes for walking and biking need to be set as a development layer to insure reservations for these uses and a timeframe are established early on in the planning process. There is interest in extending the Heartland State Trail to Moorhead and the possibility exists of extending the Central Lakes State Trail towards the City.

The City should include several areas along the Red River in its open space plan to provide access and facilities for shore-based angling. This would fit within scenario two, which proposes that most of the area along the Red River be used for parks and open space. Shore-based angling developments can be as simple as adding large, flat rocks to serve as platforms for anglers, to more complex projects, such as constructing permanent fishing platforms above a specified elevation. Fishing platforms are usually constructed to be Americans with Disabilities Act (ADA) compliant. As mentioned in the AUAR, the Red River supports a variety of fish species and serves as a very unique fishery for this area. Improved stormwater management would improve/maintain the water quality of the Red River and would contribute to efforts to prevent summer fish kills, which occur if the water quality is not maintained, especially in stagnant areas where fish may get trapped during summer months.

Moorhead is at the heart of the northern tallgrass prairie ecosystem, where million acres of native prairie once stretched beyond the horizon across portions of Minnesota and neighboring states and Canadian provinces. With the loss of prairie vegetation, prairie dependant mammals, birds, and insects have also declined. Only about 15,000 acres of high or medium quality native prairie remain in Clay County, most of which remains in two concentrations, Felton Prairie and Bluestem Prairie.

The City of Moorhead and associated neighbors are encouraged to use this AUAR process to critically evaluate opportunities for establishing and management of areas dedicated as open space, which could partially serve as a surrogate for the loss of native prairie. A stormwater management system could be designed to mimic wet prairie habitats that once flourished in this area of the valley.

Benefits of planting diverse native prairie plantings on ecologically appropriate sites are:

- Plants are adapted to local environment and soil;
- Deep roots improve water infiltration and reduces runoff;
- Restores natural heritage;
- Reduced need for chemical inputs and removes potentially harmful nutrients from runoff;
- 70% of biomass is below soil surface improving soil quality & sequestering carbon
- Biologically diverse;
- Competes well with noxious weeds;

- Excellent wildlife food and cover;
- Long lived perennials;
- Improved aesthetics

Benefits of planting native trees/shrubs on ecologically appropriate sites are:

- Adapted to local environment and soil
- Excellent at long-term carbon sequestration
- Improved water infiltration and reduced runoff
- Biologically diverse
- Restores natural heritage
- Reduced need for chemical inputs
- Excellent wildlife food and cover
- Improved aesthetics

Integrating ample open space with clustered (conservation) developments is an efficient and desirable design model for modern communities. Open space preserves the amenities the landscape offers—obstruction-free views of sunrises and sunsets, or an approaching storm, a distant flock of geese on the horizon, the gentle undulation of the Red River valley—and provides access to special areas, the River, Oakport Coulee, and recreation areas and trails. The DNR encourages the City to seek out ways to integrate its open spaces, which are normally dedicated to single use purposes--stormwater management, park, water course, roadside, or trail corridor, vacant, etc.--into a multiple use management complex. Goals for the multiple use management complex could include:

- Manage stormwater by directing water to ponds and swales where runoff will be cleansed by vegetation and infiltration;
- Enhance outdoor recreation opportunities, including nature-related recreation;
- Reestablish native prairie vegetation or woodlands as desireable;
- Broaden buffer zones along watercourses and drainageways;
- Improve habitat for wildlife; and
- Produce a biomass commodity either as forage for livestock or as a feedstock for a bioenergy conversion facility.

By establishing partnerships, the initiative could be buoyed by cooperative funding sources. Concerns over climate, energy prices, national security and job creation have lead state and federal policy makers to numerous initiatives that move the nation towards renewable energy resources including biomass. These initiatives include a variety of state and federal incentives and renewable energy standards. Perhaps most significant is the move towards cellulosic biofuels established in the federal renewable fuel standard. A significant portion of the policy discussion at the state and national level is the source biomass supplies. Many conservation and environmental interests are actively looking for opportunities to contribute to landscape level ecological restoration efforts through biomass crop production systems.

Biomass energy crops are increasingly being viewed as a means to mitigate greenhouse gases, decrease dependence on foreign energy supplies, provide alternative crops for agriculture, and enhance rural development opportunities; and in the case for the City, increase the value of open space for outdoor recreation, stormwater management and wildlife. When compared to traditional row crops, perennial biomass energy crops can provide improved soil quality and stability, improved water quality, habitat for wildlife, and lower inputs of energy, water, and agrochemicals. Planting low-input high-diversity mixtures of native prairie species to produce bioenergy feedstock is one approach being embraced. These reconstructed prairies are harvested for the energy fixed through photosynthesis. Incorporating the potential City program with a large-scale conversion facility to manage biomass plantings could serve as a

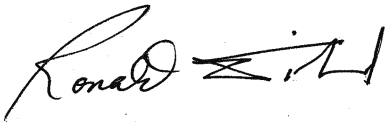
unique demonstration project that, with replication, could prove to dramatically impact the conservation and development of Minnesota's natural resources. The goal of this effort should be to produce clean, and sustainable alternative energy for our homes, businesses, and transportation while providing a wide range of natural resource benefits.

An example of an open space district of 1,000 acres of biomass production would potentially yield 2,000 to 6,000 tons of biomass annually, one-half of that if harvested on a biennial schedule, and less by proportion of lawns and landscaping, trails, etc., in the open space district. Other green spaces already established or planned in other parts of the City could be incorporated into the management scheme. Native prairies without any agronomic help are producing about 2- to 2.5-ton per acre harvest yields. In stormwater management areas with greater moisture, nutrient influx, and the potential to actually select plant material for higher yields (perhaps cordgrass), 5 tons per acre is a reasonable yield. This would not be a sufficient volume to generate all the fuel for a big industrial facility like a sugar mill. It would however not be a trivial supply (~2,000 to 3,000 ton @15 million btu per ton), especially if it were being done to augment the use of beet pulp. However, other smaller commercial/industrial users could probably better match this volume. For example, the University of Minnesota Morris facility will need 6-9 thousand tons of biomass per year. Biomass harvesting would not unduly conflict with outdoor usage of the area because the harvest could occur in the fall after spring-summer recreation season and prior to the winter sports season, and management could be revised to avoid other conflicts as needed and with consideration for wildlife needs. A high stubble height is recommended to insure some wildlife habitat value remains after harvest. Estimates of the value of the biomass production could be leveraged against the initial upfront commitment to green space set-aside. If requested, additional specifics of such a plan could be provided by the DNR and bioenergy consultants would be readily available to assist the City.

Establishing/maintaining "prairie vegetation" in the open spaces would pose some problems. Native prairie that is disturbed by the addition of stormwater runoff could have a tendency to become infested with reed canary and other exotics—smooth brome and quackgrass and canada thistle. Switchgrass monocultures, or limited polycultures involving switch, big bluestem, and prairie cordgrass, might work. The exotic species take advantage of nutrient pulses much more strongly than the native prairie species, which have evolved for life in a tightly competitive system where nutrients are largely tied up in the biomass.

The DNR appreciates the opportunity to provide comments on the draft AUAR and for your consideration. Please feel free to contact me with any questions or comments.

Sincerely yours,



Ronald Wieland, Senior Planner (651) 259-5157
Environmental Review Unit
Division of Ecological Resources

cc: Paul Stolen, Peter Buesseler, David Friedl, Jim Wolters, Helen Cozzetto, Michele Puchalski, Steve Colvin, Randall Doneen, Mark Lindquist, Jason Garms, Robert Dana, Will Haapala (PCA) (william.haapala@pca.state.mn.us)

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Minnesota Pollution Control Agency
520 Lafayette Road North | St. Paul, MN 55155-4194 | 651-296-6300 | 800-657-3864 | 651-282-5332 TTY | www.pca.state.mn.us

December 16, 2008

Mr. Scott Hutchins
Director of Community Services
City of Moorhead
500 Center Avenue
Box 779
Moorhead, MN 56561

RE: North Moorhead/Oakport Township Draft Alternative Urban Areawide Review

Dear Mr. Hutchins:

Thank you for the opportunity to review and comment on the draft Alternative Urban Areawide Review (AUAR) for North Moorhead/Oakport Township. Regarding matters for which the Minnesota Pollution Control Agency (MPCA) has regulatory responsibility and other interests, the MPCA staff has the following comments.

General

The draft AUAR analyzes two development scenarios in a project area that encompasses over 10,000 acres and a time frame for total build-out of over 50 years. Given the large scope of the study, in terms of both area and time, it is particularly important to note that the AUAR and Mitigation Plan must be revisited and consulted on a regular basis to maintain their validity. We appreciate that you have mentioned this in your draft Mitigation Plan (under the heading ***Monitoring of Development and Future Updates to the AUAR***, page 49) and have listed the eight separate circumstances under which the AUAR and the Mitigation Plan must be revised. This is especially pertinent given the long-range scope of this particular AUAR. The next 50+ years will undoubtedly see many changes in environmental knowledge and regulations - and possibly the development plans of the local unit(s) of government - and the city of Moorhead will need to ensure that the AUAR and Mitigation Plan remain current, valid, and viable documents to address environmental impacts associated with the proposed development.

Permits and Approvals

Table 8.1 Permits and Regulatory Review/Approvals on page 19 of the draft AUAR identifies the need for a U.S. Army Corps of Engineers (USACE) Clean Water Act (CWA) Section 404 Permit. If a CWA Section 404 Individual Permit is required by the USACE, then an MPCA CWA Section 401 Water Quality Certification must also be obtained as part of the permitting process. The Section 401 Water Quality Certification ensures that the project will comply with state water quality standards. Any conditions required within the MPCA 401 Certificate are then incorporated into the USACE 404 Permit. You can find additional information on the MPCA's 401 Certification process at www.pca.state.mn.us/water/404.html.

Contaminated Properties

The draft AUAR identifies several properties within the AUAR study area with actual or potential soil and/or ground water contamination. State law requires that persons properly manage contaminated soil and water they uncover or disturb - even if they are not the party responsible for the contamination.

Developers considering construction on or near contaminated properties should work with the MPCA's Petroleum Brownfields Program and/or the Voluntary Investigation and Cleanup (VIC) Program to receive necessary technical assistance in managing (investigating, remediating, mitigating, etc.) contamination. For some properties, special construction might be needed to prevent the further spreading of the contamination and/or prevent petroleum vapors from entering buildings or utility corridors. Information regarding the Petroleum Brownfields Program can be found at: http://www.pca.state.mn.us/programs/vpic_p.html#factsheets. Information regarding the VIC Program can be found at: http://www.pca.state.mn.us/cleanup/vic.html.

Stormwater and Water Quality

In general, higher density developments with increased amounts of open space create the least amount of environmental impacts and facilitate more ready mitigation of those impacts that do occur. Such high density, low impact development should be encouraged whenever possible. The MPCA encourages the use of Low Impact Design (LID) practices such as the following to aid in the minimization of stormwater impacts:

- Special ditches, arranged in a series, that soak up more water
- Vegetated filter strips at the edges of paved surfaces
- Residential or commercial rain gardens designed to capture and soak in stormwater
- Porous pavers, concrete and asphalt
- Narrower streets
- Rain barrels and cisterns
- Green roofs

Additional information on LID practices can be found on the MPCA website at: http://www.pca.state.mn.us/water/stormwater/stormwater-lid.html. The MPCA would be willing and interested in providing technical assistance, both in expanding upon these concepts for inclusion in the final AUAR, as well as in assisting developers interested in implementing LID concepts in their projects.

Under the discussion of ***Natural, Cultural and Physical Resources*** (pages 2-4), the draft AUAR states that "Developments will be required to meet as necessary the standards of the National Pollutant Discharge Elimination System (NPDES), General Permit for Construction..." It should also be noted here that developments will need to meet NPDES Municipal Separate Storm Sewer System Permit requirements. Also under this heading, the discussion regarding the need to work with the MPCA's Total Maximum Daily Load process should include references to working with other water quality programs that might impact development, such as the impaired waters program and other non-degradation programs.

For both of the development scenarios, the MPCA would like to see the design for the permanent stormwater management system go further in meeting future water quality goals and place priority on flow and volume reductions. The storm water improvements section (page 13) of the draft AUAR currently states that, "the increase in impervious surfaces from urban development will result in more storm water runoff; however, water quality should be improved due to the installation of the stormwater management and best management practices that otherwise would not be implemented in rural development or agricultural land use." Scenario Two illustrates a conceptual storm water system with enough runoff capacity to handle a 100-year, 24-hour event (5.26 inches of rain in a 24-hour period). This section should be refined to include a) discussion of the additional best management practices that will be needed to meet the NPDES Construction Stormwater Permit requirements for projects with a discharge

point within one mile of an impaired water, b) consideration of access to discharge points during the planning phase of the permanent stormwater management system since monitoring is likely to be a future requirement; and c) development of a monitoring plan that includes a budget and responsibilities for long-term monitoring of water quality parameters.

The MPCA strongly recommends that priority be given to designing a permanent stormwater management system that reduces volume, flow and flooding potential at the development site over the one large stormwater pond approach. Projects will be required to comply with Minn. R. 7050.0185 NONDEGRADATION FOR ALL WATERS that will require no increase in runoff volume. If runoff volume increases, it will have to be offset elsewhere. Development of a treatment train approach rather than designing a large pond may be better suited to dealing with water quality impairments. We would also like to see a discussion regarding the development and adoption of an ordinance for the AUAR area that will require developments to incorporate the use of innovative technologies that will reduce the flow and volume of stormwater runoff as well as other LID considerations.

The MPCA is developing a One Water approach to managing its water quality programs. It is the goal of this program to align MPCA functions to provide efficiency and effectiveness in protecting the state's waters. The Buffalo River Watershed District is participating in a pilot project for this approach. This work may lead to the development of a basin-wide permit, which would be a vehicle for a general waste load allocation for the watershed. The watershed or basin permit could be a basis for synchronizing permit issuance for all facilities in a single major watershed. It could also be used to establish permit limits based on the cumulative impact of multiple dischargers at the major watershed scale. The basic concept is to issue general NPDES permits for each of the state's major drainage basins. All NPDES dischargers (individual and general permittees) would be covered. The development of this approach to water quality management would be consistent with the philosophy of the North Moorhead/Oakport Township AUAR.

Wastewater

In the final AUAR, please include a table in the wastewater discussion that shows predicted total ultimate average daily flows for each development scenario. Additional environmental review may be required for wastewater systems, and this should be discussed in Item 18 as well as Item 28. Under Minn. R. 4410.4300, subp. 18, an Environmental Assessment Worksheet (EAW) will be required for expansion, modification, or replacement of a municipal sewage collection system resulting in an increase in design average daily flow of any part of that system by 1 million gallons per day (mgd) or more if the discharge is to a wastewater treatment facility (WWTF) with a capacity less than 20 mgd, or 2 mgd if the discharge is to a WWTF with a capacity of 20 mgd or more. Likewise, an EAW is required for expansion or reconstruction of an existing municipal or domestic WWTF that results in an increase by 50 percent or more and by at least 200,000 gallons per day of its average wet weather design flow capacity, or construction of a new municipal or domestic WWTF with an average wet weather design flow capacity of 200,000 gallons per day or more. Please note that the MPCA is the responsible governmental unit that would prepare an EAW for the afore-mentioned sewer collection or WWTF constructions/expansions.

The AUAR indicates that eventual expansion of the existing WWTF will be necessary to accommodate full development of either scenario. Continual evaluation of the need for expansion will be necessary as growth occurs, including evaluation of whether the current WWTF site has the physical capacity to accommodate such expansions, particularly under Scenario Two, which would require significant expansion to accommodate full development.

The AUAR and Growth Area Plan also suggest that the WWTF's lime sludge storage ponds should be considered for other uses in the future. The lime sludge storage ponds are located on both the east and west side of the WWTF. The ponds to the west are nearing the end of their useful life. However, the ponds are in very close proximity to the WWTF. There are 12 lime sludge storage ponds to the east of the WWTF, of which four were constructed this year. Those storage ponds have a useful life of up to 30 years. The property where these ponds are located would not be appropriate sites for development because of construction issues associated with the deposition of the lime sludge. It is recommended that when these lime sludge ponds are no longer usable, the area be utilized only as open space.

Cumulative Impacts

Please clarify your answer ("no response required") to Item 29. While this item does not require a response with respect to cumulative impacts of potential developments *within* the AUAR borders (since this is the intent of the AUAR process), it does require an analysis of projects outside the AUAR area as they relate and interact with the AUAR area developments. Specifically, as stated in the AUAR guidance text for this item, the question of cumulative potential effects of related or anticipated future projects "...should be answered with respect to the cumulative impacts of development *within* the AUAR boundaries *combined with* past, present and reasonably foreseeable future projects *outside* the AUAR area..." The final AUAR must present a complete cumulative potential effects analysis that identifies all such projects (including an explanation of information sources used to identify projects) that may interact with the proposed project in such a way as to cause cumulative impacts, describes the nature and significance of the cumulative impacts, and identifies the natural resource(s) affected and how they may be affected.

Please be aware that this letter does not constitute approval by the MPCA of any or all elements of the project for the purpose of pending or future permit action(s) by the MPCA. Ultimately, it is the responsibility of the project proposer to secure any required permits and to comply with any requisite permit conditions. If you have any questions concerning our comments related to stormwater issues, including LID, please contact Joyce Cieluch at 218-846-7387. Questions regarding wastewater may be directed to Denise Oakes at 218-846-0451. If you have any other questions, feel free to call me at 651-757-2328 for assistance.

Sincerely,

Jessica Ebertz
Planner Principal
Environmental Review and Feedlot Section
Regional Division

JE:mbo
cc: Joyce Cieluch, MPCA, Detroit Lakes
Jack Frederick, MPCA, Detroit Lakes
Denise Oakes, MPCA, Detroit Lakes
Molly McGregor, MPCA, Detroit Lakes
Andy Ronchak, MPCA, St. Paul
Mike Trojan, MPCA, St. Paul
Corey Mathisen, MPCA, St. Paul
Craig Affeldt, MPCA, St. Paul

Formal response to Final AUAR

North Moorhead/Oakport Township Alternative Urban Areawide Review (AUAR)

Prepared on: April 9, 2009

The following is a summary of the comments received during the 10-day comment period for the North Moorhead/Oakport Township AUAR Final Document dated January 27, 2009. Following the summarized comments, the preparers of the document have provided a response to comments that warrant a response. The response is provided in *italics*. Responses that require changes to the draft AUAR are also underlined.

Comments were received from the following entities:

- Probstfield Living History Farm Foundation dated and received February 12, 2009
- Minnesota Department of Agriculture dated February 10, 2009 – received February 13, 2009

Jay Leitch, Probstfield Living History Farm Foundation:

Mr. Leitch provided comments that were related to the future use of the property and the potential for collaboration which could occur. The City acknowledges those comments and will work directly with the Probstfield Living History Farm Foundation. No changes to the AUAR document were made.

Becky Balk, Minnesota Department of Agriculture

The Minnesota Department of Agriculture expressed concern about the potential for conflict between new residential, business and industrial owners locating near existing farming operations.
Page 50 of the Mitigation Plan has been modified to add in the Land Use Management section the following: "Development will be encouraged to occur contiguously to ensure utilities are extended in an efficient manner and minimize potential conflicts between new development and existing agricultural operations. Developers and property owners will be encouraged to be in contact with the Minnesota Farm Bureau Federation and make use of their brochure "Moving to the Country" to help lessen potential conflicts."

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-----Original Message-----
From: jay.leitch@ndsu.edu [mailto:jay.leitch@ndsu.edu]
Sent: Thursday, February 12, 2009 10:51 AM
To: Deb Martzahn
Subject: AUAR & question

Deb,

Thanks for the AUAR CD. Probstfield Farm appreciated being in the 'loop' as we are somewhat concerned about our future as the City surrounds the Farm.

As you might expect, we have lots of ideas about how to make the most use of our 118 acres. One recent suggestion for the wooded area along the coulee on the east side is a 3-D archery range. The Sandhills Archers have one at their property west of West Fargo. Are there currenty any ordinances covering establishment of an archery range on Probstfield Farm property? Will there be any changes when the Farm becomes part of the City in 2015?

On a related matter, we currently allow six archers to hunt deer on the Farm. Will this area be 'grandfathered' to allow archery hunting in 2015 and beyond? If not, is there a process to become grandfathered?

Thanks.

Jay A. Leitch, PFLHF Board of Trustees

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MINNESOTA DEPARTMENT OF AGRICULTURE
FROM THE FARM TO YOUR FAMILY

651-201-6369
Becky.balk@state.mn.us

February 10, 2009

Debra Martzahn
City Planner
PO Box 799
Moorhead, MN 56561

RE: North Moorhead/Oakport AUAR

Dear Ms. Martzahn:

Thank you for the opportunity to review and comment on the North Moorhead/Oakport Alternative Urban Areawide Review. The development scenarios proposed in the revised draft AUAR may have the potential to have an adverse effect on the viability of the nearby farming operations. Although it is not clear in the AUAR if any feedlot operations are nearby, a residential, commercial or industrial development in close proximity to existing feedlots is likely to result in complaints by new neighbors about odor, dust, noise, and/or hours of operation.

To help mitigate this potential conflict, we would like to suggest that the City consider providing Information to residential, business and/or industrial owners about locating near farming operations. Informing nonfarm residents about life in agricultural areas is a tool that has been used by local governments to help lessen potential conflicts between nonfarm residents and agricultural uses. For example, some local governments require a statement to be recorded on property when development occurs near agricultural areas acknowledging the possible issues associated with living near a farming operation. Others require potential buyers of property to be given this type of information. Stearns County has developed a brochure called "What You Need to Know About Mooooving into the Country." The Minnesota Farm Bureau Federation has also developed a brochure called "Moving to the Country" that you may wish to review and consider using. The Farm Bureau may be contacted at 651-905-2117.

We would also like to encourage the RGU to evaluate the proposal for its potential to stimulate scattered rural land uses that would conflict with the primary agricultural land use in the agricultural area of the jurisdiction.

Thank you for the opportunity to comment and please feel free to contact me if you have any questions.

Sincerely,

Becky Balk

Becky Balk, Agricultural Land Use Specialist
Agricultural Development and Financial Assistance Division

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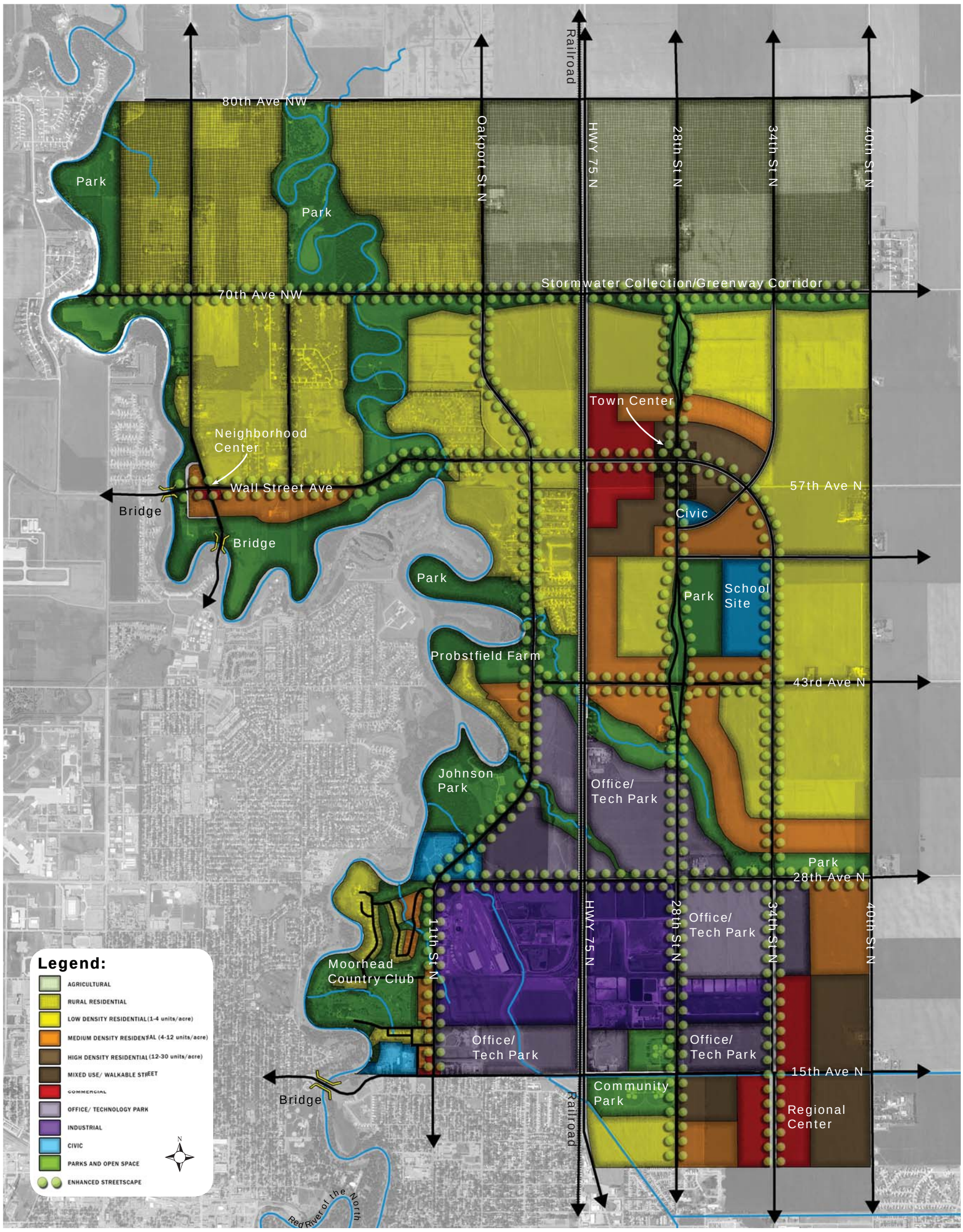
draft

PREFERRED CONCEPT



NORTH MOORHEAD/ OAKPORT TOWNSHIP

Growth Area Plan (GAP) and
Alternative Urban Areawide Review (AUAR)

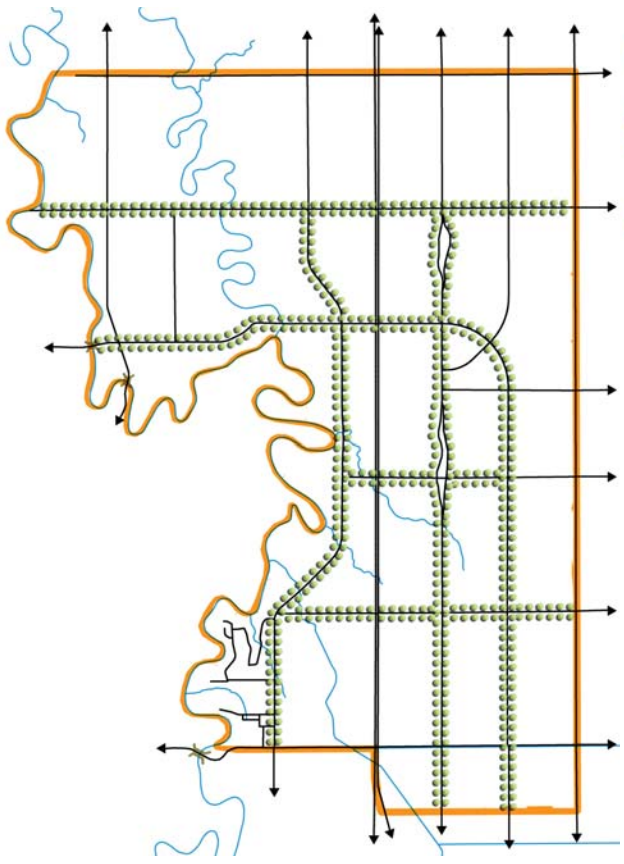
City of Moorhead, Minnesota
Hoisington Koegler Group, Inc.

March 2007

draft

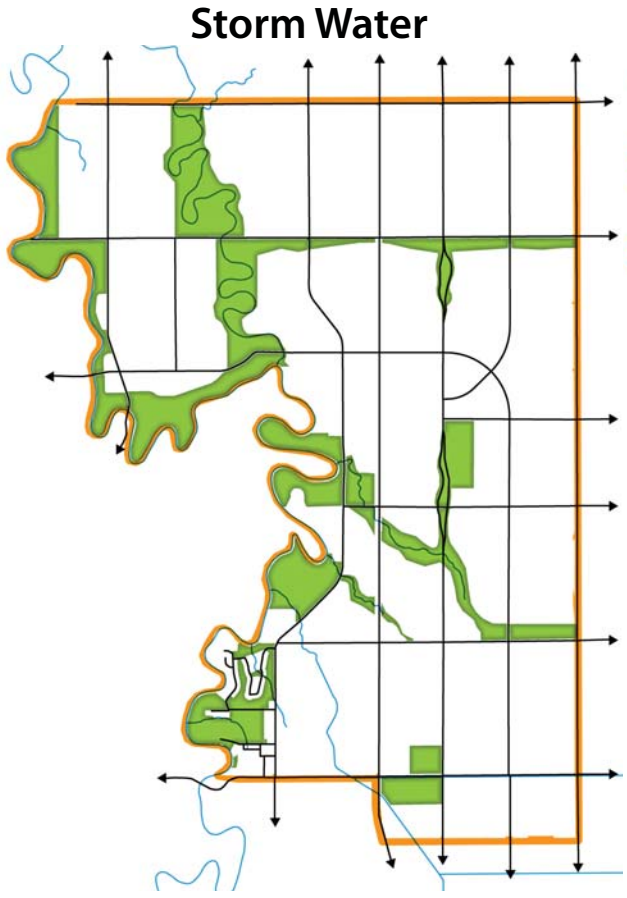
PREFERRED CONCEPT

Road Network



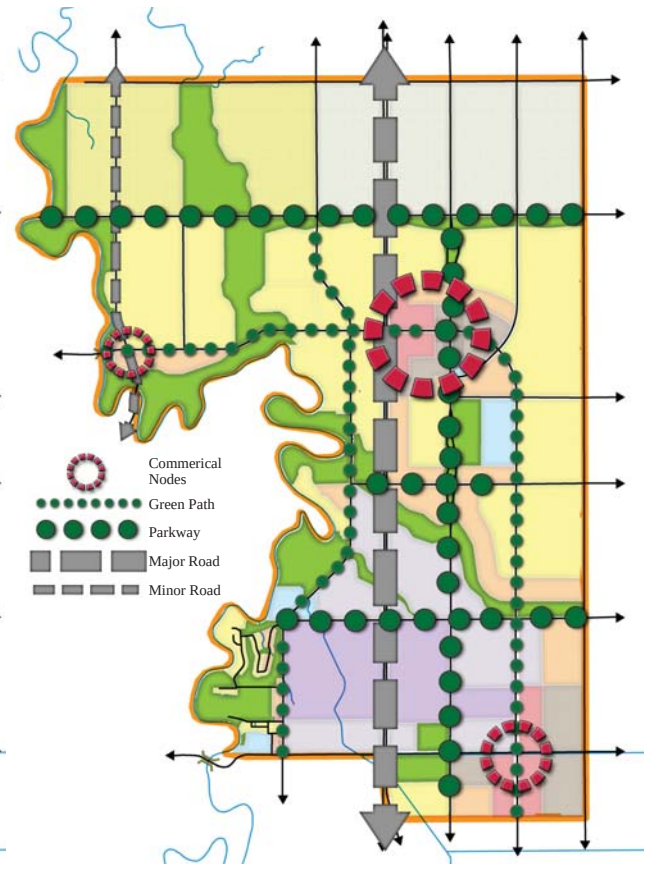
- Highway 75 and 11th/Oakport Street North are direct north/south routes.
- 34th Street extends north and curves to connect with Wall Street Avenue going east/west.
- Wall Street Avenue intersects with Oakport Street and Highway 75 and provides enhanced connection between North Moorhead and North Fargo.
- Major routes are identified for alignment adjustments to better connect major destinations and residential areas.
- Major east/west and north/south collectors and arterials are identified for enhanced streetscape treatment that provides community identity.

Parks, Open Space & Storm Water



- A contiguous open space system provides access to the river and coulees, trails, parks, sporting facilities, picnicking, etc.
- Along existing drainages linear open spaces accommodate community parks, sporting complexes and stormwater treatment and also provide buffer space between incongruent land uses.
- A linear open space along 70th Avenue provides a green connection between future residential development and the Red River park system.
- Added community parks provide recreational amenities in the southern project area.

Land Uses Patterns



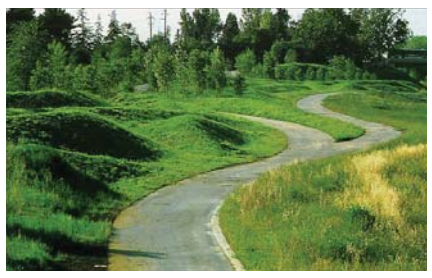
- Office and technology park uses provide a buffer between industrial and residential neighborhoods.
- Mixed-use/commercial centers include a mix of retail, office and higher density residential uses and are located near major roads; the largest center is just east of Wall Street Ave and Hwy 75.
- A commercial center in the southeast capitalizes on retail momentum of a future Super Walmart.
- A neighborhood center located at Wallstreet Avenue and Broadway would include commercial space to support the local community.
- Single-family residential uses are located north and east of the office park, while rural estate residential and agricultural uses are located north of 70th Ave.

NORTH MOORHEAD/ OAKPORT TOWNSHIP

Growth Area Plan (GAP) and Alternative Urban Areawide Review (AUAR)

City of Moorhead, Minnesota
Hoisington Koegler Group, Inc.
March 2007

PLANNING / DESIGN PRINCIPLES



1. Respect the desire for individuality in neighborhood and building design.

2. Respect the agrarian culture of Moorhead – tell the farming story and the history of the land.

3. Respect, preserve and protect the natural systems and amenities including the Red River of the North, creeks and waterways.

4. Develop a plan that supports outdoor recreation opportunities.

5. Incorporate and embrace the characteristics of the rural lifestyle and culture.

6. Capitalize on the business and industrial history and future employment opportunities in the North Moorhead area.

7. Provide future street patterns that build on historical agrarian patterns, improve connectivity, and a hierarchy of roadway types.

8. Improve regional connectivity between North Moorhead and other destinations located in Moorhead and Fargo.

9. Improve the identity of North Moorhead along major roadway arterials and at significant gateways.

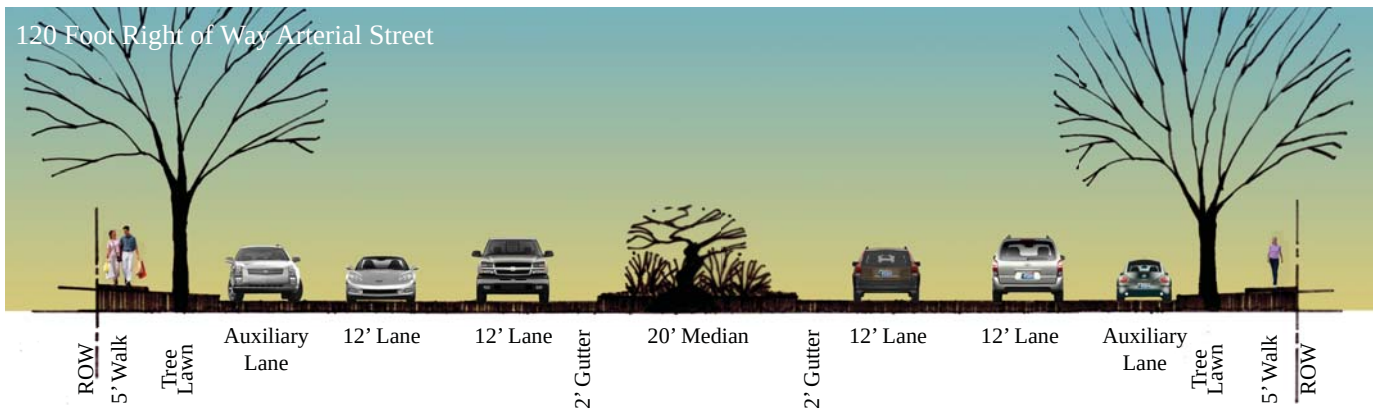
10. Provide for the future development of appropriately located and planned centers including regional, town, community and neighborhood centers.

11. Provide a comprehensive system of parks and open spaces for passive and active recreation.

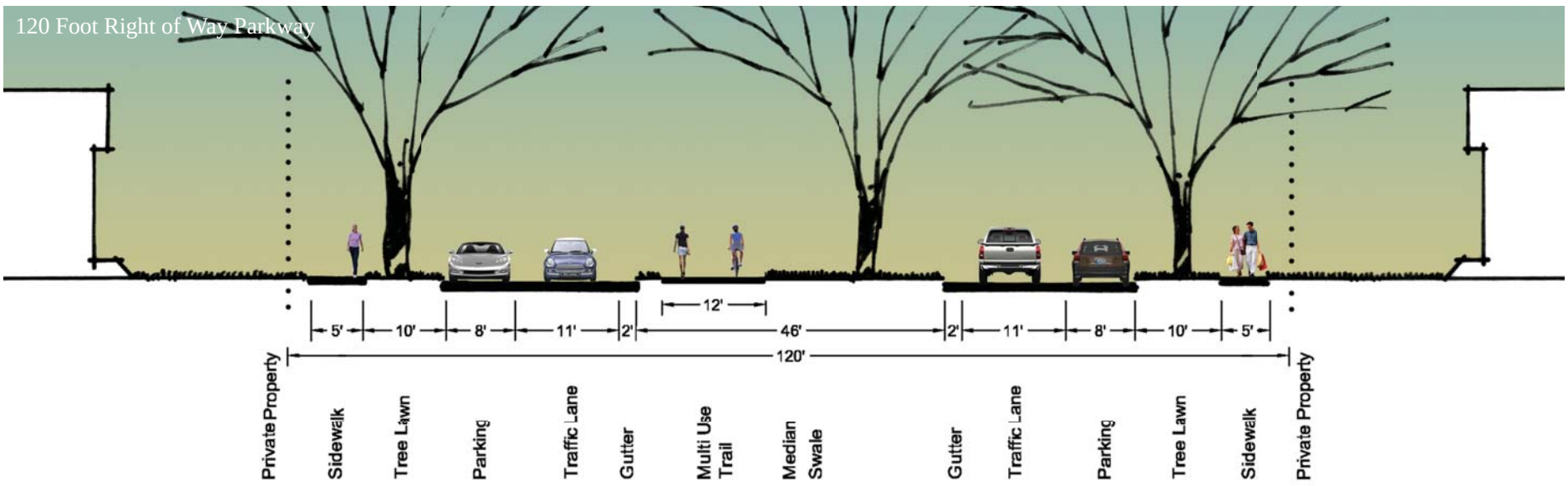
12. Plan for future storm water detention needs while integrating storm water ponds with the open space system.

STREET CROSS SECTIONS

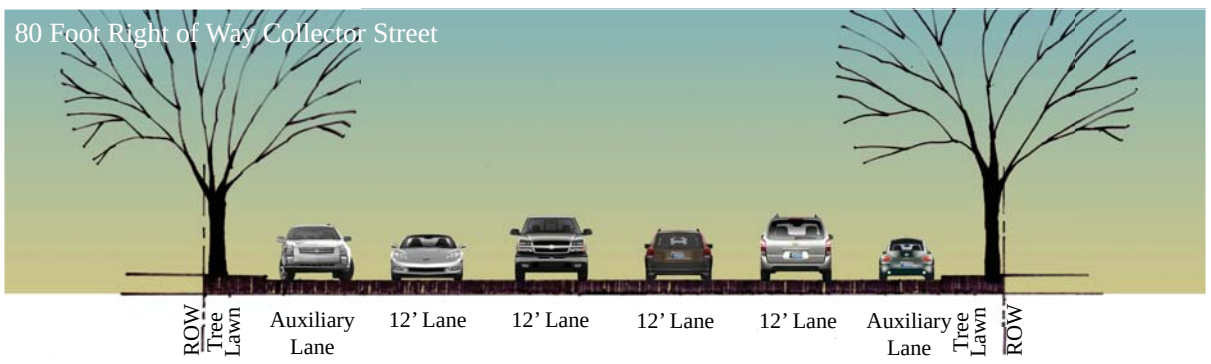
120 Foot Right of Way Arterial Street



120 Foot Right of Way Parkway

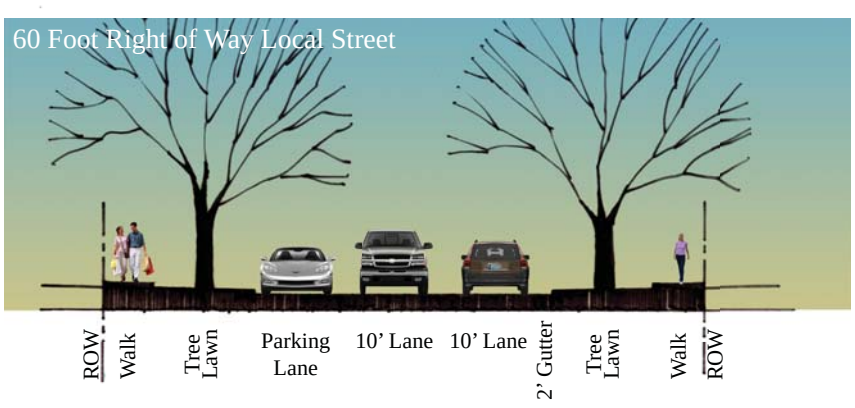


80 Foot Right of Way Collector Street

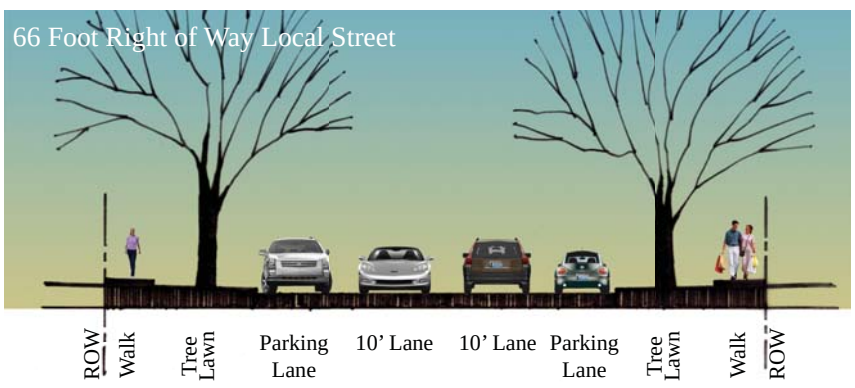


70 Foot Right of Way Local Street in Multifamily Neighborhood

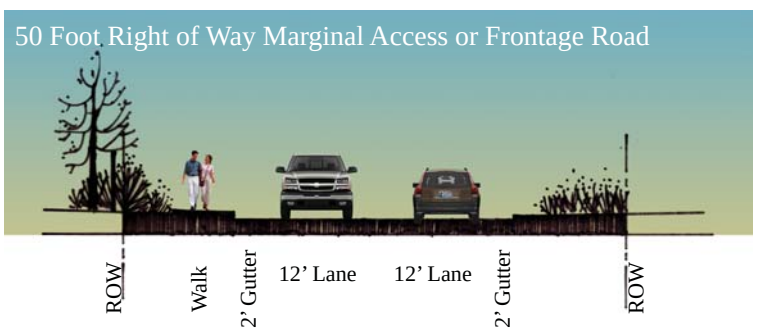
60 Foot Right of Way Local Street



66 Foot Right of Way Local Street



50 Foot Right of Way Marginal Access or Frontage Road



Growth Area Plan (GAP) and Alternative Urban Areawide Review (AUAR)

City of Moorhead, Minnesota
Hoisington Koegler Group, Inc.
Open House 01.29.2007

MIXED-USE/COMMERCIAL CENTERS

Introduction

- Mixed-use pedestrian oriented centers are an important component of new community development and are an important consideration in planning for future growth in North Moorhead.

- They can create a sense of community and establish an alternative to sprawl by forming community gathering places, providing services and promoting employment opportunities for the community.

- They are located for convenience, accommodate the automobile and integrate with the greater community.

- They may serve as an identity marker for the community.

- Centers exist in a range of scales and types: Neighborhood Centers, Community Centers, Regional Centers, Super-Regional Centers, and specialty, or themed centers.

- Centers are characterized by their concept, size, lease-able area, anchor tenants, and primary trade area.

Types of Centers

1. Regional Center

- Mostly dominated by commercial/retail uses including several large anchors that offer a vast selection of related merchandise at very competitive retail prices.

- Retail space typically ranges from 300,000 – 800,000 square feet.

- Consumes around 40-100 acres of land and serve a 15 mile trade area.

2. Town Center

- Most often located near multi-family residential neighborhoods.

- Caters to the retail needs and "lifestyle" pursuits of consumers in its trading area.

- Typically has an open air configuration and includes a mix of uses (retail, office and housing).

- Includes a minimum of 50,000 square feet of retail space occupied by upscale national chain specialty stores, but may include anywhere from 100,000 – 500,000 square feet of retail.

- May be a multi-purpose leisure-time destination and/or living environment including places to live, work, shop, dine and be entertained.

- Sometimes includes amenities such as fountains, plazas and streetscape furnishings to make it more vibrant and walkable.

3. Community Center

- Usually includes a wider variety of land uses and range of retail offerings than a neighborhood center.

- May include multi-family residential, office, civic, and retail uses.

- May be associated with or developed alongside a community scaled park or open space.

- The major draw to a community center my be a blend of civic or recreational uses, but is typically anchored by a mix of retail uses.

- Among the more common retail anchors are supermarkets, super drugstores, and discount department stores.

- May also include retailers selling home improvement products, furnishings, electronics, apparel, or sporting goods.

- Typically include from 100,000 – 350,000 square feet of retail space developed on 10-40 acres of land.

- Serve several neighborhoods located within a 5 mile radius.

4. Neighborhood Center

- Provides the immediate neighborhood with places to shop and play as well as promote social gathering.

- May be located near a school along a collector or arterial street.

- May include neighborhood park space, and usually include neighborhood-oriented retail uses.

- Designed to provide convenience shopping for the day-to-day needs of residents and consumers in the immediate neighborhood.

- Many neighborhood centers are anchored by a supermarket.

- Typically includes from 30,000 – 150,000 square feet of retail space on 3-15 acres of land.

PARKS, TRAILS and OPEN SPACE

Introduction

- Communities that preserve their scenic, ecological, and recreational assets have a competitive edge over those that do not.

- People are drawn to parks and to walking and biking trails, public squares and gardens, tree-lined streets and sidewalks, water features and sports facilities.

- A goal of the parks trails and open space system should be to provide all the elements necessary to ensure a rich variety of social and recreational needs for all residents in the community.

- The following list identifies several basic components for a comprehensive parks and open space system:

Types of Parks Trails and Open Spaces

1. Special Facilities

- Special amenities provide for unique social, educational or recreational needs not normally fulfilled by conventional public park facilities.

- Examples include:
  - golf courses
  - equestrian centers
  - historical sites
  - museums
  - gardens
  - cemeteries

2. Natural Green Space or Open Space

- Varying sizes of natural green space should be accessible by the entire community to provide access to nature and natural systems.

- Include areas of diverse environmental quality including sensitive and scenic lands targeted for conservation and wildlife habitat.

- Natural open space should be provided at approximately 5 acres per 1,000-population minimum.
- Includes trails and trail heads, sitting areas, limited picnic areas, and environmental learning experiences.

3. Community Parks with Sports Facilities

- Open space allocated for large-muscle activities such as soccer, baseball, tennis and swimming.

- Community parks are generally a minimum of 30 acres in size and located to be easily accessible to the entire community.

- Community park space should be provided at approximately 1 acre per 1,000 population.

- May include active recreation facilities, large open lawn, large natural areas, gardens, walking sitting and picnicking.

4. Neighborhood and Small Scale Parks

- Neighborhood parks range from 3 – 7 acres in size.

- Located so they are within a ¼ mile walk from most homes in a community.

- Neighborhood parks should provide play courts, children's play equipment, ballfields and practice areas for informal games, and picnic facilities.

- May also include swimming pools, restrooms or community gardens.

- Provided at 2 acres per 1,000 population.

5. School Playfields

- Amenities include ballfields and other outdoor recreational facilities typically associated with schools.

- Additional facilities can be included for music, drama and nature study and for neighborhood social gatherings.

- School playgrounds are usually 3-7 acres in size

- Located adjacent and contiguous to elementary and middle schools and accessible to several neighborhoods.

- School playgrounds should be provided at 1 acre per 1,000 population or 1 per elementary school.

6. Kids Playgrounds

- Kids playgrounds are usually 1 acre in size and serve a walking distance radius of 660 feet.

- They should be provided at ½ acre per 1,000 population.

- Used primarily by small children supervised by parents.

- May include play equipment, swings, slides, sitting and lawn areas.

- They are ideally located within neighborhoods, with homes fronting on them to provide supervision.

7. Linear Parks, Parkways, and Trails

- Linear open space can expand recreational and scenic opportunities.

- Linear parks, parkways and trails can connect parks and open spaces with neighborhoods, centers and community destinations.

- Should include provisions for walking, hiking, biking, horseback riding, snowmobiling, and skiing.

- They can be located along major roadways and include multi-use trails, sidewalks, bus shelters etc.

8. Urban Plazas and Squares

- Gathering areas located in and around urban areas that provide outdoor space for sitting, social gathering, events, etc.

- They may include provisions for live performances and cultural events.

ROADWAY SYSTEM

Introduction

- Streets provide public access to property, but they also moderate the form, structure and comfort of the community.

- They may orient and direct, and they may provide a sense of district identity through their design, materials and form.

- They are places of social and commercial encounter and exchange.

- They are places for the movement of cars, trucks, buses, bicycles and pedestrians.

- They may also be integrated with the community open space system in the form of linear parks or parkways.

Roadway Types

1. Arterial Streets

- Designed to provide a high degree of mobility and serve longer vehicle trips to, from and within the community.

- Interconnects major destinations, facilities, centers and residential areas within the city.

- The movement of people and goods, rather than access to adjacent uses, is the primary function of an arterial street.

- With the emphasis on mobility, arterials are generally designed to accommodate vehicle trips in the form of passenger cars, trucks and buses. Bicycle facilities may be provided.

- Pedestrian walkways may be provided but may vary in width and character depending on the adjacent land use.

- Generally serve higher density and intensity land uses adjacent to the street.

2. Collector Streets

- Designed to provide greater balance between mobility and land access within residential, commercial and industrial areas.

- Design and character is largely dependent on the density, size, and type of adjacent development.

- Typically designed to accommodate bicycle and pedestrian activity while still serving the needs of the motoring public.

- Provide connectivity between important neighborhood activity centers such as commercial areas, town centers, schools, parks and residential neighborhoods.

3. Commercial Streets

- Provide a high degree of access to intense mixed land uses including office, retail, residential, and public uses.

- Travel by alternative modes should be encouraged to reduce congestion and minimize the amount of land devoted to vehicular traffic and parking.

- Designed to accommodate a complex transportation network with the following characteristics:

  Higher levels of mobility during peak hours
  Heavy pedestrian activity and bicycle travel
  Public transportation routes and stops
  Loading and unloading activity
  On and off-street parking
  Complex underground utility systems

- Designed to promote pedestrian activity with wide sidewalks, crosswalks, seating and shelter from the elements, street trees, public art and identity signage.

4. Parkways and Boulevards

- Parkways have particular significance in many cities because of their influence on development and unique physical character of the city.

- They may function as arterials, collectors or local streets.

- They provide important connections between major community destinations, particularly parks, open spaces, civic uses, activity centers and residential areas.

- May be included as an integral component of the parks, trails and open space network within a given community.

5. Local Streets

- Design features of local streets are influenced less by traffic volumes and more to providing local access to homes and businesses and improving community livability.

- Mobility on local streets is typically incidental and involves relatively short trips at lower speeds to and from collector streets.

- Pedestrian and bicycle safety and aesthetics are generally high priorities on local streets in residential and commercial areas.

OFFICE PARK and INDUSTRIAL

Introduction

- Office and industrial uses will be an important land use for future economic growth in North Moorhead.

- Office and industrial uses located in North Moorhead can provide a variety of employment opportunities for the local and regional community.

- Office and industrial uses are located adjacent to major vehicular routes, rail lines and airports for convenience of access, circulation and distribution purposes.

- These uses are also located where land costs are affordable and the land is readily accessible for development.

Types of Office and Industrial Uses

1. Office

- Office uses may be developed as stand alone office buildings, in a campus setting with other office buildings, or as part of a mixed use building or development.

- Many office developments are being planned and built in campus-like settings (office parks). These tend to be attractive to young college graduates and create a unique corporate identity.

- The quality of the work environment is becoming more important in the recruiting and retention of talented and valuable employees.

- Many office parks include amenities such as dining, fitness centers, banking and dry cleaning services to improve the quality of the work environment, reduce travel times and improve productivity.

- Many new office buildings are developed with flexibility in mind in order to adapt to future tenant changes.

- Biotechnology office parks are developed where there is a strong relationship to nearby research facilities.

- Office buildings house everything from medical clinics, law services, computer technology, food production and biotechnology to graphic design, printing, engineering and architectural services.

2. Industrial

- Industrial uses are involved with manufacturing, storage and/or distribution of goods and products.

- They may also serve important utilitarian needs for municipalities such as the treatment of water, sewage, composting, trash services, power plants, or storage of equipment.

- Industrial uses may be considered heavy or light industry. Heavy industries can be differentiated from light industries as being more capital intensive, where light industries are more labor intensive.

- Heavy industry produces products for other industries instead of end users.

- Light industries are easier to relocate than heavy industry, and can be built with less investment.

RESIDENTIAL

Introduction

- More and more, communities are seeing a need to provide a mix of housing types to address a diverse population and ever-changing lifestyles.
- By allowing a mix of housing types, a community can help satisfy a wide range of local housing needs while reducing the impact on traffic, infrastructure and open space.
- A broad mix of housing and household types is better able to support public amenities and nearby retail activity.
- A mix of housing types at a full range of prices helps make it possible for local employees to live near their jobs.
- A diverse mix of housing types can address lifecycle housing needs, allowing seniors and empty nesters the ability to continue living in the neighborhoods they grew up and raised their families in.
- A mix of housing types and costs can maximize absorption for a development and provide the flexibility to accommodate changes in the market.
- By responding to the evolving makeup of today's – and tomorrows – households, a development that provides a mix of housing types can create greater value for the entire community.

Housing Types

1. Single Family Detached

- The basic building block of single family housing.
- Lot sizes vary from 2,500 square feet to several acres.
- Density can range from 0-15 dwelling units per acre.
- The trend is to develop smaller, more affordable lots and to mix various lot sizes within a block or neighborhood.

2. Duplex (Twin Homes)

- Typically includes 2 single family homes that share a common wall.
- Density typically ranges from 8-16 dwelling units per acre.

3. Carriage House

- A carriage house, or accessory unit, is typically built above the garage and may be attached or detached from the main residence.
- May provide housing for an extended family member (ie. grandparents), for rental, or is often used for a home office.
- May provide a better alternative to aging baby boomers than isolated retirement communities and nursing homes.
- Allows for greater density than single family detached housing.

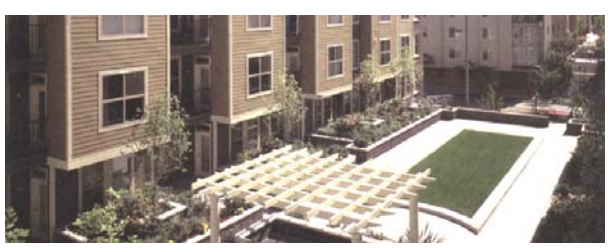
4. Townhouse

- Several single family housing units attached with common walls.
- Typically 2-3 story units, built as a rowhouse or in cluster development.
- Very adaptable to many site conditions and efficient use of land.
- Townhomes are being integrated into single family housing to increase overall project densities, while maintaining a pedestrian-oriented presence on the street.
- Typically allows for 12-24 dwelling units per acre.

5. Manor or Mansion House

- Includes 2-4 housing units grouped in a single building that has the presence and formality of a mansion.
- Mansion houses are being developed adjacent to real mansions to increase overall project density while blending into the scale and character of the real mansions.
- Densities can range from 8-24 dwelling units per acre.

6. Courtyard/Cluster



- Courtyard and/or cluster type housing can be single family or multi-family housing organized around a semipublic open space.
- Courtyard housing can create a substantial presence on the street, while offering more intimate semiprivate courtyards where unit entrances are located.
- Clustering typically preserves more public open space than traditional single family lotting.
- Densities of 12-30 dwelling units per acre can be obtained.

7. Live/Work Building

- Live/work units, combining living and working spaces, are similar to rowhouses.
- The residence is above the place of work, with separate public entrances to each.
- Often located near the center of neighborhoods, as a transition between primarily commercial and primarily residential areas.
- Densities typically range from 12-24 dwelling units per acre.

8. Low-Rise Building

- May include for-rent apartments and/or for-sale condominium housing units.
- Building height ranges from 2-4 stories.
- Provides greater densities on relatively small and urban building sites.
- May be built of timber frame construction, keeping building costs down.
- Densities typically range from 24-50 dwelling units per acre.

9. Mid-Rise Building

- May include for-rent apartments and/or for-sale condominium housing units.
- Building height ranges from 5-7 stories.
- Provides greater densities on relatively small and urban building sites.
- Usually require steel and/or concrete construction.
- Densities typically range from 50-80 dwelling units per acre.

10. High-Rise Building

- May include for-rent apartments and/or for-sale condominium housing units.
- Building height is above 8 stories.
- Provides greater densities on relatively small and urban building sites.
- Requires steel and/or concrete construction.
- Densities typically range above 80 dwelling units per acre.

STORMWATER MANAGEMENT

Introduction

- Stormwater is the flow of water that results from precipitation and which occurs immediately following rainfall or as a result of snowmelt.

- When a rainfall event occurs, several things can happen to the precipitation. Some of the precipitation infiltrates into the soil surface, some is taken up by plants, and some is evaporated into the atmosphere. Stormwater is the rest of the precipitation that runs off land surfaces and impervious areas.

- Stormwater discharges are generated by precipitation and runoff from land, pavements, building rooftops and other surfaces. These hardened surfaces are called 'impervious surfaces' and they do not allow rainfall to infiltrate into the soil surface like natural vegetation, so more of the rainfall becomes stormwater runoff.

- Stormwater runoff accumulates pollutants as it travels across land. Heavy precipitation or snowmelt can also cause sewer overflows that may contaminate water sources.

- Stormwater management is the management of stormwater runoff, often using water retention facilities, to provide controlled release into receiving streams.

- The goal of stormwater management is to use stormwater as a resource, reduce nonpoint source pollution, maintain natural hydrology, and mitigate the impacts of urban runoff and associated pollution. The following is a general list of best practices for managing stormwater runoff:

Best Practices

- Encourage low impact development (LID) as a strategy for controlling runoff volume and protecting receiving waters from polluted stormwater. LID's goal is to mimic a site's predevelopment hydrology by using design techniques that infiltrate, filter, store, evaporate, and detain runoff close to its source.

- Instead of conveying, managing and treating stormwater in large, costly end-of-pipe facilities located at the bottom of drainage

areas, LID addresses stormwater through small, cost-effective landscape features located at the lot level. This includes not only open space, but also rooftops, streetscapes, parking lots, sidewalks, and medians.

- Whether LID is appropriate depends on site conditions including slope, depth of water table, and permeability of the soil.

- Install non-traditional swales with natural meanders and stone check dams to slow water runoff, creating visual amenities for the community.

- By integrating stormwater management systems with parks, parkways and open spaces, managing runoff can become an amenity for the community by creating ponds, streams and raingardens that are aesthetically pleasing, benefiting the community by increasing the sales performance of those neighborhoods that have views and access to these amenities.

- A well-designed and integrated surface stormwater management system can provide benefits to the environment by reducing downstream flooding, improving water quality

and reducing pollution, and improving wildlife habitats and corridors.

- Drainage costs can be reduced and water can be used for irrigation or aquifer recharge by incorporating three basic management techniques:

  1. Capture runoff water close to where it falls.
  2. Reuse runoff water as close to the source as possible.
  3. Avoid creating concentrated runoff and erosion.