Moorhead North Growth Area Alternative Urban Areawide Review (AUAR)

Final AUAR

Prepared for the

City of Moorhead, MN

By

Stantec Consulting Services, Inc.

October 17, 2018

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Mitigation Plan

Mitigation is discussed in each section of the AUAR.

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Introduction

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 to 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.

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.

AUAR Process Summary

City staff began exploring the concept of completing an AUAR for the project area in conjunction with a study of the North Moorhead growth area. The City of Moorhead expected that property owners and developers in the growth area would begin to explore development projects. Rather than evaluating projects individually, the City desired a comprehensive review of 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.

Three agencies provided comments to the Draft AUAR. Their letters and the Draft AUAR Response to Comments can be found in the Appendix. The commenting agencies included the Minnesota Department of Natural Resources, Minnesota Pollution Control Agency, and the Minnesota Department of Administration State Historic Preservation Office.

1. Project Title

North Moorhead Growth Area Plan

2. Proposer

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3. RGU

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4. Reason for EAW Preparation

Over the past decade, the City of Moorhead has experienced an increase in development activity that has led to the need to plan for future growth. 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 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. Project Location

County: Clay County
City: Moorhead

PLS Location (¼, ¼, Section, Township, Range): Sections 7-10, 15-22, 27-29, 32-34, Township 140N, Range 48W; Sections 12-13, Township 140N, Range 49; Sections 3-4, Township 139N, Range 48W.
Watershed: Upper Red River of the North (57) and Unknown DNR Minor Watershed Name
GPS Coordinates: 46°53'18.0"N 96° 45'00.7W
Tax Parcel Numbers: Please refer to the map in the Appendix regarding tax parcels for North Growth Area
Attach each of the following maps to the EAW: county map, USGS map, and a site plan. *AUAR Guidelines: The county map is not needed for an AUAR. The USGS map should be included. 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 maps as required in conjunction with items 9 and 27; and (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.*

All required maps and additional maps displaying relevant information are found in Appendix A.

6. Project Description

a. Provide a project summary of 50 words or less to be published in the *EQB Monitor*.
The City of Moorhead is updating its 2009 AUAR. This AUAR evaluates the potential future growth and its associated impacts on a cumulative basis.

b. Give a complete description of the proposed project and related new construction, including infrastructure needs. If the project is an expansion include a description of the existing facility. Emphasize: 1) construction, operation methods and features that will cause physical manipulation of the environment or will produce wastes, 2) modifications to existing equipment or industrial processes, 3) significant demolition, removal or remodeling of existing structures, and 4) timing and duration of construction activities.

The project area encompasses over 10,000 acres in Moorhead and Oakport Township. Total build out of the project area is not anticipated until the end of and through the growth year 2040. This AUAR evaluates the potential full build-out scenario, as per the Growth Area Plan (GAP).

The full build-out by 2040 development scenario is evaluated in this AUAR. This scenario reflects the land use pattern described in the Moorhead Growth Area Plan (GAP). The GAP was developed to address the increase in development activity that has led to the need to plan for future growth. General directions for the GAP were established based on the City Comprehensive Plan (updated in 2009), stormwater plans, utility infrastructure plans, and regional transportation plans 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.

1) 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 stormwater runoff is not managed adequately.

2) There will be no modifications to existing equipment or industrial processes. Any and all existing equipment will be removed from the site and disposed of according to all applicable city, state and federal regulations.

3) At this time, the Proposer does not have plans to demolish, remove, or remodel any existing structures. However, should demolition occur, all construction wastes will be removed and disposed of off-site according to all applicable city, state and federal regulations.

4) At this time, the project area for Scenario 2 will be developed through the growth year 2040, depending upon market conditions.

c. Project Magnitude

Total Project Acreage 10, 253.19 acres

This AUAR is an update to the 2009 AUAR. The 2009 AUAR evaluated two development scenarios with varying magnitudes. Table 6-1 summarizes the development magnitude data for each Scenario.

Scenario 1: No Further Build. This scenario assumes that development in the North AUAR area would halt at its current state. Therefore, acreage and development intensity figures used in this AUAR represent the current status (at time of writing) of development in the North AUAR area. See Table 6-1 for currently developed acreage.

Scenario 2: Maximum Development. This scenario assumes that all land in the North AUAR area will develop to its maximum allowed intensity. The acreage figures for this scenario represent how the current AUAR area acreage is guided by the City. See Table 6-1 for guided acreages. The development intensity figures for Scenario 2 represent the maximum development that could occur in the North AUAR area based on the City's current land use and zoning controls.

Table 6-1: Acreage Assumptions of North AUAR Area Scenarios

Land Uses	Scenario 1: No Further Build (acres)	Scenario 2: Maximum Development (acres)
Residential	1,136.98	5,145.13
Commercial	30.66	217.22
Mixed Use		53.91
Industrial	458.14	1,335.76
Public/Semi-Public, Institutional/Cemetery	238.47	232.02

Parks & Open Space	681.13	1,854.38
Agricultural	7,164.22	610.42
Right-of-way	438.03	698.78
Open Water	105.56	105.56
Total	**10,253.19**	**10,253.19**

d. Explain the project purpose; if the project will be carried out by a governmental unit, explain the need for the project and identify its beneficiaries.

The City of Moorhead has experienced an increase in development activity that has led to the need to plan 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 is a discretionary AUAR completed by the City of Moorhead.

The project serves as a major development opportunity for the City of Moorhead. The development will increase housing options and availability and provide recreation opportunities, hospitality and commercial services to the area. The City and the region will be positively impacted by the increased revenue and property taxes generated by development on the site, as well as enhancements to services, jobs, and recreational opportunities in the region. The project will mostly be completed by private developers.

e. Are future stages of this development including development on any other property planned or likely to happen? Yes or No.

No. The AUAR evaluates the full build-out of proposed development within the AUAR area. The area is planned to be developed continuously through the growth year 2040, in response to market demand.

Figure 7-1 depicts the land use from the 2009 Comprehensive Plan, which represents the site at full build-out.

f. If yes, briefly describe the past development, timeline and any past environmental review.

Not applicable.

7. Cover Types

Land cover in the AUAR area was determined based on the 2011 National Land Cover Database (NLCD). The NLCD is a database which assesses national land cover changes and trends across the US from 2001 to 2011. The system categorizes open and developed areas in terms of land cover, rather than land use, using a 16-class land cover classification scheme. This AUAR categorizes land cover boundaries based upon the NLCD.

Table 7-1 (Pre- and post-construction land cover types for the AUAR area under the full build-out scenario) provides a summary of land cover types currently in the AUAR area and estimated post-construction land cover as a result of planned development. Table 7-1 is based

on the NLCD data and GIS tools (Figure 7-1). Estimated post-construction land cover types were calculated by overlaying the Growth Area Plan (Figure 7-1) on the NLCD data (see Figure 7-2). It is assumed that land cover will be converted to lawn/landscaping (i.e., maintained grasses) in areas of concentrated development.

Table 7-1: Land Cover Type Assumptions of North AUAR Area Scenarios

Land Cover Type (determined through NLCD data)	Scenario 1: No Further Development		Scenario 2: Maximum Development	
	Total Acres	Percent of AUAR Area	Total Acres	Percent of AUAR Area
Deciduous Forest	68.19	1%	16.65	0%
Evergreen Forest	3.71	0%	2.49	0%
Grassland/Herbaceous	2.14	0%	1.10	0%
Pasture/Hay	312.33	3%	153.41	1%
Cultivated Crops	6,650.54	65%	2,074.58	20%
Woody Wetlands	862.63	8%	583.83	6%
Open Water	105.56	1%	105.56	1%
Developed land, <11% to >90% impermeable [a]	2,248.10	22%	7,315.56	71%
Total [b]	**10,253.19**		**10,253.19**	

[a] Post-construction values reflect NLCD data and new impervious areas (e.g., buildings, parking lots, etc.) per the GAP.
[b] Totals reflect actual values and do not account for rounding error within the table.

Per the NLCD User Manual[1], descriptions of the land cover types illustrated on the figures and tables within this Question 7 are summarized in Appendix B.

Based upon the current GAP, cultivated crops will be the primary NLCD land cover type (not previously developed or an impervious area) that will become developed in the North AUAR area (i.e., impervious surface or maintained grasses) as a result of full build-out development. Pasture/hay land and deciduous forest will be the second most developed land cover type (Table 7-1).

Based upon NLCD data, the North area contains approximately 862.63 acres of woody wetland; however, the National Wetland Inventory (NWI) has been more recently updated than the NLCD data, and provides more accurate wetland mapping. As per the NWI, there are approximately 151.96 acres of wetlands and 157.08 acres of industrial open water (e.g., borrow pits, wastewater treatment ponds) within the AUAR area. It is anticipated that impacts to these wetlands will be minimal, as it is expected that the developers will avoid impacting these areas to the greatest practicable extent.

[1] NLCD. 2011. Homer, C.G., et al., 2015, Completion of the 2011 National Land Cover Database for the conterminous United States-Representing a decade of land cover change information. *Photogrammetric Engineering and Remote Sensing*, v. 81, no. 5, p. 345-354

The NLCD methodology separates land cover types into three categories: natural, semi-natural, and cultural. Natural land cover types are more likely to contain potential suitable habitat for rare wildlife and plant species than previously disturbed areas that may contain artificial surfaces and/or invasive species (i.e., semi-natural and cultural). Existing natural land cover accounts for approximately 10% of the total AUAR area. While there are natural land cover types within the AUAR area, and the acreages of these areas are predicted to decrease with full build-out based on Table 7-1 above, it is important to note that the change in land cover does not necessarily equate with full loss of these areas. It is anticipated that the City will avoid impacting natural areas, if possible. Where impacts cannot be avoided, it is expected that post-construction land cover will include created natural areas, such as landscaped areas, parks, and open space.

It is anticipated that the full build-out of the AUAR area actually will result in similar post-construction land cover totals, since preservation of open water, wetlands, and other natural habitat types are generally a priority in development planning.

8. Permits and Approvals Required

List all known local, state and federal permits, approvals, certifications and financial assistance for the project. Include modifications of any existing permits, governmental review of plans and all direct and indirect forms of public financial assistance including bond guarantees, Tax Increment Financing and infrastructure. *All of these final decisions are prohibited until all appropriate environmental review has been completed. See Minnesota Rules, Chapter 4410.3100.*

Table 8-1 lists all permits that are anticipated to be required for development in the AUAR area.

Table 8-1: Anticipated Permit Requirements

Unit of government	Type of application
Federal	
US Army Corps of Engineers	Clean Water Act Section 401/10 Wetland Permits (Joint Application for Activities Affecting Water Resources in Minnesota)
Federal Aviation Administration	FAA 7460-1 Permit
State	
Clay County Soil and Water Conservation District	Joint Application for Activities Affecting Water Resources in Minnesota
Minnesota State Historic Preservation Office	Cultural Resource Coordination
Minnesota Department of Transportation	Utilities in Right-of-Way Permit
	Right-of-way permit for work within or affecting MnDOT right-of-way

	Limited Use Permit
Minnesota Department of Health	Water Main Plan Review
Minnesota Pollution Control Agency	NPDES General Permit for Construction
	Sanitary Sewer Extension Permit
	Clean Water Act Section 401 Water Quality Certification required if a US Army Corps of Engineers Clean Water Action Section 404 Permit is required
	Antidegradation Assessment is required if a Clean Water Act Section 401 Water Quality Certification is required due to wetland impacts
	Notification of Intent to Perform a Demolition
	UST Notification of Installation or Change in Status Form
Minnesota Environmental Quality Board (EQB)	Environmental Assessments (AUAR)
Regional/Local	
City of Moorhead	Subdivision Approval
	Rezoning
	Planned Unit Development Approval
	Flood Fringe and Floodway Overlay Subdivision
	Floodplain Development Permit
	Conditional Use Permit Approval
	Grading/Erosion Control Permit
	Site Plan Review Approval
	Comprehensive Plan Amendments
	Zoning Ordinance Amendments
	Variance
BNSF and OTVR Railroad	Utility Crossing License Agreement
	Railway Crossing License Agreement

Clay County	Roadway Access Permit
	Utilities in Right-of-Way Permit
Buffalo-Red River Watershed District	Watershed Permit

9. Land Use

The land use has not changed since the 2009 AUAR. Below is the land use summary from the 2009 AUAR.

a. Describe:

i. Existing land use of the site as well as areas adjacent to and near the site, including parks, trails, prime or unique farmlands.

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. Many of these residential neighborhoods are within the City of Moorhead, though some residential areas near 40th Street North are not.

The southern portion of the project area, which is also in the City of Moorhead, is comprised of a mixture of uses. West of 11th Street North is a residential neighborhood, small commercial node, the National Guard Armory, Moorhead Country Club, a cemetery and MB Johnson Park.

East of 11th Street North 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 southwest corner, a sugar beet processing facility, and farmland they have purchased to create a buffer to the property.

East 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. East of Highway 75 and north of 28th Avenue is also a small commercial area that provides a limited amount of goods and services to the area.

As described in Question 14, the Randolph M. Probstfield House and Farm is located within the AUAR area, near the intersection of 43rd Avenue North and Oakport Street North. This property was listed on the National Register of Historic Places (NRHP) in 1980. The property is currently used as a sustainable farm and educational center.

Adjacent land uses consist of a combination of urban and rural land uses. Across the Red River to the west of the North Growth Area is City of Fargo residential, commercial and golf course/open space. To the south is 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 rural 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.

Figure 9-1 illustrates existing land use in the North Growth Area.

ii. Plans. Describe planned land use as identified in comprehensive plan (if available) and any other applicable plan for land use, water, or resources management by a local, regional, state, or federal agency.

In 2009, the City of Moorhead updated their Comprehensive Plan to determine how the City will grow into the future. As part of this Plan, the City identified future land uses throughout the City and in its Growth Areas. However, this Plan did not specifically address land uses in the North Growth Area. Instead, future land use in the North Growth Area was established in the 2004 Comprehensive Plan. This Plan identifies several proposed future land uses including:

- Oakport Residential along the Red River, to the far northern part of the growth area;
- Moderate Density Residential and Park/Open Space to the south of 43rd Avenue North between the Red River and Highway 75;
- Heavy Industrial and Public/Institutional uses south of 28th Avenue North;
- Moderate Density and High Density Mixed Residential uses are proposed for south of the industrial area, but north of 15th Avenue North; and,
- A mix of commercial, residential, and park/open space uses are planned for land between the Red River and 11th Street North.

Figure 9-2 illustrates the planned future land use in the North Growth Area.

iii. Zoning, including special districts or overlays such as shoreland, floodplain, wild and scenic rivers, critical area, agricultural preserves, etc.

Zoning in the North Growth Area is complicated because of the many jurisdictions located within the area. For property within the City of Moorhead, zoning generally follows the pattern from north to south:

- RLD0a Residential Low Density 0a and P Public Open Space
- I Institutional
- P Public Open Space and TZ Transitional

- HI Heavy Industrial and I Institutional

For the far southwestern part of the North Growth Area, which is home to a variety of uses, land is zoned RLD2 Residential Low Density 2, RMD1 Residential Medium Density 1, CC Community Commercial, P Public Open Space, and I Institutional.

§10-17E of the City of Moorhead's zoning code establishes the Gateway Overlay District. This district was created to provide a higher standard of appearance for corridors that serve as the main entrances to the community. Highway 75 north of Highway 10 is included in this district (properties within 300 feet of the roadway). While this overlay district does not impact the permitted, accessory, or conditional uses of the underlying district, it does include increased standards. These standards include:

- Landscaping and buffers to improve the visual impact of the corridor
- High quality building materials
- Pedestrian scale lighting, building design, and facilities
- Visual breaks to building mass (building materials, windows, public art, roof overhangs etc.)

For land within the North Growth Area, but outside of the City of Moorhead, Clay County has some zoning authority. In areas they have authority, land is zoned AG General. There is some land within the North Growth Area along the Red River that is a part of the Oakport Joint Powers agreement. Zoning authority for land in this area is not under the jurisdiction of the County, instead it is under jurisdiction of the City of Moorhead.

Figure 9-3 illustrates existing zoning in the North Growth Area.

Due to the Red River of the North making up the western boundary of the North Growth area, much of the North Growth Area is located within a Federal Emergency Management Agency (FEMA) mapped floodplain. These areas are illustrated on Figure 9-4. Within these areas, special regulations are in place to protect from flooding, and as per City code, improvements within the flood way are limited or are not permitted unless the improvement is independently evaluated through hydraulic modeling. A floodplain permit is required for lots within the 100-year floodplain. More information can be found in the in Title 10, Chapter 17, Article B of the City Code.

b. Discuss the project's compatibility with nearby land uses, zoning, and plans listed in Item 9a above, concentrating on implications for environmental effects.

In 2009, the City of Moorhead adopted a Growth Area Plan (GAP) for the North Growth Area (Figure 7-1). This plan identified future land uses in this area. Much like the adopted Comprehensive Plan, the Growth Area Plan identifies a mix of low and medium density residential throughout the northern part of the North Growth Area, with industrial areas to the south along Highway 75. Future parks and a new park along the Red River.

However, there are some areas in which this Growth Area Plan diverges from the Comprehensive Plan. For example, this GAP identifies additional residential growth to the

east of Highway 75, with a large commercial and mixed use node at the intersection of Highway 75 and 57th Avenue North. The area will also support medium and high density housing and new institutional uses. Light industrial areas have been proposed to surround existing heavy industrial uses along Highway 75. All of these distinct neighborhoods will be linked together through a proposed network of parks and open spaces that connect to the Red River.

Despite these differences between the City's adopted 2009 Comprehensive Plan and the North Growth Area Plan, the proposed GAP is consistent with many goals from the Comprehensive Plan:

> "1.1 Support the development of neighborhoods with a mixture of housing types.
>
> 1.10 Neighborhood commercial nodes should be developed to provide convenience retail and services to the surrounding neighborhood.
>
> 1.15 Support the development of a linear park system to serve as connections between neighborhoods and walking/biking destinations such as schools, churches, and activity centers.
>
> 8.5 Ensure areas of high employment have direct access to the transportation network to minimize impact on residential areas."

Attention to the Probstfield House and Farm will be needed as development occurs. Although listing on the NRHP does not prohibit development or demolition of the property, special attention will be needed in this area. As described in Question 14, a phase II assessment will need to be completed and additional mitigation may be recommended.

The general organization of the GAP, with residential uses north of industrial areas and parks throughout is generally consistent with existing zoning, but many variations exist, especially in the proposed mixed use node (currently zoned agricultural by the County).

c. Identify measures incorporated into the proposed project to mitigate any potential incompatibility as discussed in Item 9b above.

Required Changes to the Comprehensive Plan:

For the North Growth Area Plan to be consistent, the City must adopt the plan into their Comprehensive Plan.

Required Changes to Zoning:

Given that the proposed future land use in the North Growth Area is only generally consistent with existing zoning, the City must update their zoning map to accurately implement this revised future land use plan.

As new land within the North Growth Area is annexed into the City of Moorhead, the City must update its zoning map to reflect the residential and mixed use nature of the proposed future land use.

10. Geologic Hazards and Soil Conditions

a. Geology - Describe the geology underlying the project area and identify and map any susceptible geologic features such as sinkholes, shallow limestone formations, unconfined/shallow aquifers, or karst conditions. Discuss any limitations of these features for the project and any effects the project could have on these features. Identify any project designs or mitigation measures to address effects to geologic features.

Surface geology over the majority of the project area is comprised of Wisconsinan Episode glacial deposits associated with glacial Lake Agassiz. These deposits are fine-grained lake sediments comprised of clay, silty clay, and silt. In the areas nearest to the Red River, alluvial deposits are found. These deposits extend between 0.5 and 1.0 miles to the east of the river. The alluvial deposits are comprised of sand and gravel, with a high percentage of organic components including woody debris.

Depth to bedrock across the project area ranges from 200 to 360 feet in depth, as observed in local well logs, with an average depth of approximately 255 feet. The uppermost bedrock units are either granite or granodiorite intrusive rocks or supracrustal mafic metavolcanics rocks, mainly basalt. No carbonate bedrock is known to exist within the project area, making the risk of karst features to be extremely unlikely.

The water supply aquifers in the area are separated from the land surface by multiple layers of clay and sandy clay deposits. The sensitivity of these aquifers to activities at the land surface is low. The greatest risk posed to the aquifer is from contamination that infiltrates through wells that are not properly constructed or through unused wells that are not properly sealed.

No other geologic hazards were identified.

b. Soils and topography - Describe the soils on the site, giving NRCS (SCS) classifications and descriptions, including limitations of soils. Describe topography, any special site conditions relating to erosion potential, soil stability or other soils limitations, such as steep slopes, highly permeable soils. Provide estimated volume and acreage of soil excavation and/or grading. Discuss impacts from project activities (distinguish between construction and operational activities) related to soils and topography. Identify measures during and after project construction to address soil limitations including stabilization, soil corrections or other measures. Erosion/sedimentation control related to stormwater runoff should be addressed in response to Item 11.b.ii.

Soils in the project area are either part of the Fargo Association or the Bearden-Colvin Association. Figure 10-1 and Table 10-1 show the NRCS soil classifications for the project area. The Bearden-Colvin soils can be somewhat problematic for development, with a higher potential for wetness due to poor drainage characteristics. These soils are not suitable for infiltration or for septic drain fields. There is a potential for perched groundwater conditions to exist where groundwater lies on top of clay-rich soils or geologic deposits.

Table 10-1: Soil Types in the AUAR Area (North)

Map Unit Symbol	Map Unit Name	Hydrologic Soil Group	Percent of Area
I16F	Fluvaguents, frequently flooded- Hapludolls complex, 0-30% slopes	A/D	1.5%
I49A	Rauville silty clay loam, 0-2% slopes, frequently flooded	B/D	0.1%
I119A	Bearden silty clay loam, 0-2% slopes	C	11.8%
I150B	Zell, fine-silty-LaDelle silt loams, 2-6% slopes	B	0.4%
I229A	Fargo silty clay, 0-1% slopes	C/D	28.6%
I233A	Fargo silty clay loam, 0-1% slopes	C/D	0.0%
I235A	Fargo silty clay, depressional, 0-1% slopes	C/D	8.6%
I248A	Wahpeton silty clay, 0-2 % slopes, occasionally flooded	C	16.6%
I248B	Wahpeton silty clay, 2-3 % slopes, occasionally flooded	C	1.3%
I248C	Wahpeton silty clay, 6-9 % slopes, occasionally flooded	C	0.3%
I293B	Cashel silty clay, 0-6% slopes, occasionally flooded	D	1.7%
I376A	Colvin silty clay loam, 0-1% slopes	C/D	3.3%
I377A	Wheatville silt loam, 0-2% slopes	C	2.5%
I383A	Overly silty clay loam, 0-2% slopes	C	1.0%
I475B	Sinai silty clay, levees, 0-6% slopes	C	0.1%
I641A	Fargo silty clay, silty substratum, 0-1% slopes	C/D	9.4%
I642A	Fargo silty clay, silty substratum, depressional, 0-1% slopes	C/D	3.5%
I795A	Lamoure silt loam, 0-2% slopes, frequently flooded	B/D	0.9%
I900A	Urban Land, 0-2% slopes		0.9%
I901A	Urban Land-Aquerts complex, 0-2% slopes		4.5%
IM-W	Miscellaneous Water		2.2%
IWa	Water		0.4%

Erosion potential across the project area is low except for the deposits along the Red River, which can experience slope failure as the river erodes at the banks. Additionally, soils have low strength, are susceptible to shrink-swell, and are corrosive to metals. These soils are generally poor for building roads, and are not suitable for basements.

Ground movement has also been reported along the Red River, when natural vegetation has been removed and the weight of structures causes underlying clays to move laterally to the river banks, causing the overlying ground to fill in for the clays that have moved. To reduce the risks for ground movement, it has been recommended that development not take place within 500-1000 feet of the river. More site-specific studies may be required for construction planned near the river.

MITIGATION STRATEGIES

If shallow groundwater or wet soils are encountered that require dewatering in excess of 10,000 gallons per day or 1 million gallons per year, a MDNR water appropriation permit will be required before dewatering can begin.

Individual homes with basements should have sump pumps and granular backfill, and lots should be graded to properly drain. For roads, geotextile should be utilized to add strength, and a granular base should be used to add strength and drainage. Use of drain tiles should

also be considered. Use of metal pipes should be avoided where possible. Exposed metal should be wrapped with polywrap to limit exposure and reduce corrosion.

Prior to construction taking place in the vicinity of the river, an analysis of site-specific soil conditions should be undertaken to determine the likelihood of soil erosion and ground movement.

11. Water Resources

a. Describe surface water and groundwater features on or near the site in a.i. and a.ii. below.

i. Surface water - lakes, streams, wetlands, intermittent channels, and county/judicial ditches. Include any special designations such as public waters, trout stream/lake, wildlife lakes, migratory waterfowl feeding/resting lake, and outstanding resource value water. Include water quality impairments or special designations listed on the current MPCA 303d Impaired Waters List that are within 1 mile of the project. Include DNR Public Waters Inventory number(s), if any.

Surface waters in the project area are shown on Figure 11-1. Currently, the surface waters of the site include 151.96 acres of freshwater wetlands, freshwater ponds, and riverine wetlands. There is one impaired water within one mile of the AUAR area: the Red River of the North (Red River). The river makes up the western boundary of the AUAR area. The specific impairments can be seen in Table 11-1, below.

Table 11-1: Impaired Waters within One Mile of the AUAR Area.

Impaired Water	Distance to Project Boundary	Impairment
Red River of the North	0 miles – western project boundary	Mercury in Fish Tissue; PCB in Fish Tissue; Turbidity

Development in the AUAR area has the potential to decrease water quality and impact aquatic habitat in the Red River if stormwater is not managed adequately. This remains unchanged from the 2009 North Moorhead-Oakport AUAR.

MITIGATION STRATEGIES

- Better Site Design concepts found in the Minnesota Stormwater Manual will be utilized to maintain pre-development hydrology for the AUAR area development by reducing the amount of new impervious surfaces that will result in increased flows to the Red River.
- Infiltration areas will be utilized to the extent practicable to keep water onsite.
- A minimum 50-foot natural buffer will be maintained near surface waters during and after construction. When this buffer cannot be maintained, redundant downgradient sediment controls will be utilized, and the natural buffer restored with native vegetation upon completion of construction.
- Due to the impairment of the Red River, any soil that is disturbed as a result of development must be stabilized within seven days for any portion of the

development where soil disturbance will temporarily or permanently cease for seven days or more.

- If any planned development exceeds 50 acres of ground disturbance, the site-specific Stormwater Pollution Prevention Plan will be submitted to the MPCA for review and approval.

The MPCA approved a Watershed Restoration and Protection Strategy (WRAPS) report for the Upper Red River of the North watershed on December 22nd, 2017. The WRAPS process was developed by the MPCA to identify and address water quality threats in Minnesota's eighty major watersheds. The reports have two parts. The first is that impaired waters have restoration strategies, and the second is that non-impaired waters have protection strategies. A full report for the Upper Red River of the North watershed can be found here: https://www.pca.state.mn.us/sites/default/files/wq-ws4-36a.pdf, and a summary of the report is also provided by the MPCA: https://www.pca.state.mn.us/sites/default/files/wq-ws4-36b.pdf. The WRAPS summary includes information on the WRAPS program, watershed characteristics, and strategies for protection, as well as other components of this process. Best management practices (BMPs) based on sediment, phosphorus and nitrogen delivery, as well as bacteria risks, in this area, are identified. Developers should reference this report and incorporate BMPs where possible.**ii. Groundwater – aquifers, springs, seeps. Include: 1) depth to groundwater; 2) if project is within a MDH wellhead protection area; 3) identification of any onsite and/or nearby wells, including unique numbers and well logs if available. If there are no wells known on site or nearby, explain the methodology used to determine this.**

The chief water supply aquifer consists of buried sand and gravel deposits overlain by a thick layer of clay and sandy clay. The overall sensitivity of the aquifer to pollution is relatively low due to these clay deposits.

1) **Depth to groundwater:** Depth to groundwater within the project area ranges from 15 feet to 160 feet in the wells observed within the area. Average groundwater depth is 70 feet. However, since low permeability soils and clay deposits exist in the area, there is a potential for perched groundwater to be present at or near the land surface over portions of the project area.
2) **MDH wellhead protection area:** The southern end of the project area overlaps with a portion of the Drinking Water Supply Management Area (DWSMA) for the Moorhead aquifer. This DWSMA is centered around Highway 75, south of North 15th Avenue. This DWSMA has been classified as "not vulnerable" to contamination from spills or leaks that occur at or near the land surface. Development of the project area should not have a negative impact on the drinking water source for the City of Moorhead's wells.
3) **The following wells were identified on the property:** A total of 152 groundwater wells have been identified within the project area using the County Well Index database. See Figure 11-2 and Table 11-2. Most of these wells are for domestic use, but there are also some test wells, public supply wells, and irrigation wells within the area. Seven of the wells are reported to be sealed. The actual

number of wells within the project area is likely to be greater, since not all wells have been accounted for in the State's database, especially any wells drilled prior to 1975 before the State started collecting well records. Improperly constructed wells, or unused wells which haven't been sealed, can act as a pathway for contaminants to reach the aquifer. Therefore, Well Code requires that unused wells be sealed by a licensed well contractor. If any unused wells are encountered during construction activities, or if any wells are taken out of service during the course of construction, these wells must be sealed to meet the Well Code.

Table 11-2: County Well Index

Unique Number	Well Name	Depth (Feet)	Static Water Level (Feet)	Aquifer	Well Type	Listed Status
222114	Anda, Roger	267	47	QBAA	Domestic	Active
419480	Fremo, Roger	169	83	QBAA	Domestic	Active
222057	Carpenter, Mrs. Emery	198		QBAA	Domestic	Active
143139	Wendt, Gary	222	82	QBAA	Public Supply	Active
215471	Schachtschneider, Curt	216	50	MTPL	Domestic	Active
580121	Bouchard, Shirley	161	63	QBAA	Domestic	Active
166240	Bryson, Harley	141	70	QBAA	Domestic	Active
147217	Hurner, Wesley	137	69	QBAA	Domestic	Active
166540	Davis, Norman	162	26	QBAA	Domestic	Active
102637	Fisher, Robert Tw-3	272			Test Well	Active
107297	Holm, John	242	62	QBAA	Domestic	Active
709940	Brentwood Acres 4	246	83	QBAA	Abandoned	Sealed
221858	Miller, W.F.	167	69	QBAA	Domestic	Active
221887	Johnson, Morlin	237	55	QBAA	Domestic	Active
221892	Lively, Bill Tw-1	287			Test Well	Active
221865	Eisert, Gaylan Tw-1	192			Test Well	Active
221885	Dockter, Glen	167	47	QBAA	Domestic	Active
221864	Eisert, Gaylan	182	127	QBAA	Domestic	Active
222124	Stern, Pete Tw-2	287			Test Well	Active
445112	Hauck, Roger	176	102	QBAA	Domestic	Active
422559	Sornsen, Jim	140	28	QBAA	Domestic	Active
143188	Rice, Mrs. Ester	231	104	QBAA	Domestic	Active
130555	Pierce, Loren No.2	168		QBAA	Domestic	Active
138851	Tullar, Dick	196	107	QBAA	Domestic	Active
221860	Peterson, Henry	148		QBAA	Domestic	Active
102636	Fisher, Robert Tw-2	270			Test Well	Active
147260	Hersrud, Don	265	32	QBAA	Domestic	Active
222122	Stern, Pete	259	61	UREG	Domestic	Active

Unique Number	Well Name	Depth (Feet)	Static Water Level (Feet)	Aquifer	Well Type	Listed Status
130580	Rick, Roy	130		QBAA	Domestic	Active
143124	Schenck, Harris	141	40	QBAA	Domestic	Active
143125	Larson, Ernest	190	152	QBUA	Domestic	Active
222056	Loock, Vernon	197	53	QBAA	Domestic	Active
107272	Asplin, Ken	347			Test Well	Active
221884	Kosen, Gary	174	69	QBAA	Domestic	Active
247075	Fremo, Roger Tw#1	272			Test Well	Sealed
143186	Winans, Jerry	264	110	QBAA	Public Supply	Active
422581	Vasek, Joe	160	42	QBAA	Domestic	Active
409235	Tortorice, Anthony	274	99	QBAA	Domestic	Active
221869	Bakken, Gordon	205	80	QBAA	Domestic	Active
221861	Chezick, Fred	135	38	QBAA	Domestic	Active
222024	Jorgensen, H.+G.	160	47	QBAA	Domestic	Active
221888	Provonost, Gerald	189		QBAA	Domestic	Active
221893	Coust, Skippy #2	263	55	QBAA	Domestic	Active
191586	Beaton, John	146	51	QBAA	Domestic	Active
163367	Cowden, Walter	130	46	QBAA	Domestic	Active
221868	Gauthier, Robert	248	71	QBAA	Domestic	Active
221872	Vangerud, Joel	123	18	QBAA	Domestic	Active
221891	Skippy Construction Tw-1	261			Test Well	Active
102601	Paschke, Arnold	235	69	QBAA	Abandoned	Sealed
445114	Fetzer, Alvin	167	87	QBAA	Domestic	Active
222041	Hersrud, Douglas	162	51	QBAA	Domestic	Active
221879	Meester, Ken Tw-1	222			Test Well	Active
221866	Eisert, Gaylan Tw-2	342			Test Well	Active
130597	Tullar, Dick Tw-1	172			Test Well	Sealed
215477	Atherton, Don Tw-1	230			Test Well	Active
221871	Houland, Purcell	237			Test Well	Unknown
215472	Schachtschneider, Curt T	240			Test Well	Active
221870	Houland, Purcell	219	50	QBAA	Test Well	Active
222117	Hersrud, Don Tw-1	291			Test Well	Active
222123	Sterns, Pete Tw-1	272			Test Well	Active
248062	Brentwood Acres 1	0			Public Supply	Active
221890	Coust, Skippy #1	260	58	QBAA	Domestic	Active
222125	Stern, Pete Tw-3	286			Test Well	Active
221883	Olson, Richard	187	62	QBAA	Domestic	Active
175747	Hanson, Alfred	133	90	QBAA	Domestic	Active
102639	Pierce, Loren No.1	331		UREG	Domestic	Active

Unique Number	Well Name	Depth (Feet)	Static Water Level (Feet)	Aquifer	Well Type	Listed Status
102609	Krieg, Lloyd	156		QBAA	Domestic	Active
221889	Dalby, Arvid	255	47	QBAA	Domestic	Active
248063	Brentwood Acres 2	0			Public Supply	Active
221882	Kraemer, Venal	165	80	QBAA	Domestic	Active
221878	Meester, Ken	135	77	QBAA	Domestic	Active
221880	Meester, Ken Tw#2	217			Test Well	Active
511063	Nolte, Ben	53	26	QBAA	Domestic	Active
221873	Engelson, Floyd	158		QBAA	Domestic	Active
221886	Dockter, Glenn Tw-1	266			Test Well	Active
222116	Hersrud, Don	265	78	QBAA	Domestic	Active
215476	Atherton, Don	239	65	UREG	Domestic	Active
248064	Brentwood Acres 3	0			Public Supply	Active
437649	Martinson, Roy	63	27	QBAA	Domestic	Active
511078	Anderson, E.W.	158	90	QBAA	Domestic	Active
222115	Anda, Roger Tw-1	291			Test Well	Active
175746	Schaan, Mark	133	80	QBAA	Domestic	Active
222055	Gregerson, Keith	181	112	QBAA	Domestic	Active
571348	Jones, John	256	94	QBAA	Domestic	Active
222058	Carpenter, Mrs. Emery Tw	365			Test Well	Active
163192	Jamison, Robert	261	80	QBAA	Domestic	Active
143182	Wendt, Gary	255	115	QBAA	Public Supply	Active
174817	Miller, Marcella	297	96	QBAA	Domestic	Unknown
467231	Rasmussen, Dale	308	99	QBAA	Domestic	Active
163356	Nelson, Steven	208	116	QBAA	Domestic	Active
197055	Wendt, Gary	297	102	QBAA	Domestic	Active
163364	Speers, William Mrs.	227	84	QBAA	Domestic	Active
107273	Asplin, Ken	177	113	QBAA	Domestic	Active
455782	Jacobson, Dan	89	30	QBAA	Domestic	Active
243704	City of Moorhead (Dnr 14012)	130			Observation	Unknown
422580	Sather, Lyle	240	78	QBAA	Domestic	Active
422568	Duis, Jack	168	47	QBAA	Domestic	Active
422573	Dullum, Bryan	250			Test Well	Sealed
422577	Dullum, Bryan	140	44	QBAA	Domestic	Active
501525	Anderson, Charles	149	66	QBAA	Domestic	Active
409232	Grey Manor Stables	144	74	QBAA	Domestic	Active
505000	Gunderson, Don	157	50	QBAA	Domestic	Active
567833	Beutler, Duane	225	160	QBAA	Domestic	Active

Unique Number	Well Name	Depth (Feet)	Static Water Level (Feet)	Aquifer	Well Type	Listed Status
558062	Nymark, Palmer J.	347	54	QBAA	Domestic	Active
546981	Phyllis Nymark Trust	208	150	QBAA	Domestic	Active
611568	Larson, Ben	164	53	QBAA	Irrigation	Active
535433	Jensen, Greg	240	85	QBAA	Domestic	Active
511764	Rehder, Mitchell	177	90	QBAA	Domestic	Active
603803	Schwindt, Janice	198	60	QBAA	Irrigation	Active
478194	Fillipi, Jacob	155	66	QBAA	Domestic	Active
568495	Larson, Roger	115	55	QBAA	Domestic	Active
571345	Borgen, Curt	180	38	QBAA	Domestic	Active
571325	Schreiner, Jim	210	28	QBAA	Domestic	Active
590854	Victor Beutler Trust	237			Abandoned	Sealed
543947	Gee, Jerry	137	46	QBAA	Domestic	Active
654763	Bjerke, Tim	210	149	QBAA	Domestic	Active
613145	Goehring & Nelson	130	42	QBAA	Domestic	Active
685115	Winter, James	155	50	QBAA	Domestic	Active
723212	Thompson, Daniel & Shila	191	72	QBAA	Domestic	Active
694063	Mehling, Paul	205	123	QBAA	Domestic	Active
704425	Stoneking, Todd	182	60	QBAA	Domestic	Active
704400	Borgen, Curt	180	61	QBAA	Domestic	Active
680142	Softing, Harley	150	48	QBAA	Domestic	Active
737372	Aabye, Larry	209	57	QBAA	Domestic	Active
723243	Score, Thad	180		QBAA	Domestic	Active
746027	Nelson, Todd	310	85	QBAA	Domestic	Active
723246	Kroshus, Vernon	230	90	QBAA	Domestic	Active
221881	Severson, Entrip	164	15	QBAA	Domestic	Active
735350	Atherton, Gary	281	40	QBAA	Domestic	Active
735352	Jacobson, Marvin	157	50	QBAA	Domestic	Active
737365	Gossett, Jon	180	50	QBAA	Domestic	Active
719054	Stenland, Eunice	65	15	QBAA	Domestic	Active
704401	Borgen, Bill	190	61	QBAA	Domestic	Active
688713	Westmore, Dan	206	60	QBAA	Domestic	Active
271695	Grey Manor Stables	227			Test Well	Unknown
271690		123	18	QBAA	Unknown	Unknown
271687	Gasell, Ray	205	80	QBAA	Domestic	Unknown
271689	Anderson, George	213			Test Well	Inactive
773615	Shaskey, Todd & Deb	187	61	QBAA	Domestic	Active
221862	Staska, John G.	127			Test Well	Active
737359	Gregoire, Kent	342	89	QBAA	Domestic	Active
746074	Johnson, Mark.Laurie	196	53	QBAA	Domestic	Active

Unique Number	Well Name	Depth (Feet)	Static Water Level (Feet)	Aquifer	Well Type	Listed Status
746047	Larson, Chad	311	114	QBAA	Domestic	Active
746064	Carlson, Dennis Gene	190	47	QBAA	Domestic	Active
780803	Sharpe, Shane	190	54		Domestic	Active
784860	T and S Custom Homes, Inc.	180	55		Domestic	Active
800552	Miller, John & Joann	215	52		Domestic	Active
808869	Jacobsen, Dean	150	34		Domestic	Active
800507	P&K Construction	278	69		Domestic	Active
107285	Fedje, Arliss	250	62	QBAA	Domestic	Active
437607	Spiesz, Woodrow	198	51	QBAA	Domestic	Active

MITIGATION STRATEGIES

If shallow groundwater or wet soils are encountered that require dewatering in excess of 10,000 gallons per day or 1 million gallons per year, a MDNR water appropriation permit will be required before dewatering can begin.

Construction activities that fall inside the DWSMA for the Moorhead-Buffalo aquifer should follow best management practices to mitigate risks of contaminating the underlying aquifer. Activities should also comply with the City of Moorhead's Wellhead Protection Plan.

Any unused wells that are encountered in the project area should be sealed using a licensed well contractor.

b. Describe effects from project activities on water resources and measures to minimize or mitigate the effects in Item b.i. through Item b.iv. below.

i. Wastewater - For each of the following, describe the sources, quantities and composition of all sanitary, municipal/domestic and industrial wastewater produced or treated at the site.

1. **If the wastewater discharge is to a publicly owned treatment facility, identify any pretreatment measures and the ability of the facility to handle the added water and waste loadings, including any effects on, or required expansion of, municipal wastewater infrastructure.**
2. **If the wastewater discharge is to a subsurface sewage treatment systems (SSTS), describe the system used, the design flow, and suitability of site conditions for such a system.**
3. **If the wastewater discharge is to surface water, identify the wastewater treatment methods and identify discharge points and proposed effluent limitations to mitigate impacts. Discuss any effects to surface or groundwater from wastewater discharges.**

The City of Moorhead completed a Sanitary/Storm Water Master Plan in 2008 that investigated the future sanitary sewer needs in the area covered in this AUAR. That document is incorporated by reference and is available for review through the City of Moorhead Engineering Department. The vast majority of this area is undeveloped. The exception to this statement is part of the former Oakport Township that contains an existing sanitary sewer system. That system is sufficient to serve the existing residences plus the minor amount of infill that is expected in the area. For the remainder of the area, a new sanitary sewer system is proposed.

That system is depicted on Figure 2 of the 2008 Sanitary/Storm Water Master Plan and consists of a series of lift stations and gravity sewers that pump and convey wastewater to the City's Wastewater Treatment Facility (WWTF) located on 28th St. No just north of 15th Ave. North.

The analysis that was performed to generate the system Layout for that report was conducted using four phases. These phases were established by considering anticipated construction based on an expected logical progression of growth. Average wastewater flows were allocated to each different land use proposed as shown in Table 11-3 below. The expected wastewater flows for each land use subarea are available in the 2008 report available from the City of Moorhead Engineering Department.

Table 11-3: Average Wastewater Flows by Land Use

Land Use	Flow Allocation
Residential	300 gallons per unit per day
Commercial	1500 gallons per acre per day
Mixed Use	200 gallons per unit per day
Industrial	2000 gallons per acre per day
Public	200 gallons per acre per day
Parks	50 gallons per acre per day

The entire area will flow to four specific regional lift stations that will discharge directly into the WWTF. Flow to the regional lift stations will be by gravity trunk sewer, regional sewer, or sub-regional lift stations or in combinations. The four regions are entirely separate systems that do not rely on each other. This configuration allows for the most flexibility in development. As mentioned previously, the existing conveyance system for this area of Moorhead is very small and will be upgraded as required to account for the infill development in the Oakport area, but will not be a large factor in the construction of this portion of the overall sanitary sewer system. The staging of the sanitary sewer system construction is provided in the 2008 Master Plan available from the City of Moorhead Engineering Department

All wastewater in the City of Moorhead is transported to the WWTF. The WWTF is currently operating under its wet weather design capacity of 9 million gallons per day. However, in order for this area to be completely developed, a major expansion to the

WWTF will be needed. Based on the City's anticipated growth rate, expansion will not be needed for the next 10 years.

MITIGATION STRATEGIES

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 the site development plan review process, the City of Moorhead will monitor and verify estimated wastewater flows for general conformance to the 2008 Sanitary/Storm Water Master Plan. Each development will be responsible for: 1) Sanitary sewer connection fees related to their proposed development; 2) Proportional share of the costs of the Trunk Sanitary Sewer Components; 3) Construction of local sewer components to serve the development; and, 4) MPCA/NPDES sanitary sewer extension permits.

ii. Stormwater - Describe the quantity and quality of stormwater runoff at the site prior to and post construction. Include the routes and receiving water bodies for runoff from the site (major downstream water bodies as well as the immediate receiving waters). Discuss any environmental effects from stormwater discharges. Describe stormwater pollution prevention plans including temporary and permanent runoff controls and potential BMP site locations to manage or treat stormwater runoff. Identify specific erosion control, sedimentation control or stabilization measures to address soil limitations during and after project construction.

Surface waters in the project area are shown on Figure 11-2. Surface water generally flows to the Red River, via County ditches, the unnamed tributary, and other tributary streams and ravines. The study area contains County Ditches No. 41 and No. 67. Note that no upgrades are planned for these ditches, and that there are no other ditches that will be required for development.

Existing conditions largely consist of agricultural land use, with little structural stormwater management. Development in the project area is anticipated to increase stormwater runoff due to the increase in impervious surfaces associated with urban land uses. Under proposed conditions, a stormwater system will be implemented to address local, state, and federal requirements, as discussed below. This system will generally consist of stormwater ponds for rate control and water quality treatment; infiltration, filtration, or bioretention for volume control and water quality treatment where feasible in accordance with City code and MPCA permit requirements; and temporary erosion and sediment control features such as vegetative restoration, storm drain inlet protection, construction entrance protection, and silt fence.

Where possible, the City's Growth Area Plan (GAP) encourages stormwater to be kept on the surface and treated on-site to reduce expensive stormwater system costs, subject to site limitations. In some cases, regional stormwater treatment may be more effective. The GAP also encourages the stormwater 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 stormwater systems.

There are several planned stormwater ponds identified in the City's Storm Water Master Plan in the southern portion of the study area, generally discharging to County Ditch No. 41, as shown on Figure 11-1.

Two recent projects are of significance in this area. These projects are the BRRWD Oakport Project and the North Moorhead Flood Mitigation Project.

The Buffalo-Red River Watershed District (BRRWD) Oakport Flood Mitigation Project was constructed in response to the severe flood of 1997 that damaged over 150 homes in the Oakpart area. The overall project consisted primarily of buyouts, two ring levees, and all associated interior flood control features. The project area includes most of the land located east of the Red River with a southern boundary of the river and CSAH 22, a northern boundary of Clay County Road 93, and an easterly boundary of Clay County Road 96. The project area encompasses approximately 750 acres of land that could potentially support 1,000 homes. The project was constructed over an 8-year period starting construction 2009 and completing in 2016. The final portion of the project received FEMA certification in 2017.

The North Moorhead Flood Mitigation Project is in the preliminary design stage and was necessitated due to the incorporation of an additional area into the City of Moorhead. This project intends to provide flood protection to an area bounded generally between the Red River of the North and the RR embankment on the west side of US Hwy 75 extending from the Crystal Creek Subdivision to the McCanns 1st Subdivision. The project includes levees, a stormwater pond, and all necessary interior flood control facilities required to provide overall flood protection to this area.

Development within this area is subject to the regulations of Chapter 8 – Storm Water Management of Title 3 – Public Health and Sanitation of the City Code. The City Code incorporates the design standards in the Minnesota Stormwater Manual and National Pollutant Discharge Elimination System (NPDES) Construction Site Permit by reference. The Code calls for no increase or a reduction from pre-project conditions for stormwater volume, total suspended solids (TSS), and total phosphorus (TP) (subject to site-specific limitations and/or prohibitions), as well as for peak flows for the 2-, 10-, and 100-year storm events. To accomplish these goals of no net increase or a reduction of TSS, TP, and peak flows from pre-project conditions, developments should seek to incorporate Low Impact Design (LID) practices; LID is a stormwater management approach that helps produce conditions similar to the site's natural hydrology. Examples of LID practices include vegetated filter strips at the edges of paved surfaces, trees or swales between rows of cars in a parking lot, rain gardens, porous pavers, and green roofs. Developers will refer to the Minnesota Stormwater Manual (dated November 2005) for guidance.

Additionally, stormwater will need to be managed in accordance with the City's NPDES MS4 Stormwater Permit and Stormwater Pollution Prevention Plan (SWPPP),

Construction Site Stormwater Permit, and (for industrial sites) Industrial Stormwater Permit, as well as the requirements of the Buffalo-Red River Watershed Management District. These plans, codes, and permits provide requirements for rate control, water quality treatment, and volume control. They address both temporary and permanent stormwater management.

Most of the development in the project area is outside of the 100-year floodplain. The western portion of the project area along the Red River is within the 100-year floodplain. 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. The GAP continues Moorhead's efforts to establish a greenway along the Red River. The Red River is not part of the Wild and Scenic Rivers program or the Critical Areas program. At this time, there are no plans to construct additional in-town levees within the AUAR area.

iii. Water appropriation - Describe if the project proposes to appropriate surface or groundwater (including dewatering). Describe the source, quantity, duration, use and purpose of the water use and if a DNR water appropriation permit is required. Describe any well abandonment. If connecting to an existing municipal water supply, identify the wells to be used as a water source and any effects on, or required expansion of, municipal water infrastructure. Discuss environmental effects from water appropriation, including an assessment of the water resources available for appropriation. Identify any measures to avoid, minimize, or mitigate environmental effects from the water appropriation.

Moorhead Public Service (MPS), a municipally-owned entity, will be the source of water for the developed area. The current firm capacity of the MPS system is 11.0 MGD (million gallons per day), using three different water sources. These sources are the Red River, the Moorhead Aquifer, and the Buffalo Aquifer. Well water from the Moorhead and Buffalo aquifers supplies 5.6 MGD of the current capacity, with the Red River supplying the remain 5.4 MGD. Current water usage is approximately 5.0 MGD, with a peak demand of 9.0 MGD during summer months.

Development of the project area is anticipated to increase water demand by 6 MGD for average daily demand, with an estimated additional peak demand of 15 MGD. Therefore, the system will ultimately need to provide for an ultimate demand of 24 MGD to satisfy peak demands. Development of other portions of the City may additionally increase daily demands on the system, requiring further appropriations of surface water and groundwater to meet these demands.

The Moorhead Aquifer has historically provided groundwater to the community, but is limited in its yield due to a low recharge rate. Water levels in the Moorhead Aquifer have dropped over the past century due to continued pumping. Additional water supply needs will therefore be more dependent on the expansion of pumping from the Buffalo Aquifer and the Red River.

The Buffalo Aquifer receives a higher amount of recharge than the Moorhead Aquifer and is therefore a more sustainable source of groundwater for the coming decades. MPS, with cooperation from the DNR, has developed the Buffalo Aquifer Management Plan to help guide usage of this aquifer for future needs, especially during drought periods where the aquifer will be heavily relied upon to meet most of Moorhead's water supply needs. The plan outlines a monitoring approach to identify drought stages and provides appropriate responses to address each stage of drought that include potential water demand reductions and demand reduction actions.

MPS is planning to construct an additional well field in the Buffalo Aquifer capable of producing an additional 5.0 MGD by the year 2027. Expansion of the Red River water treatment plant is the other option for increasing water supply capacity. Assuming the Buffalo Aquifer produces an additional 5.0 MGD by 2027, the Red River may be required to supply the additional 8 MGD to meet the anticipated peak demands.

Expanding the water supply system to further utilize the Buffalo Aquifer and the Red River will require an amended Water Appropriations Permit from the Minnesota DNR. As part of this permitting process, an investigation into any possible environmental impacts of the groundwater or surface water withdrawals will need to be undertaken. At present, there are no known negative impacts identified other than the reduction in water levels of the Moorhead Aquifer. Further study will be required to demonstrate that proposed future water withdrawals will be sustainable without negatively impacting natural resources or other well owners in the vicinity.

If temporary dewatering of shallow groundwater is required as part of the project activities, and is expected to exceed 10,000 gallons per day or 1 million gallons per year, then a separate Minnesota DNR Water Appropriations permit will be required before undertaking dewatering. Any temporary dewatering activities are not expected to have an impact on nearby groundwater wells (either private or municipal).

No specific wells have been identified for abandonment as part of the project activities. As existing properties are redeveloped, however, there is a likelihood that wells on these properties may be sealed as part of those redevelopment activities. Potential wells that could be impacted are identified in Table 11-2. Other wells that are not identified in Table 11-2 may also exist within the project area if they are not accounted for in the State's database.

MITIGATION STRATEGIES

Expansion of the MPS water supply system will be required to meet anticipated water demands for the built-out project area. Expansion of the system will require appropriations of water from the Buffalo Aquifer and/or the Red River. The Buffalo Aquifer Management Plan will be used to guide future development of wells in the Buffalo Aquifer, along with management of pumping rates. A Minnesota DNR Water Appropriations permit will be required to utilize new (or expanded) sources of water. Depending on the actual number of wells that are required and the future water

demands, the permitting process will identify any additional mitigation measures needed to protect natural resources or other water supply users. Additional mitigation strategies may include additional monitoring of aquifer levels, instituting more preventative water conservation measures, and working with the DNR to predict aquifer sustainability.

If current water resources are unable to meet anticipated water demands, more aggressive water conservation and reuse will need to be implemented, including (but not limited to) temporary water sprinkling bans during peak demand periods and the use of stormwater for irrigation to reduce demands on the aquifers.

If shallow groundwater requires dewatering in excess of 10,000 gallons per day or 1 million gallons per year, a DNR water appropriation permit will be required before dewatering can begin.

Any wells abandoned during the course of project development or redevelopment will need to be sealed according to Minnesota Well Code by a licensed well contractor.

iv. Surface Waters

a) Wetlands - Describe any anticipated physical effects or alterations to wetland features such as draining, filling, permanent inundation, dredging and vegetative removal. Discuss direct and indirect environmental effects from physical modification of wetlands, including the anticipated effects that any proposed wetland alterations may have to the host watershed. Identify measures to avoid (e.g., available alternatives that were considered), minimize, or mitigate environmental effects to wetlands. Discuss whether any required compensatory wetland mitigation for unavoidable wetland impacts will occur in the same minor or major watershed, and identify those probable locations.

There are approximately 151.96 acres of wetlands within the AUAR area (Figure 11-3). Any wetlands within the AUAR area are under the jurisdiction of the USACE and the Wetland Conservation Act (WCA). Additionally, the City of Moorhead may regulate any excavation, grading, or filling in a wetland, designated flood plain, or shoreland district. Further consultation with the City, County, and appropriate Watershed Management District should be conducted during the planning phase of any future development within the AUAR area with the potential to impact wetlands.

Currently, no specific development in the AUAR area is planned; however, it is anticipated that the City will avoid impacts (e.g., dredging, filling) to wetlands to the greatest practicable extent during project-specific planning for future development.

MITIGATION STRATEGIES

Both the USACE and WCA require that impacts to wetlands be avoided and minimized to the greatest practicable extent, and that alternatives to impacts are examined. Alternatives can include a 'no build' scenario, as well as examining other potential locations for developments within the AUAR area. The applicant must provide written explanation of the chosen location, and explain why wetland impacts were unavoidable. The proposer will be required to review the development location and determine whether alternative locations are feasible within the AUAR area. Part of the review will include wetland delineation field surveys to map out the extent and spatial arrangement of wetlands and waterways within the AUAR area. The results of the wetland delineation and a Joint Application for Activities Affecting Water Resources in Minnesota (Joint Application) will be submitted to the USACE and local government unit (LGU) administering the WCA for Clay County for preliminary jurisdictional review.

Should alternative locations not be feasible, then the proposer will design the development project in a manner that will minimize and avoid wetland impacts to the greatest practicable extent. The USACE and LGU, and other appropriate stakeholders, will be consulted during this process. Currently, no specific development to the AUAR area is planned; therefore, there are no anticipated impacts to wetlands. However, should wetland impacts become necessary with development within the AUAR area, on-site wetland mitigation will be considered if there are wetland restoration opportunities located within the AUAR area that would yield wetland mitigation credit. Wetland banking will be used if on-site locations are not available and/or if agencies recommend the use of a wetland bank.

Additional mitigation strategies that may be implemented to preserve and protect surface waters include vegetative buffers, construction erosion control, and coordination with watershed district staff on watershed quality issues. Wetlands will not be utilized for stormwater treatment unless they have been mitigated for.

b) Other surface waters- Describe any anticipated physical effects or alterations to surface water features (lakes, streams, ponds, intermittent channels, county/judicial ditches) such as draining, filling, permanent inundation, dredging, diking, stream diversion, impoundment, aquatic plant removal and riparian alteration. Discuss direct and indirect environmental effects from physical modification of water features. Identify measures to avoid, minimize, or mitigate environmental effects to surface water features, including in-water Best Management Practices that are proposed to avoid or minimize turbidity/sedimentation while physically altering the water features. Discuss how the project will change the number or type of watercraft on any water body, including current and projected watercraft usage.

As with wetlands within the AUAR area, specific impacts to other surface waters are not currently proposed. It is anticipated that the City will avoid physical or direct alterations to surface water features to the greatest practicable extent with the development of the AUAR area. Additionally, best management practices and erosion and sediment control devices will be used during construction activities to prevent the flow of sediment into surface waters within or adjacent to the AUAR area, which could result in adverse effects to water quality (e.g., turbidity) and aquatic species, if present.

Due to the proximity of the Red and Buffalo rivers to the AUAR area, it is possible that the number of recreational watercraft on these rivers increases with the addition of residential developments. Industrial watercraft usage is not anticipated to increase at this time as no specific industrial development is proposed.

An intensive study on current and projected watercraft usage was not conducted as part of this AUAR. It is anticipated that recreational watercraft usage could increase as residential development increases; however, impacts are expected to be minimal. Future watercraft usage will be studied, as necessary, as specific residential developments are proposed.

12. Solid Wastes, Hazardous Wastes, Storage Tanks

a. Pre-project site conditions - Describe existing contamination or potential environmental hazards on or in close proximity to the project site such as soil or ground water contamination, abandoned dumps, closed landfills, existing or abandoned storage tanks, and hazardous liquid or gas pipelines. Discuss any potential environmental effects from pre-project site conditions that would be caused or exacerbated by project construction and operation. Identify measures to avoid, minimize or mitigate adverse effects from existing contamination or potential environmental hazards. Include development of a Contingency Plan or Response Action Plan.

A search of MPCA's What's in My Neighborhood database revealed the following aboveground storage tank (AST) and/or underground storage tank (UST) sites in the AUAR area:

- Jerrys One-Stop Convenience Store – 1500 11th St. North: Inactive petroleum UST site TS0012729
- Moorhead Country Club – 2101 River Drive North: Inactive petroleum UST site TS0014661
- Moorhead City Public Works Maintenance Garage – 700 15th Ave North: Active petroleum UST site TS0005945
- Moorhead County Shop – 1300 15th Ave North: Inactive petroleum UST site TS0005979
- Moorhead Maintenance Shop – 1304 15th Ave North: Inactive Petroleum UST site TS0006011
- American Crystal Sugar – 1700 11th St. North: Active AST & UST site TS0014451
- American Crystal Sugar – 2500 11th St. North: Active petroleum AST & UST site TS0005920
- Wood & Conn Co Inc. – 3712 Highway 75 N: Inactive petroleum UST site TS0005966

- Moorhead WWTP – 2121 28th St. North: Inactive UST site TS0005943
- Busch Agricultural Resources – 2101 26th St. S.: Active AST & UST site TS0054189

The database also revealed the following Leak Sites and/or investigation/cleanup sites present within the AUAR area which may or may not represent active or inactive AST/UST sites:

- Bert's Truck Equipment – 3804 Highway 75 N.: Closed (1995) petroleum remediation LS0008010
- Wood & Conn Co Inc. – 3712 Highway 75 N.: Closed (1991) petroleum remediation LS0004097
- Paul Carter Residence – 5900 Elm St. N.: Closed (2010) petroleum remediation LS0017927
- Atherton Farm – 7462 Oakport St. NW.: Closed (2002) petroleum remediation LS0013043
- Martin Residence – 4211 Highway 75: Closed (1997) petroleum remediation LS0010420
- Moorhead WWTP – 2121 28th St. N.: Closed (1999) petroleum remediation LS0012125
- Busch Agricultural Resources – 2101 26th St. S.: Closed (1995) petroleum remediation LS0006465
- Old Moorhead Dump – lat. 46.89258 / long. -96.74357
    - Active CERCLIS Site MND980995856
    - Inactive (1900) Site Assessment SA0007342
- American Crystal Sugar Company – lat. 46.90885 / long. -96.76147
    - Inactive (1900) site assessment SA0007341
- 2500 11th St. North:
    - Inactive (1999) Integrated Remediation LS0012264
    - Closed (1996) petroleum remediation LS0005324
    - Closed (1995) petroleum remediation LS0008391
    - Closed (1997) petroleum remediation LS0008302
    - Closed (1994) petroleum remediation LS0002154
    - Closed (1991) petroleum remediation LS0004169
    - Closed (1997) petroleum remediation LS0007718
- Moorhead City Public Works Maintenance Garage – 700 15th Ave N.: Closed (2000) petroleum remediation LS0011963
- Moorhead TACC – 1002 15th Ave N.: Closed (2003) Brownfields Voluntary Investigation and Cleanup VP16380
- Moorhead Maintenance Shop – 1304 15th Ave N.: Closed (1994) petroleum remediation LS0003140
- Moorhead County Shop – 1300 15th Ave N.: Closed (1995) petroleum remediation LS0006650

Review of the National Pipeline Mapping System (NPMS) indicated the presence of one buried natural gas pipeline in the AUAR area. The identified pipeline extends northeast to southwest across the central portion of the AUAR area from approximately the intersection of 40th Street North and 43rd Avenue North to approximately 28th Avenue North, just north of

American Crystal Sugar Company where it extends east to west along 28th Avenue North. Viking Gas Transmission Company operates the pipeline.

Prepare a Construction Contingency Plan (CCP) to address proper handling, treatment, storage, and disposal of solid wastes, hazardous materials, petroleum products, and other regulated materials/wastes that are used or generated during construction. The CCP should also establish protocols to minimize impacts to soil and groundwater in the event a release of hazardous substances or petroleum occurs during construction. Steps outlined in the CCP will be implemented in the event that previously unknown hazardous substances or petroleum products (i.e., releases not identified in presently available reports or databases) are encountered during construction activities.

If soil contamination is discovered through due diligence testing or during the course of development, the developer or other responsible party will be required to appropriately mitigate the contaminants according to the type of development planned and in compliance with MPCA rules.

b. Project related generation/storage of solid wastes - Describe solid wastes generated/stored during construction and/or operation of the project. Indicate method of disposal. Discuss potential environmental effects from solid waste handling, storage and disposal. Identify measures to avoid, minimize or mitigate adverse effects from the generation/storage of solid waste including source reduction and recycling.

Construction wastes will be byproducts from the construction of utilities, roads, and residential structures. Construction wastes will be primarily nonhazardous and can be managed as municipal solid waste (MSW) or construction/demolition debris. Through the development review process, the City will require that all MPCA and other applicable regulatory requirements be met in the management and disposal of construction-related wastes. Recycling will be strongly encouraged, but this will be the responsibility of the developer and/or the construction contractor. There are several residential and farmstead structures currently within the AUAR area; however, it is unknown at this time if the proposed development within the AUAR area will require the demolition of existing buildings.

Construction wastes will either be recycled or stored in approved containers and disposed of in the proper facilities. MSW will be managed according to MPCA and other regulatory requirements.

c. Project related use/storage of hazardous materials - Describe chemicals/hazardous materials used/stored during construction and/or operation of the project including method of storage. Indicate the number, location and size of any above or below ground tanks to store petroleum or other materials. Discuss potential environmental effects from accidental spill or release of hazardous materials. Identify measures to avoid, minimize or mitigate adverse effects from the use/storage of chemicals/hazardous materials including source reduction and recycling. Include development of a spill prevention plan.

Hazardous materials in the form of used oils/lubricants, waste paints or other materials may be used or stored during construction. Through the development review process, the City will require that all MPCA and other regulatory requirements be met.

If above or below ground tanks will be installed within the AUAR area as part of post-construction operations, all MPCA and other regulatory requirements will be met. Fueling activities during construction will comply with MPCA operating and containment requirements. Prior to construction activities a spill prevention plan will be prepared to provide best management plans to minimize and mitigated petroleum and hazardous materials spills.

d. Project related generation/storage of hazardous wastes - Describe hazardous wastes generated/stored during construction and/or operation of the project. Indicate method of disposal. Discuss potential environmental effects from hazardous waste handling, storage, and disposal. Identify measures to avoid, minimize or mitigate adverse effects from the generation/storage of hazardous waste including source reduction and recycling.

Small quantities of hazardous wastes in the form of used oils/lubricants, waste paints or other materials may be generated during construction. Small quantities of household hazardous wastes may be generated post-construction. Through the development review process, the City will require that all MPCA and other regulatory requirements be met for the generation/storage of hazardous wastes.

13. Fish, Wildlife, Plant Communities, and Sensitive Ecological Resources (rare features)

a. Describe fish and wildlife resources as well as habitats and vegetation on or near the site.

A detailed description of the land cover types within the AUAR area is provided in Question 7. 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 species 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.

Per the NLCD data the AUAR area is primarily cultivated crops and developed lands (6,650.54 acres [65%] and 2,248.10 acres [22%], respectively).

Per the NLCD data, approximately 71.9 acres (0.70%) of the future development portion of the AUAR area are upland forest and 967.94 acres (9.4%) are woody wetland/open water. Although limited, woodland, wetlands and open water within the AUAR area may constitute suitable avian migration stopover habitat. Also, grassland and pasture lands (314.4 acres [3.0%]) within the AUAR area may provide suitable nesting habitat for birds. Therefore, there is potential for migratory birds to be present within the AUAR area during the spring, summer, and fall. In addition, a few species may winter in the AUAR area; common wintering species in Minnesota include the northern cardinal and the common

redpoll.

In addition, the open water and wetland features within the AUAR area may provide suitable habitat for some aquatic species, including fish, frogs and toads. It is anticipated that the wetland and open water support a limited diversity of aquatic species due to the isolation of these features. The woodlands, wetlands and open water located within and near the AUAR area may contain suitable summer habitat and drinking sources for bat species.

b. Describe rare features such as state-listed (endangered, threatened or special concern) species, native plant communities, Minnesota County Biological Survey Sites of Biodiversity Significance, and other sensitive ecological resources on or within close proximity to the site. Provide the license agreement number (LA-879) and/or correspondence number (ERDB) from which the data were obtained and attach the Natural Heritage letter from the DNR. Indicate if any additional habitat or species survey work has been conducted within the site and describe the results.

Federally Listed Threatened and Endangered Species

Per a review of the U.S. Fish and Wildlife Service's (USFWS's) Endangered Species website[2], there are three federally listed species with geographic ranges that include Clay County:

- Northern long-eared bat (*Myotis septentrionalis*) – Threatened
- Dakota skipper (*Hesperia dacotae*) – Threatened
- Rusty patched bumble bee (*Bombus affinis*) – Endangered

The northern long-eared bat (NLEB) is a commonly encountered species throughout the majority of the Midwest, being commonly captured in mist-net surveys (USFWS 2016a[3]). However, they are typically found in low numbers in hibernacula in the Midwest (USFWS 2016a).

In the winter, NLEB hibernate in large caves and mines that have large passages and entrances, constant temperatures, and high humidity with no air currents. No caves or structures are present within the AUAR area that would provide suitable winter habitat for this species.

In the spring, summer and fall, NLEB use a wide variety of forested habitats for roosting, foraging and traveling, and may also utilize some adjacent and interspersed non-forested habitat such as emergent wetlands and edges of fields. This species has also been found

[2] USFWS. 2015. County Distribution of Federally Listed Threatened, Endangered, Proposed, and Candidate Species. http://www.fws.gov/midwest/endangered/lists/minnesot-cty.html. Revised April 2015.

[3] USFWS. 2016a. Programmatic Biological Opinion on Final 4(d) Rule for the Northern Long-Eared Bat and Activities Excepted from Take Prohibitions. USFWS Regions 2, 3, 4, 5, & 6. January 5, 2016.

roosting in structures like barns and sheds (particularly when suitable tree roosts are unavailable). The bats emerge at dusk to forage in upland and lowland woodlots and tree-lined corridors, feeding on insects, which they catch while in flight using echolocation. This species also feeds by gleaning insects from vegetation and water surfaces (USFWS 2016a).

Roosting habitat includes forested areas with live trees and/or snags with a diameter at breast height (dbh) of at least three inches with exfoliating bark, cracks, crevices and/or other cavities. Trees are considered suitable roost trees if they meet those requirements and are located within 1,000 feet of another suitable roost tree, woodlot, or wooded fencerow (USFWS 2016a). Maternity habitat is defined as suitable summer habitat that is used by juveniles and reproductive females. After hibernation ends in late March or early April, most NLEB migrate to summer roosts. The NLEB active season is the period between emergence and hibernation from April 1 – October 31 (USFWS 2016a).

Present land use within the AUAR area is dominated by cultivated crops and developed lands (6,650.54 acres [65%] and 2,248.10 acres [22%], respectively); a trend which continues with future land use type. Isolated woody wetlands are present throughout the AUAR area, although only 32% of these wetlands are located within the future development portion of the AUAR area. The forest/trees present throughout the AUAR area are unlikely to provide suitable summer habitat for the NLEB due to their size and lack of connectivity to large, contiguous tracts of forest. The woody wetlands, open water and upland forest present throughout the AUAR area and near the site may contain suitable summer habitat and drinking sources for the NLEB.

Direct mortality from collision with construction equipment is unlikely given that construction activities will occur during daylight hours when bats would not be active. Tree clearing as a result of the proposed development scenarios may affect potentially suitable NLEB summer habitat within the AUAR area. Per a review of the USFWS's White-Nose Syndrome (WNS) Zone map dated June 30, 2017[4], Clay County, Minnesota is located within 150 miles of a location where WNS has been detected. Therefore, the AUAR area falls within the WNS buffer zone per the Final 4(d) Rule under the Endangered Species Act (ESA).

For areas within the WNS buffer zone, the incidental take (e.g., the harm, harassment or killing of a bat as a side effect of otherwise lawful actions, like tree clearing) from tree removal activities is not prohibited unless 1) it results in removing a known occupied maternity roost tree, 2) if tree removal activities occur within 150 feet of a known occupied maternity roost tree from June 1 through July 31, or 3) tree removal activities occur within 0.25 mile of a hibernaculum at any time. Tree removal activities may then proceed without a permit and there is no need to contact the USFWS.

Due diligence is generally required to determine if a maternity roost tree or a hibernaculum is on the property; however, per the Final 4(d) Rule, private landowners are not required to

[4] USFWS. 2017b. White-Nose Syndrome Zone Around WNS/Pd Positive Counties/Districts. http://www.fws.gov/Midwest/endangered/mammals/nleb/pdf/WNSZone.pdf. June 30, 2017.

conduct surveys on their lands. In Minnesota, the MDNR maintains records of maternity roost trees or a hibernaculum within its Natural Heritage Inventory System (NHIS) database.

No field surveys for potential roost trees were conducted as part of this assessment; therefore, it is unknown whether suitable roost trees occur in or near the AUAR area. Upon review of the MDNR NHIS database under license agreement LA-879, there are no records of NLEB maternity roost trees or a hibernaculum within the AUAR area or its vicinity.

As there are no records of NLEB maternity roost trees or a hibernaculum within the AUAR area or a 0.25-mile buffer, incidental take of NLEB as a result of tree removal activities is not prohibited under the Final 4(d) Rule under the ESA.

The Dakota skipper is a small butterfly that lives in high-quality mixed and tallgrass prairie. This habitat type is unlikely to be reestablished on a site that has been plowed (e.g., used for agricultural purposes, cropland). According to the USFWS, this species is almost always absent from overgrazed and otherwise degraded prairies. The AUAR area is primarily cultivated crops and developed land; therefore, suitable Dakota skipper habitat is not present within the AUAR area. Subsequently, it is expected that the Project will have no effect on the Dakota skipper. Species-specific surveys are not anticipated to be required for Project development.

The rusty patched bumble bee (RPBB) is known to inhabit prairies, grasslands, wetlands, woodlands, agricultural areas, and residential parks and gardens. Specifically, the RPBB has been reported to inhabit grasslands with flowering plants from April through October, underground and abandoned rodent cavities or clumps of grasses above ground as nesting sites, and undisturbed soil for hibernating queens to overwinter (USFWS 2017). It is active from April to September and needs a constant source of floral resources throughout that time period. A review of the USFWS RPBB map indicates that the AUAR area is not within an area identified as where the RPBB may be present; however, as per correspondence with the MDNR, an occurrence of the RPBB was recently documented in the AUAR vicinity. A survey to confirm the presence or absence of the RPBB was not conducted for the purpose of this AUAR.

Migratory Birds

Construction activities and development within the AUAR area have the potential to impact birds protected under the Migratory Bird Treaty Act (MBTA). The MBTA makes it illegal for anyone to take (i.e., to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct) any migratory bird, or the parts, nests, or eggs of such a bird except under the terms of a valid permit issued pursuant to Federal regulations.

Under the MBTA, construction activities in grassland, roadsides, wetland, riparian (stream), shrubland, or woodland habitats that would otherwise result in the taking of migratory birds, eggs, young and/or active nests should be avoided. Although the provisions of the MBTA

are applicable throughout the entire year, most migratory bird nesting activity in Minnesota occurs approximately from mid-March to August 15, per the MDNR[5].

According to the USFWS Information for Planning and Conservation (IPaC) Database[6], there are 22 migratory birds of concern with the potential to occur within the AUAR area.

State-Listed Threatened and Endangered Species

Based upon a review of the MDNR NHIS under License Agreement No. 879, there are no known records of state-listed threatened or endangered species within the AUAR area. However, the review indicated known records of two species within the vicinity of the North Growth Area:

- Garilta skipperling (*Oarisma garita*) [Threatened] – There is one record of this species, observed in 1968, to the southeast of the AUAR area. The record of the species is disputed, and listed as likely to be an accidental occurrence, as the species has been searched for many times in the area since 1968 and was never found. This species is tracked and listed as threatened in the state of Minnesota; however, due to the fact that the record is disputed, and the species hasn't been observed in the area in over 49 years, it is unlikely that development in the North Growth Area will have any effect on the Garita skipperling.

- Short-beaked arrowhead (*Sagittaria brevirostra*) [Endangered] – This plant species, observed in 1956, was observed in a park adjacent to the Red River south of the AUAR area. This species is tracked and listed as endangered in Minnesota; however, the plant has not been documented in the AUAR area or vicinity since 1956. Per the United States Department of Agriculture (USDA) species profile, the plant is an obligate wetland species. Land Cover in the AUAR area is 8.4% wetland, so it is unlikely that this species is located within the North Growth Area, especially given the wetland are categorized as woody or forested, and this plant species is typically found in herbaceous (non-wooded) wetlands. Should impacts to wetlands be proposed under future growth, wetland delineations and surveys would be required. Any occurrences of the short-beaked arrowhead within the North Growth Area would be documented at this time, and avoidance and mitigation measures could be taken, as necessary.

Based upon the above findings, protected species surveys for the short-beaked arrowhead can be conducted concurrently with any wetland delineations and surveys within the AUAR area. Surveys for the Garita skippering are not anticipated to be necessary.

[5] MDNR. 2014. Best Practices for Meeting DNR GP 2004-0001 (version 4, October 2014). http://files.dnr.state.mn.us/waters/watermgmt_section/pwpermits/gp_2004_0001_chapter1.pdf.

[6] USFWS. 2017c. Information for Planning and Conservation Database. https://ecos.fws.gov/ipac/ . Website accessed July 24, 2017.

In addition to the species listed above, two species of special concern were documented with proximity to the AUAR area. Species of special concern are not regulated by the state; however, these species are considered extremely uncommon or have unique or highly specific habitat requirements and receive careful monitoring of their status. The two species of special concern, the lake sturgeon (*Acipenser fulvescens*) and the black sandshell mussel (*Ligumia recta*) were documented within the Red River.

Per an analysis of Minnesota Biological Survey (MBS) data, there are no mapped high quality plant communities or MDNR-mapped Sites of Biodiversity Significance within the AUAR area; however, a remnant mesic prairie community exists within a railroad right-of-way to the south of the AUAR area. While the prairie community is not within the AUAR area itself, improvements to Highway 75 have the potential to impact this rare feature. Additionally, this area coincides with the Gateway Overlay district, which was created to provide a higher standard of appearance for corridors that serve as the main entrances to the community. As such, it is assumed that any impacts to the prairie community would be avoided to the greatest practicable extent under the terms of the Gateway Overlay district; however, it is recommended that consultation with the MDNR is initiated during development to ensure the protection of this rare community.

c. Discuss how the identified fish, wildlife, plant communities, rare features and ecosystems may be affected by the project. Include a discussion on introduction and spread of invasive species from the project construction and operation. Separately discuss effects to known threatened and endangered species.

Development of the North Growth Area is not anticipated to have a significant adverse effect on federally or state-listed threatened and endangered species.

The project has the potential to impact the RPBB during construction (e.g., habitat removal as a result of earth disturbing activities; entanglement in erosion control mesh). The City of Moorhead is committed to planting native prairie species. Therefore, development has the potential to positively impact RPBB populations as it is anticipated that pollinator-friendly landscaping (e.g., native flowering plants, grasses, trees) will be utilized in the landscape design to promote pollinator health within the community.

Although a portion (934.5 acres) of the AUAR area may provide suitable summer habitat for the NLEB, under the Final 4(d) Rule of the ESA, tree clearing is not prohibited as there are no records of NLEB maternity roost trees or a hibernaculum within the AUAR area or a 0.25-mile buffer.

Urban wildlife may be impacted with the removal of woodland and dry grassland within the AUAR area; however, these habitat generalist species are typically adaptive to development activities and would likely relocate to undeveloped areas in the vicinity or continue to live in the remaining undeveloped areas within the AUAR area.

Construction activities in grassland, roadsides, shrubland, or woodland habitats within the AUAR area may result in the taking of migratory birds, eggs, young and/or active nests, if present. Although the provisions of the MBTA are applicable throughout the entire year, most

migratory bird nesting activity in Minnesota occurs approximately from mid-March to August 15. When possible, removal of vegetation will occur outside of this timing window to minimize potential take of migratory birds, if present.

Construction activities that involve soil disturbance can result in the introduction and spread of invasive species. Minnesota statutes (Chapter 18) and local ordinances regulate management of noxious weeds and invasive species. Best management practices during construction activities and operation within the AUAR area will be implemented to minimize the introduction or spread of noxious weeds and invasive species at the site.

d. Identify measures that will be taken to avoid, minimize, or mitigate adverse effects to fish, wildlife, plant communities, and sensitive ecological resources.

The Proposer will limit impacts to wooded and wetland areas to the greatest practicable extent during development. Per the GAP, approximately 491.5 acres of wildlife habitat (forest, grassland, pasture, wetlands) within the future development portion of the AUAR area will be developed. The AUAR area is zoned for full development; however, wildlife habitat will be avoided where possible. The developer should consult with the MDNR prior to development and construction; however, the potential presence of these species is not anticipated to prevent development. Species-specific surveys will be conducted, if recommended or required by the MDNR, to prevent impacts to state-listed species to the greatest practicable extent.

MITIGATION STRATEGIES

If suitable RPBB habitat is proposed to be removed between April and October, surveys for the insect should be conducted between May and August to determine the presence or absence of this species, as necessary. If RPBB presence is detected, then vegetative clearing of RPBB habitat should occur after September to avoid impacts to this endangered insect. Pollinator-friendly landscaping (e.g., native flowering plants, grasses, trees) are anticipated to be utilized in the landscape design to promote pollinator health within the community.

Although there are no records of NLEB maternity roost trees or a hibernaculum within the AUAR area or a 0.25-mile buffer, when possible, tree clearing will occur outside of the NLEB pup season, June 1 through July 31. Although a field survey by a qualified biologist could determine the absence/presence of a maternity roost tree within the AUAR area; under the Final 4(d) Rule of the ESA, field surveys are not required to complete due diligence at the site. Prior to tree clearing within the AUAR area, the MDNR/USFWS-issued list of NLEB records for Minnesota[7] must be consulted to ensure activities will not 1) result in removing a known occupied maternity roost tree, 2) occur within 150 feet of a known occupied maternity roost

[7] MDNR and USFWS. 2015. Townships Containing Northern Long-eared Bat Roost Trees and/or Hibernacula. http://files.dnr.state.mn.us/eco/ereview/minnesota_nleb_township_list_and_map_20150604.pdf. April 1, 2017

tree from June 1 through July 31, or 3) occur within 0.25 mile of a hibernaculum at any time. The MDNR anticipates updating this list twice annually on April 1 and October 1.

When possible, removal of vegetation will occur outside of this timing window to minimize potential take of migratory birds, if present. If vegetation clearing cannot be avoided during the peak breeding season for migratory birds (approximately mid-March to August 15), it is recommended that a qualified biologist will conduct a pre-construction breeding bird survey within AUAR area to determine the absence or presence of breeding birds and their nests. Pre-construction breeding bird surveys may include:

1) Pre-construction surveys that occur no more than two weeks before tree and shrub clearing activities commence. The area surveyed will include the areas where potential suitable habitat has been identified and tree or shrub clearing has not been completed.
2) If an occupied nest is observed during the survey, tree and shrub clearing activities will not be permitted within a 0.12-mile buffer of the nest site during the breeding season or until the fledglings have left the area. Consult with the USFWS to avoid take of the species.

Upon completion, the survey results will be submitted to the USFWS, as appropriate. If breeding birds are not present, construction can proceed with no restrictions. If breeding birds or active nests are present, additional consultation will be required.

The results of the MDNR NHIS review are typically valid for one year. The NHIS database should be consulted prior to the commencement of construction activities within the AUAR area to identify any new records of rare or otherwise significant species, native plant communities, and other natural features within the AUAR area vicinity.

Best management practices and erosion and sediment control devices will be used during construction activities to prevent the flow of sediment into wetlands and open water within or adjacent to the AUAR area, which could result in adverse effects to water quality (e.g., turbidity) and aquatic species, if present. Wildlife-friendly erosion control materials will be used, whenever feasible (due to natural wetlands and proposed greenspace).

14. Historic Properties

Describe any historic structures, archeological sites, and/or traditional cultural properties on or in close proximity to the site. Include: 1) historic designations, 2) known artifact areas, and 3) architectural features. Attach letter received from the State Historic Preservation Office (SHPO). Discuss any anticipated effects to historic properties during project construction and operation. Identify measures that will be taken to avoid, minimize, or mitigate adverse effects to historic properties.

Eight archaeological sites (21CY0004, 21CY0018, 21CY0020, 21CY0021, 21CY0067, 21CYg, and 21Cyr) and 11 architectural resources (CY-MHC-058, CY-MHC-064, CY-MHC-093, CY-MHC-098, CY-MHC-099, CY-OAK-001, CY-OAK-004, CY-OAK-006, CY-OAK-007, CY-OAK-008, and CY-OAK-009) are located within the project area. An additional 12 archaeological sites and 98 architectural resources are located within a mile of the project area. The archaeological sites are primarily lithic scatters and artifact scatters that date to the Woodland Period and Post

Contact period representing urban and railroad development. None of the sites have been determined eligible or have been listed on the National Register of Historic Places.

The architectural resources within the project area and the vicinity represent houses, churches, commercial buildings including warehouses, depots, plants, and administration buildings, cemeteries, bridges, and railroads. Of the ten resources within the project area the Randolph M. Probstfield House (CY-OAK-001) is listed on the NRHP and the American Crystal Sugar Plant (CY-MHC-058) is considered eligible. Of the 99 resources, outside of the project area nine have been listed (CY-MHC-002, CY-MHC-013, CY-MHC-016, CY-MHC-028, CY-MHC-031, CY-MHC-040, CY-MHC-041, CY-MHC-046, CY-MHC-066) on the NRHP and four are considered eligible (CY-MHC-025, CY-MHC-056, CY-MHC-061, CY-MHC-094). One has been determined not eligible (CY-MHC-065 and the remaining resources have not been evaluated.

No archaeological surveys were conducted during the preparation of this AUAR as no specific development project is planned at this time. However, due to the nature and location of the North growth area, when development occurs, a Phase IA literature review and archaeological assessment should be completed per development project to assess the potential for intact archaeological sites in the development area. Based on the results of the Phase IA review and assessment, a Phase I archaeological survey may be required.

MITIGATION STRATEGIES

If proposed development should be conducted within 150 feet of a previously recorded archaeological site or architectural resource a Phase II evaluation should be conducted to provide recommendations for eligibility of the site or resource if it cannot be avoided. For the architectural resources, visual effects should be conducted for the listed and eligible sites.

15. Visual

Describe any scenic views or vistas on or near the project site. Describe any project related visual effects such as vapor plumes or glare from intense lights. Discuss the potential visual effects from the project. Identify any measures to avoid, minimize, or mitigate visual effects.

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.

16. Air

a. Stationary source emissions - Describe the type, sources, quantities and compositions of any emissions from stationary sources such as boilers or exhaust stacks. Include any hazardous air pollutants, criteria pollutants, and any greenhouse gases. Discuss effects to air quality including any sensitive receptors, human health or applicable regulatory criteria. Include a discussion of any methods used assess the project's effect on air quality and the results of that assessment. Identify pollution control equipment and other measures that will be taken to avoid, minimize, or mitigate adverse effects from stationary source emissions.

Stationary source emissions will not be produced by the project.

b. Vehicle emissions - Describe the effect of the project's traffic generation on air emissions. Discuss the project's vehicle-related emissions effect on air quality. Identify measures (e.g. traffic operational improvements, diesel idling minimization plan) that will be taken to minimize or mitigate vehicle-related emissions.

Section 109(b) of the Clean Air Act (CAA) requires that the EPA establish National Ambient Air Quality Standards (NAAQS) "requisite to protect" public health and public welfare (40 CFR Part 50). The CAA identifies two class types of NAAQS: primary standards and secondary standards. Primary standards are limits set to protect the public health of the most sensitive populations, such as asthmatics, children and the elderly. Secondary standards are limits set to protect public welfare, such as protection against visibility impairment or damage to vegetation, wildlife and structures. The CAA requires the EPA to periodically review and, if new data indicate, update the NAAQS.

The EPA has promulgated NAAQS for six criteria pollutants: ozone, particulate matter (PM), sulfur dioxide (SO2), nitrogen dioxide (NO2), carbon monoxide (CO) and lead. Standards for PM are categorized on the size of the PM based on the aerodynamic diameter of the PM. PM10 represents particulate matter with an aerodynamic diameter of less than 10 microns and PM2.5 is PM with a diameter of less than 2.5 microns.

In Minnesota, the Minnesota Pollution Control Agency (MPCA) monitors and regulates air pollution. MPCA is required to develop regulations, referred to as the State Implementation Plan (SIP) to outline how the areas under their jurisdiction will attain and maintain ambient air concentration levels in compliance with the NAAQS. Within their SIP, MPCA has developed state air quality regulations under Section 7009.0800 of the Minnesota Administrative Rules. In general, the state standards mirror the USEPA NAAQS. The primary difference is the state has developed ambient air quality standards for hydrogen sulfide (H2S).

Minnesota had several areas designated as nonattainment for lead, PM10, and SO2 during the 1980s and 1990s. These areas were primarily located in the seven-county Twin Cities Metropolitan Area. These areas were all redesignated to attainment by 2002 and are now considered maintenance areas, which require the state to regularly assess monitoring information, changes to emission patterns, and perform evaluation of the SIP requirements to assure that the areas continue to maintain their attainment status. The remainder of the state including the Moorhead area has been designated as attainment for all pollutants.

Carbon monoxide (CO) levels are elevated near roadway intersections due to the emission of this pollutant from the vehicles idling and passing by. The State of Minnesota has ambient CO standards that are designed to protect human health and the environment. The state standards are:

- 1-hour average: 30 parts per million (ppm); and
- 8-hour average: 9 ppm.

Concentrations near or above these levels are most likely to occur near intersections that are congested and have high traffic volumes. The Minnesota Department of

Transportation has developed a screening method designed to identify intersections that may cause a CO impact above the State standards. This method requires an intersection to be heavily congested (Level of Service F) and have a traffic volume of greater than 140,000 vehicles per day in order to be considered to have the potential for causing CO air pollution problems. None of the intersections in the AUAR area exceed the criteria under any of the scenarios that would lead to a violation of the air quality standards. For the full build-out scenario, the highest volume intersections have volumes around 6,000 – 7,000 vehicles in the peak hour. With a K-factor[8] of 0.10, this translates into a daily volume of approximately 70,000 vehicles per day, which is lower than the threshold of 140,000 vehicles (see Section 9 of the Traffic Impact Study in Appendix D)

Sulfur dioxide emissions are primarily associated with power plants and specific industrial activities. Automotive traffic is not a major source of sulfur dioxide emissions. Diesel engines were formerly a source of sulfur dioxide emissions, but recent federal air pollution regulations mandated that all on-road diesel fuel be converted to ultra-low sulfur diesel, which contains less than 15 parts per million sulfur. Therefore, truck traffic is no longer a significant source of sulfur dioxide emissions.

Like carbon monoxide, nitrogen dioxide emissions are elevated near roadway intersections due to the emission of this pollutant from the vehicles idling and passing by. MPCA has performed long time ambient air monitoring for this pollutant throughout the Twin Cities area at heavily trafficked intersections. No exceedances of the NAAQS for nitrogen dioxide have been monitored. Therefore, none of the intersections in the AUAR area under any of the traffic scenarios would result in a violation of the air quality standard for nitrogen dioxide.

Nitrogen dioxide and volatile organic compound emissions from vehicular traffic contribute to the formation of ozone. Ground-level ozone, also known as smog, is produced on hot, sunny days by a chemical reaction between VOCs and oxides of nitrogen (NOx). VOCs are released from activities such as the use of paints and solvents. NOx emissions are released from motor vehicles, power plants, and other activities that require fuel combustion. Levels of ozone are dependent on the amount of VOCs and NOx in the air as well as weather conditions including sunlight, temperature, and wind speed and direction. In Minnesota, the highest levels of ozone occur on hot and sunny summer days. Due to the conditions necessary to create ozone, ozone is considered a regional pollutant and is not associated with small, localized changes in traffic conditions. Since the development being analyzed within this AUAR will not result in any significant changes to the vehicular emissions within the Moorhead metropolitan area and the Moorhead area currently attains the ozone NAAQS, the nitrogen dioxide and volatile organic compound traffic emissions associated with this project would not result in a violation of the air quality standard for ozone.

[8] K-factor is defined as the proportion of annual average daily traffic occurring in an hour.

Vehicular traffic is not a significant contributor to particulate or lead emissions. Lead was removed as an additive from gasoline in the 1970s. Federal regulations have been implemented over the past two decades that have substantially reduced particulate emissions from diesel truck engines. Continued turnover of current truck fleets in the coming years will result in reductions of diesel particulate impacts from vehicular traffic throughout the nation and within the AUAR study area. Since the AUAR study area currently attains the lead and particulate matter NAAQS, this project will not result in a violation of the air quality standards.

c. Dust and odors - Describe sources, characteristics, duration, quantities, and intensity of dust and odors generated during project construction and operation. (Fugitive dust may be discussed under item 16a). Discuss the effect of dust and odors in the vicinity of the project including nearby sensitive receptors and quality of life. Identify measures that will be taken to minimize or mitigate the effects of dust and odors.

Per EQB Guidance, dust and odors need not be addressed in an AUAR (as no industrial uses are proposed) unless there is some unusual reason to do so. There is no unusual reason to do so with respect to the proposed project.

17. Noise

Describe sources, characteristics, duration, quantities, and intensity of noise generated during project construction and operation. Discuss the effect of noise in the vicinity of the project including 1) existing noise levels/sources in the area, 2) nearby sensitive receptors, 3) conformance to state noise standards, and 4) quality of life. Identify measures that will be taken to minimize or mitigate the effects of noise.

Minnesota Rules Chapter 7030 provides the Minnesota standards for noise. These standards describe the limiting levels of sound established on the basis of present knowledge for the preservation of health and welfare. These standards are designed to be consistent with sleep, speech, annoyance, and hearing conservation requirements for receivers within areas grouped according to land use activities. The Minnesota standards are as follows:

Table 17-1: Minnesota Pollution Control Agency State Noise Standards

Land Use	Code	Day (7:00 a.m. - 10:00 p.m.) dBA		Night (10:00 p.m. - 7:00 a.m.) dBA	
Residential	NAC-1	L10 of 65	L50 of 60	L10 of 55	L50 of 50
Commercial	NAC-2	L10 of 70	L50 of 65	L10 of 70	L50 of 65
Industrial	NAC-3	L10 of 80	L50 of 75	L10 of 80	L50 of 75

Notes:
1. NAC-1 includes household units, transient lodging and hotels, educational, religious, cultural entertainment, camping and picnicking land uses.
2. NAC-2 includes retail and restaurants, transportation terminals, professional offices, parks, recreational and amusement land uses.
3. NAC-3 includes industrial, manufacturing, transportation facilities (except terminals), and utilities land uses.
4. From Minnesota Pollution Control Agency, Minn. Rules sec. 7030.0040

L10 means the sound level which is exceeded for 10 percent of the time for a one-hour period. L50 means the sound level that is exceeded 50 percent of the time for a one-hour period. Sound

levels are expressed in dBA. A dBA is a unit of sound level expressed in decibels and weighted for the purpose of approximating the human response to sound.

Minnesota Statutes, Section 116.07, Subd. 2a, exempt noise from local and county roads from the requirements of these noise rules unless full control of access to the road has been acquired. This statute exempts noise from all roadways in the AUAR area.

18. Transportation

a. Describe traffic-related aspects of project construction and operation. Include: 1) existing and proposed additional parking spaces, 2) estimated total average daily traffic generated, 3) estimated maximum peak hour traffic generated and time of occurrence, 4) indicate source of trip generation rates used in the estimates, and 5) availability of transit and/or other alternative transportation modes.

The transportation system in the Fargo-Moorhead area is modeled by the Fargo-Moorhead Metropolitan Council of Governments (Metro COG). The previous 2009 AUAR for North Moorhead and Oakport Township utilized Metro COG's Long Range Transportation Plan (LRTP) which forecasted conditions out to the year 2030. An updated LRTP was developed, reviewed, and approved by the Fargo-Moorhead Metropolitan Council of Governments (Metro COG), Minnesota Department of Transportation (MnDOT), Federal Highway Administration (FHWA), Clay County, and the City of Moorhead in 2014 to guide how the region grows and invests transportation dollars out to the year 2040. This AUAR is updated to reflect the latest LRTP updates. The 2014 LRTP can be accessed using the following link http://fmmetrocog.org/new/index.php?id=127.

The anticipated buildout of the project area is assumed to be 50 years or more with no specific developments being considered. Therefore, traffic-related development specifics such as parking spaces were not considered. Traffic impact analysis will need to be conducted periodically as development occurs to re-assess impacts to the transportation system.

The growth assumptions outlined in the 2014 LRTP for population, households, and persons per household are shown below. Moorhead is projected to continue a steady growth pattern with a 2010 to 2040 population and household change of over forty percent.

Table 18-1: 2014 LRTP Household/Population Projections

Growth Category	2010	2040	% Change 2010-2040
Population	38065	54990	44.5%
Households	14304	21350	49.26%
Persons Per Household	2.66	2.58	-3.01%

Existing Metro COG travel demand model (TDM) results from the 2014 LRTP were used to reflect traffic conditions in the North growth area. 2040 model runs from the 2014 LRTP were utilized to document capacity issues, identify mitigation methods, and define network revisions.

Table 18-2: TDM Forecasted AADT

Link	Functional Class	2010 Existing Daily Volumes	2020 Forecasted Daily Volumes on E + C Network[a]	2040 Forecasted Daily Volumes on Fiscally Constrained Network[b]
70th Ave N	Collector	300	300	100
Wall St N	Minor Arterial	4,400	4,700	6,400
57th Ave N	Collector	1,700	1,600	2,600
28th Ave N	Collector	1,900	3,400	4,300
15th Ave NW	Minor Arterial	3,400[c]	3,600	4,100
2nd St N	Collector	0	0	0
Highway 3 (70th Ave N to 49th Ave N)	Collector	2,200	2,100	2,300
Highway 3 (49th Ave N Project Limits)	Minor Arterial	3,600	4,200	4,400
Highway 75 (Project Limits to 40th Ave N)	Minor Arterial	4,500	5,400	5,500
Highway 75 (40th Ave N to Project Limits)	Principal Arterial	4,800	5,400	6,500
28th St N	Collector	400	400	1,600
34th St N	Minor Arterial	1,400	1,700	2,100
40th St N	Collector	200	100	200

[a] E+C Network = Existing Plus Committed Network is defined as the existing roadway network combined with the projects currently programmed or budgeted out to the year 2020.

[b] Fiscally Constrained Network is defined as the roadway network feasible within the budgeting constraints of current revenues out to the full 2040 build horizon.

[c] Traffic counts for the 2014 LRTP were taken in 2010. The 15th Avenue Toll Bridge was removed in February 2015. Metro COG completed counts in 2015 after the toll was removed. In 2015, the west leg of 15th Avenue North and 11th Street North had an ADT of 8,135 or an approximate 40% increase in ADT from 2010. These additional traffic volumes are not expected to create capacity issues within the 2040 planning horizon.

The forecasted Annual Average Daily Traffic (AADT) volumes on links within the North growth area is shown in Table 18.2. The percentage of AADT occurring during the peak hour was estimated using MnDOT Automated Traffic Recorder (ATR) 43, which is in a similar area type along TH 10. Table 18.3 shows that peak hour traffic was determined to be 12.0 percent of AADT occurring on a weekday between 3-5PM. Directional distribution in the peak direction was determined to be 63%.

Table 18-3: Percent of AADT in Peak Hour for North Growth Area

ATR #	% of AADT in Peak Hour by Year					
	2012	2013	2014	2015	2016	Average
043	N/A	N/A	11.9	12.2	12.0	12.0

The Metro COG TDM forecasts the magnitude of additional trips added to the network by applying trip production equations to demographic and socioeconomic data. The resulting trip production rates are balanced with attraction rates obtained from NCHRP 714 and the ITE trip generation manual. Forecasted trips are distributed and assigned to the network to generate future AADT. Forecasted AADT for a 2040 buildout is shown in Table 18.2.

Metro Area Transit Bus (MATBUS) is the public transportation system serving the communities of Fargo ND, West Fargo ND, Moorhead MN, and Dilworth MN. They currently provide 24 fixed routes linking riders to employment, education, healthcare, entertainment and more. Currently route 4, 6, and 9 operate adjacent to the study area.

Route 4 runs parallel to the project limits at 15th Avenue North and 11th Street North, continuing 4 blocks east until 14th Street North where it veers to the south outside the growth area. Bus stops along this segment include 15th Avenue North and 11th Street North, 15th Avenue North and 12th Street North, and 15th Avenue North and 13 ½ Street North.

Route 4, 6, and 9 run parallel to the project limits in Dilworth, MN at the intersection of 8th Avenue North and 34th Street North. Each route makes a loop around Walmart before continuing south along 34th Street North. Although the Walmart building is outside the project limits, the stops at this location are immediately adjacent to the project boundary. All three routes stop at the north Walmart Parking lot (shelter 108) and route 4 stops at 8th Avenue North near 36th Street Southwest. Additional transit options include 24/7 taxi cab services, Uber, and a variety of transport options for disabled or senior residents.

As outlined in the 2014 LRTP, expanded transit coverage in 2040 is expected to serve areas at the southern fringe of the north growth area with shorter 15-minute headways. Additional transit routes serving the proposed growth areas are recommended as full buildout occurs and densities increase. Transit coverage for 2020 and 2040 is shown in Figure 18.4.

Burlington Northern Santa Fe (BNSF) has an existing railroad line parallel to MN Highway 75 on the west side of the roadway. Currently, the railroad does not utilize this line north of 28th Avenue North.

b. ***Discuss the effect on traffic congestion on affected roads, and describe any traffic improvements necessary. The analysis must discuss the project's impact on the regional transportation system. If the peak hour traffic generated exceeds 250 vehicles or the total daily trips exceed 2,500, a traffic impact study must be prepared as a part of the EAW. Use the format and procedures described in the Minnesota Department of Transportation's Access Management Manual, Chapter 5 or a similar local guidance.***

The impact to the regional transportation system was assessed using the Metro COG's TDM developed as part of the 2014 LRTP. The model was updated in 2013 considering committed improvements out to the year 2040. Forecasted traffic through 2040 did not suggest major impacts to the transportation system.

Fargo-Moorhead Metro COG's TDM assigns capacity based on the functional class, number of lanes, and intersection configuration. Base capacities for each functional class were modified according to the number of lanes. Link volume to capacity ratios for existing roadways within the east growth area are summarized in Table 18.4.

Table 18-4: Link Volume to Capacity Ratios 2040 (2014 LRTP)

Link	Functional Class	V/C 2010 Existing Daily	V/C 2020 Forecasted Daily Volumes on E + C Network	V/C 2040 Forecasted Daily on Fiscally Constrained Network
70th Ave N	Collector	0.04	0.04	0.01
Wall St N	Minor Arterial	0.39	0.42	0.57
57th Ave N	Collector	0.23	0.21	0.35
28th Ave N	Collector	0.25	0.45	0.57
15th Ave NW	Minor Arterial	0.30	0.32	0.36
2nd St N	Collector	0.00	0.00	0.00
Highway 3 (70th Ave N to 49th Ave N)	Collector	0.29	0.28	0.31
Highway 3 (49th Ave N Project Limits)	Minor Arterial	0.32	0.37	0.39
Highway 75 (Project Limits to 40th Ave N)	Minor Arterial	0.40	0.48	0.49
Highway 75 (40th Ave N to Project Limits)	Principal Arterial	0.29	0.32	0.39
28th St N	Collector	0.05	0.05	0.21
34th St N	Minor Arterial	0.12	0.15	0.19
40th St N	Collector	0.03	0.01	0.03

Table 18.4 shows that links within the north growth area would operate below capacity using projected traffic through 2040. A demand-to-capacity ratio less than 0.85 suggests that the links are operating below capacity with no excessive delay experienced. Poor operation is indicated by demand-to-capacity ratio between 0.95 and 1.0.

c. Identify measures that will be taken to minimize or mitigate project-related transportation effects.

Proposed roadway improvements needed to accommodate full buildout of the north growth area beyond 2040 are summarized below:

- Upgrade of 70th Avenue N between Oakport Street N and 40th Street N to collector.
- Construction of 57th Avenue N as a local collector.
- Upgrade of 43rd Avenue N between 11th Street N and 40th Street N to collector.
- Construction of 8th Avenue N from 28th Street North to 34th Street N and from 40th Street North east to the existing roadway termination point.
- Construction of Oakport St North as a collector to 80th Avenue N.
- Upgrade 28th Street N to a collector from 43rd Avenue N to 70th Avenue N.
- Construction of 34th Street N from 28th Avenue N to Wall Street Avenue as a minor arterial.
- Upgrade of 40th Street N as a local collector from 28th Avenue to 43rd Avenue.

19. Cumulative Potential Effects

Cumulative potential effects are addressed throughout the AUAR as the AUAR reviews the potential impacts of development scenarios that will include multiple projects that will develop through the growth year 2040. The response to this question specifically addresses reasonably foreseeable projects that may interact with development in the AUAR area.

a. Describe the geographic scales and timeframes of the project related environmental effects that could combine with other environmental effects resulting in cumulative potential effects.

Full build-out of the AUAR area is expected to occur up to and through the growth year 2040, depending on market conditions. The geographic scale of potential effects is assumed to be a one-mile radius of the AUAR area. No significant developments have been identified within this area and none were mentioned by any agency representatives who attended the scoping informational meeting. Anticipated cumulative impacts are associated with normal growth and development and they will be addressed in the 2040 Comprehensive Plan Update and the five-year updates of the AUAR.

b. Describe any reasonably foreseeable future projects (for which a basis of expectation has been laid) that may interact with environmental effects of the proposed project within the geographic scales and timeframes identified above.

All cumulative impacts associated with anticipated development within the AUAR area have been accounted for within the responses to AUAR questions. In addition, the MDNR has requested that the Fargo-Moorhead Diversion project (Diversion project) be included as a reasonably foreseeable project that may interact with the environmental effects of development of the North growth area. The Diversion project proposes to construct a 36-mile long channel to divert flood waters from the Red River during times of flooding. Construction of the Diversion project will reduce the 100-year flood event from 42.4 feet to

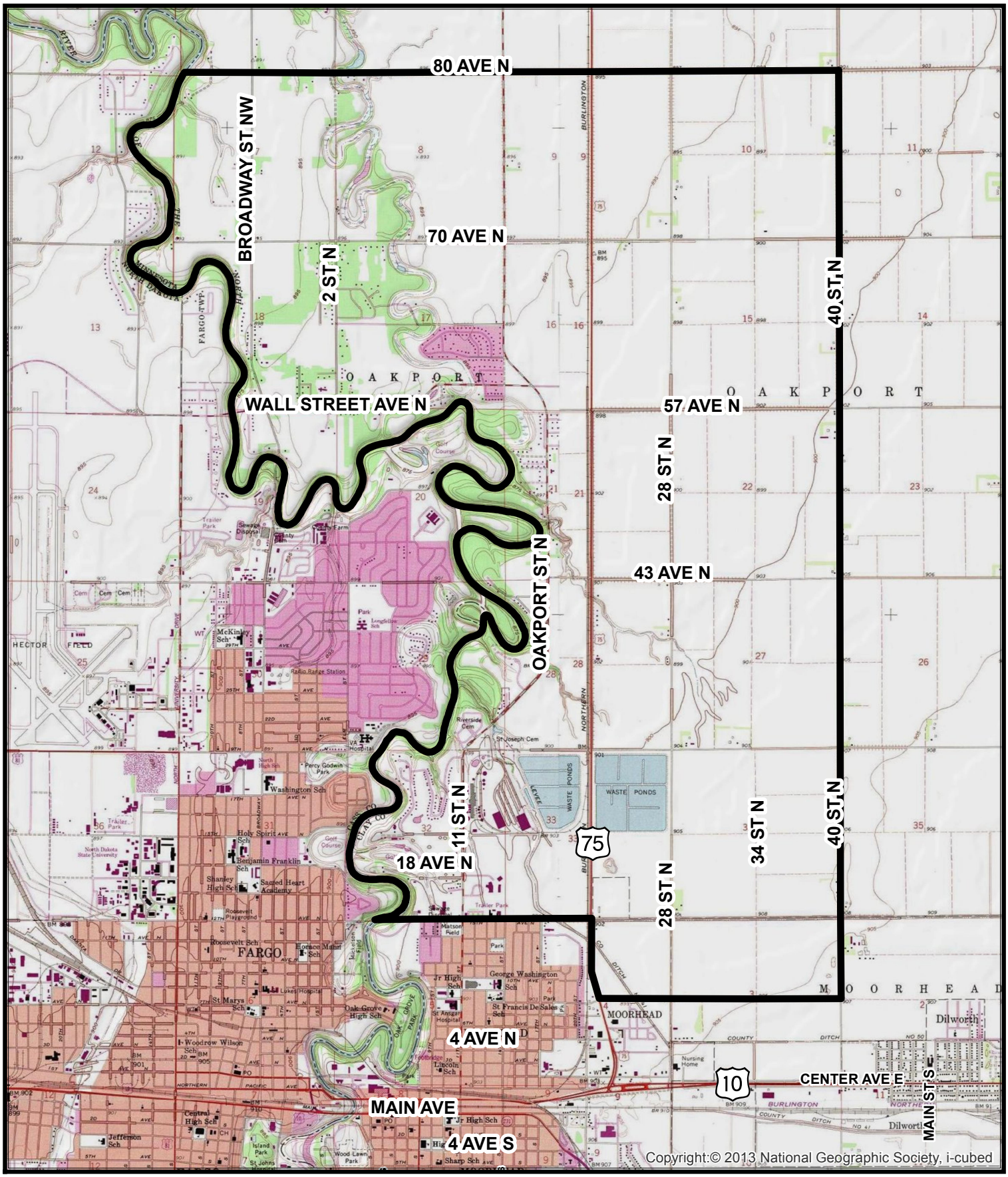
35 feet at the Fargo gage. The Diversion project reroutes the floodwaters from the Red River starting approximately four miles south of the confluence of the Red and Wild Rice Rivers, and extends west and north around the cities of Horace, Fargo, West Fargo and Harwood, North Dakota. The water would re-enter the Red River north of the confluence of the Red and Sheyenne Rivers near the city of Georgetown, Minnesota. The reduction in floodwater levels that may occur as a result of the Diversion project has the potential to affect the North Growth Area; however, impacts are anticipated to be positive (e.g., reduced flooding during springtime and rain events, reduced potential for flooding of the sanitary sewers, fewer impacts to developed properties in the Red River floodplain). Negative interactions between the projects are not anticipated; however, the Diversion project will be considered during the planning stages of development associated with the North Growth Area.

The Diversion project could affect development and zoning could change with this flood protection project. However, land use changes were considered in the AUAR analysis and were addressed previously. Should zoning changes occur, these will be reflected in the City's ordinances, and adhered to by the developer. The developer should also consider changes that are required under the FEMA National Flood Insurance Program, and adhere to these federal regulations. The development of the East and South growth areas (submitted for review as separate AUARs) should also be considered with the development of the North growth area. Surrounding jurisdictions have been contacted and no significant developments have been identified.

c. Discuss the nature of the cumulative potential effects and summarize any other available information relevant to determining whether there is potential for significant environmental effects due to these cumulative effects.

All cumulative impacts associated with known proposed development within the AUAR area have been accounted for within the responses to the EAW questions contained in this AUAR.

Appendix A - Figures



USGS Map

Figure 5-1

North Moorhead/Oakport Township AUAR Update

June 6, 2017

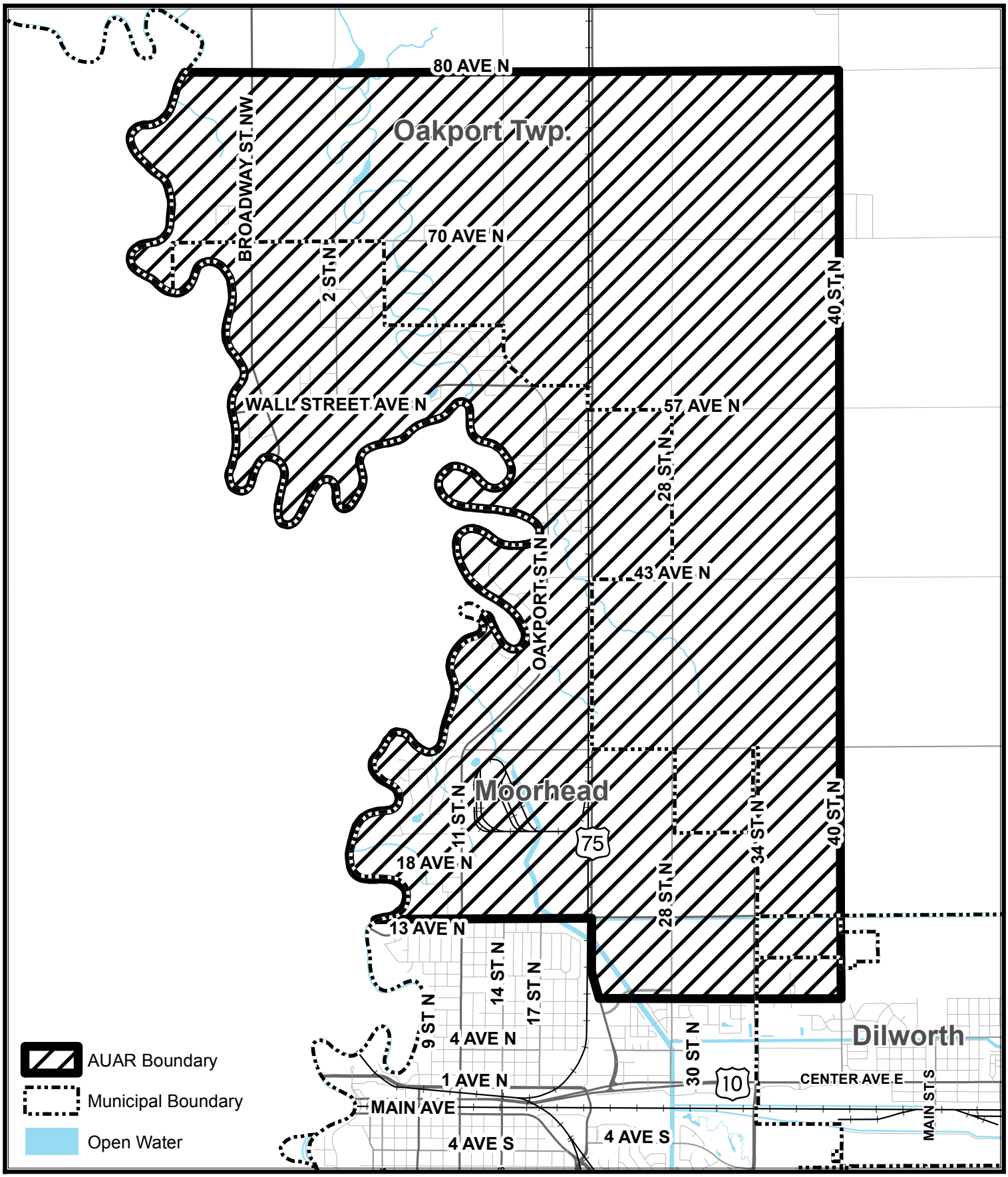
AUAR Boundary

Stantec

N

4,000 0 4,000 Feet

V:\1938\active\193803429\GIS\Projects\AUAR\North AUAR USGS Map.mxd



AUAR Boundary

North Moorhead/Oakport Township AUAR Update

Figure 5-2

June 6, 2017

Stantec

N

4,000 0 4,000 Feet

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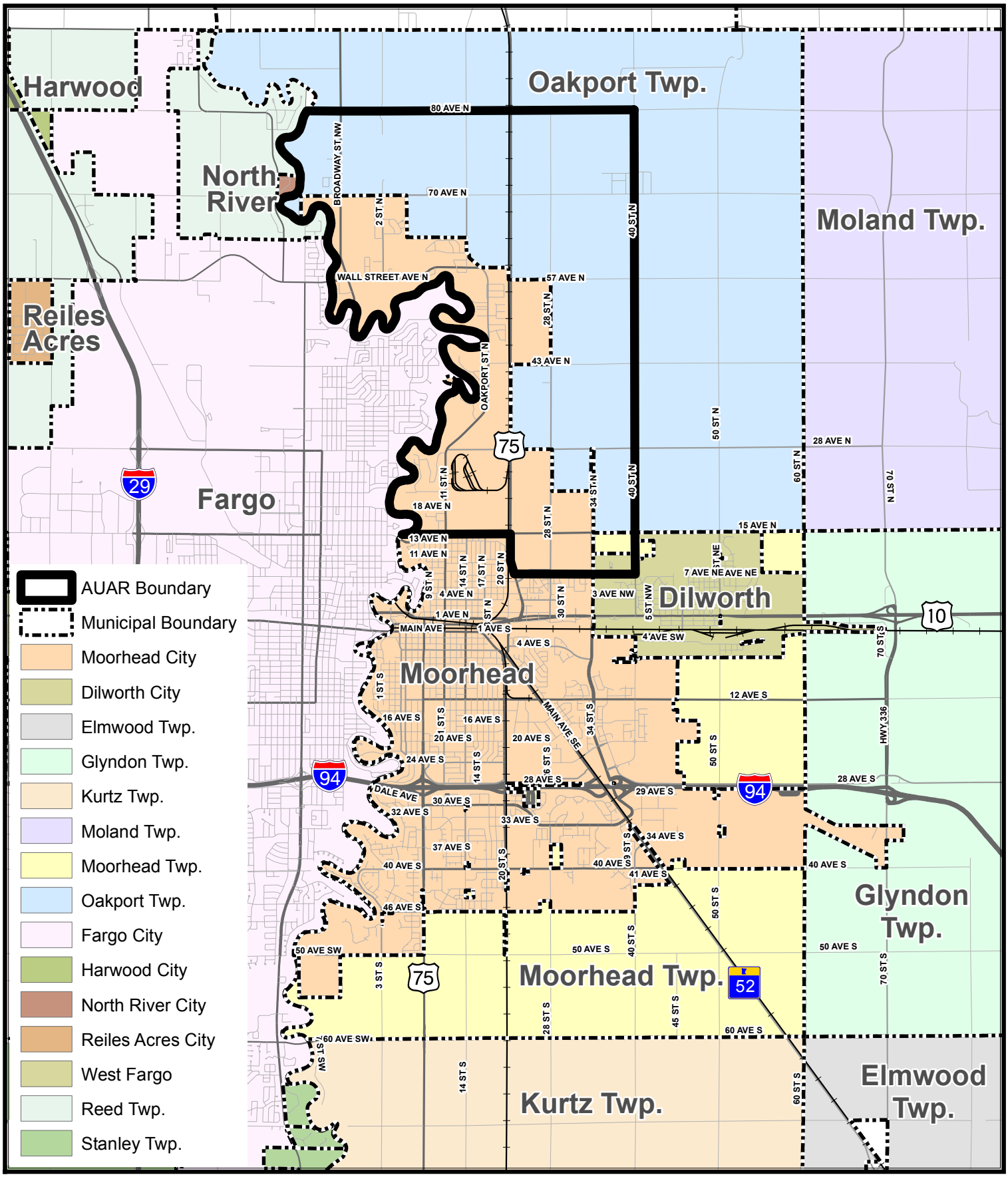

Project Location

North Moorhead/Oakport Township AUAR Update

Figure 5-3

June 6, 2017

N

8,000 0 8,000 Feet

Stantec

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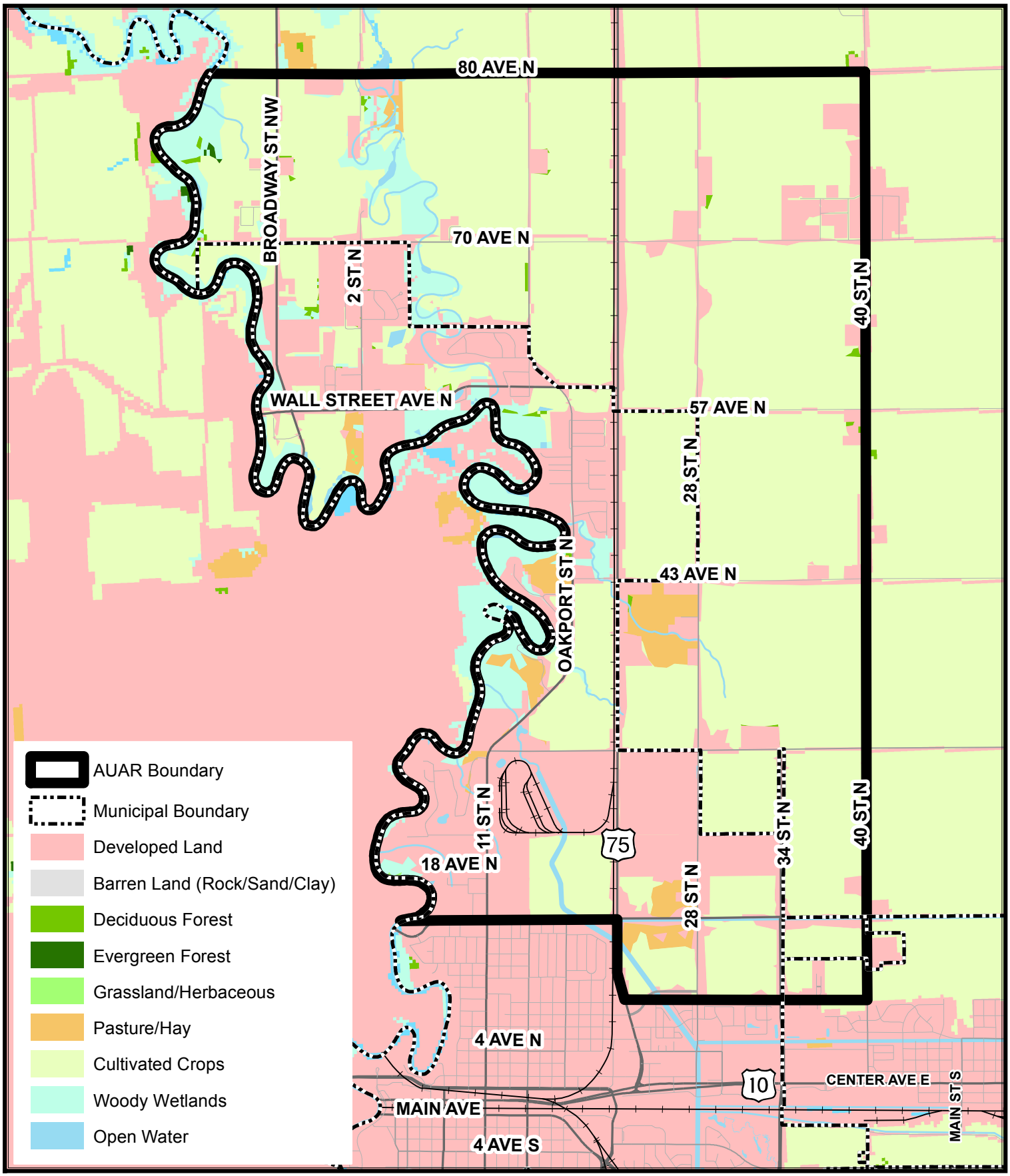

Land Cover Types

North Moorhead/Oakport Township AUAR Update

Figure 7-1

June 21, 2017

N

4,000 0 4,000 Feet

Stantec

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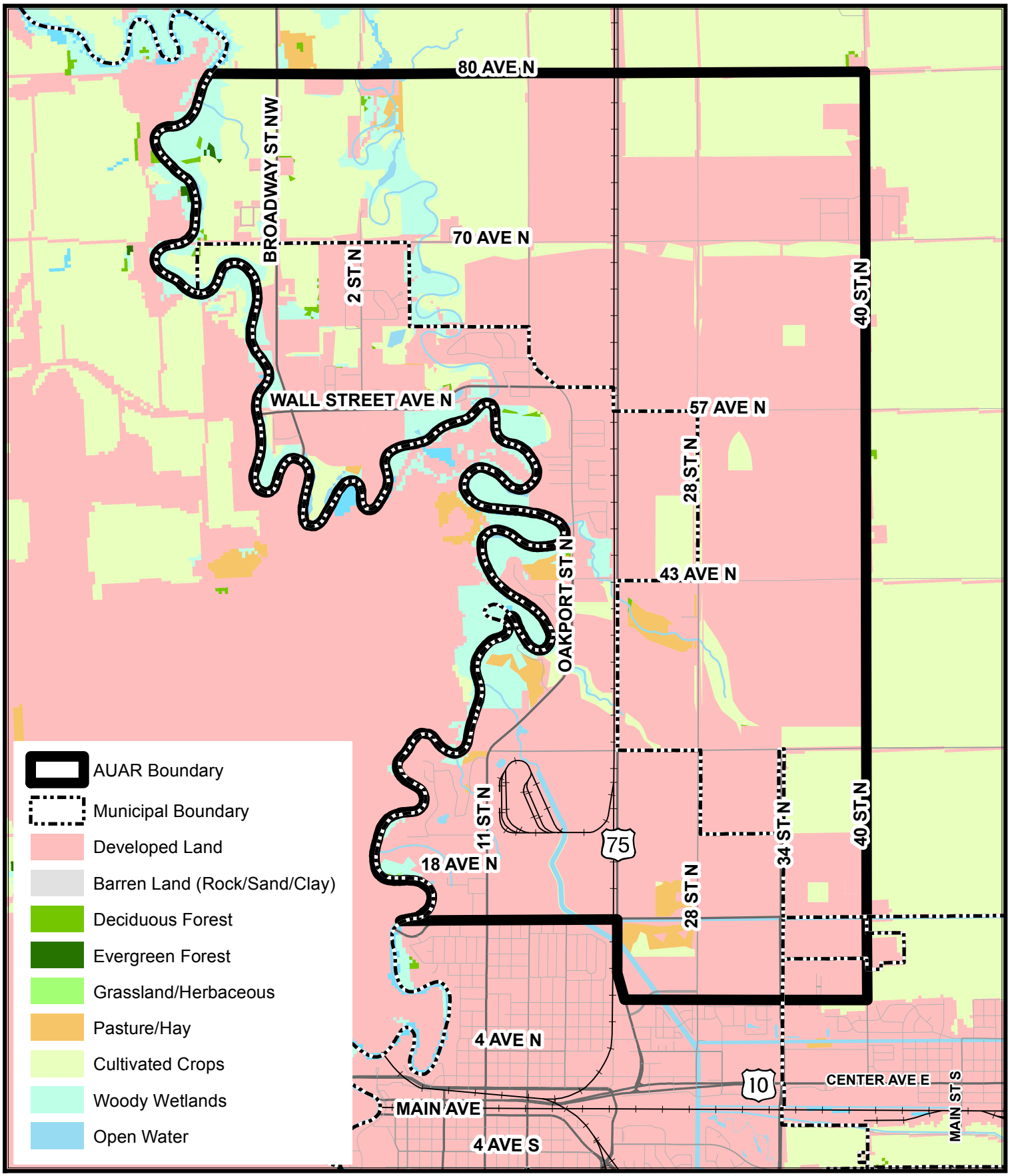


Land Cover Types after Future Land Use Development

Figure 7-2

North Moorhead/Oakport Township AUAR Update

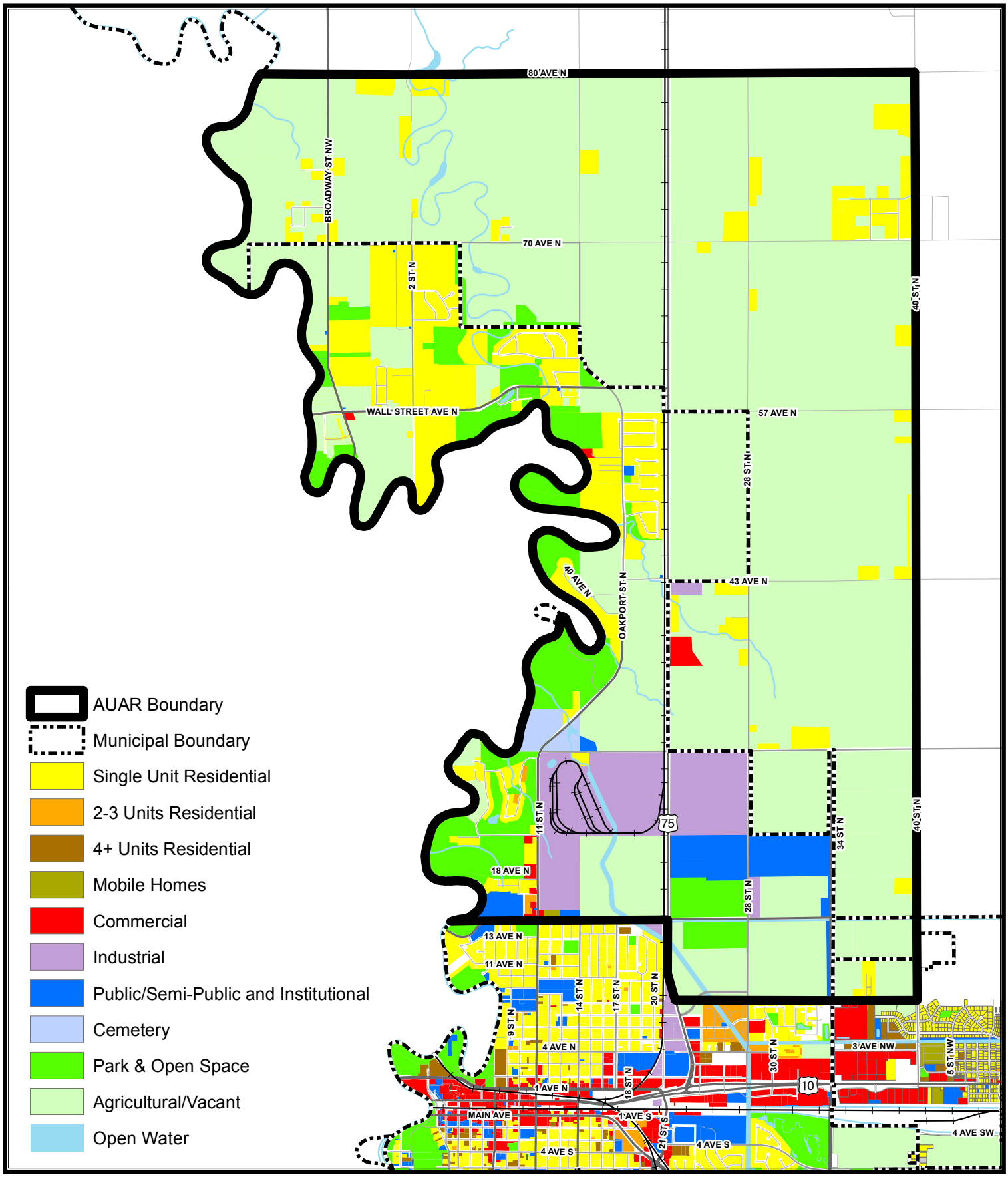
June 22, 2017

N

4,000 0 4,000 Feet

Stantec

V:\1938\active\193803429\GIS\Projects\AUAR\North AUAR Land Cover-Future.mxd



Existing Land Use

North Moorhead/Oakport Township AUAR Update

Figure 9-1

June 20, 2017

N

4,000 0 4,000 Feet

Stantec

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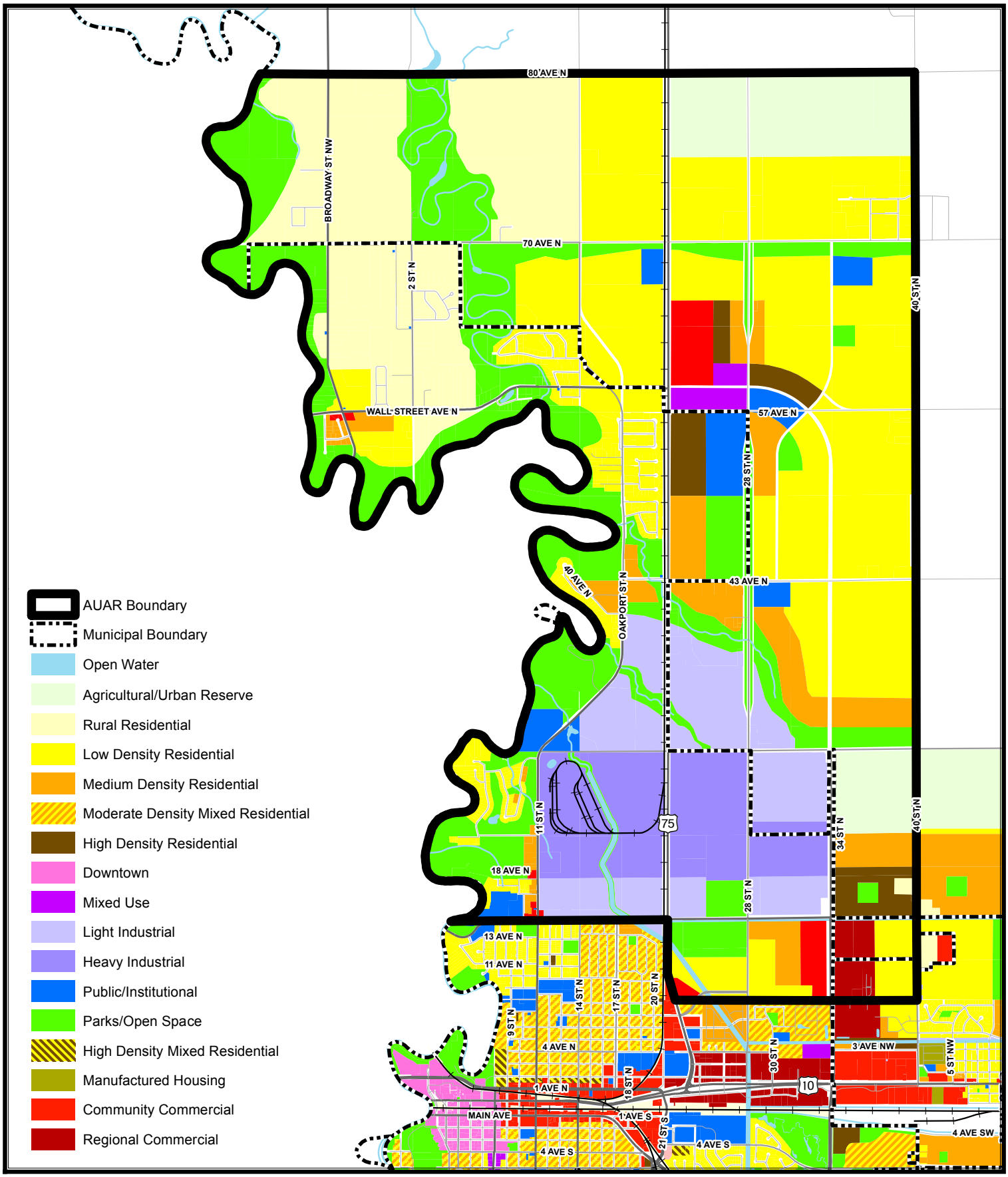

Planned Future Land Use

North Moorhead/Oakport Township AUAR Update

Figure 9-2

June 20, 2017

N

4,000 0 4,000 Feet

Stantec

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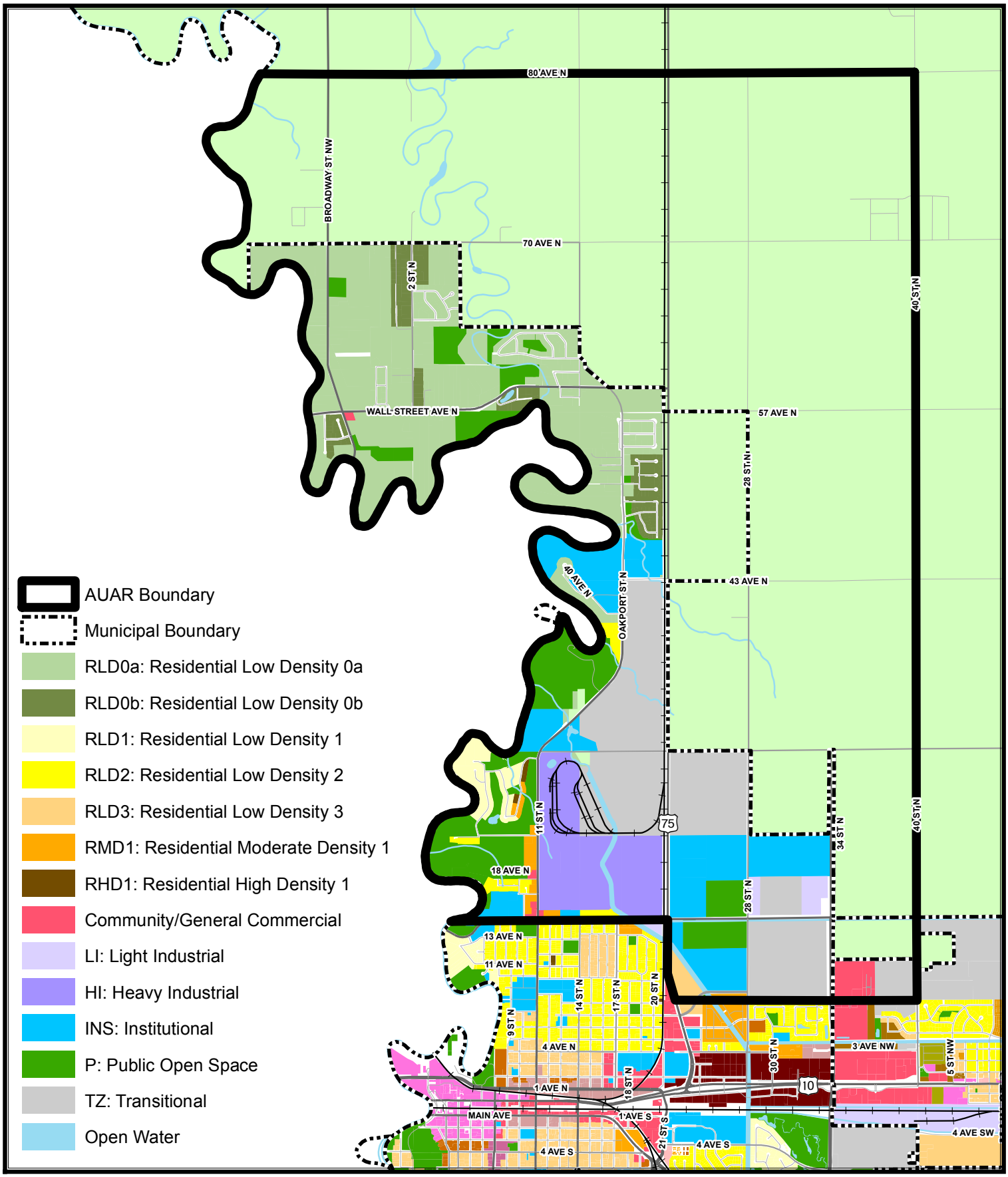


Existing Zoning Designations

North Moorhead/Oakport Township AUAR Update

Figure 9.3

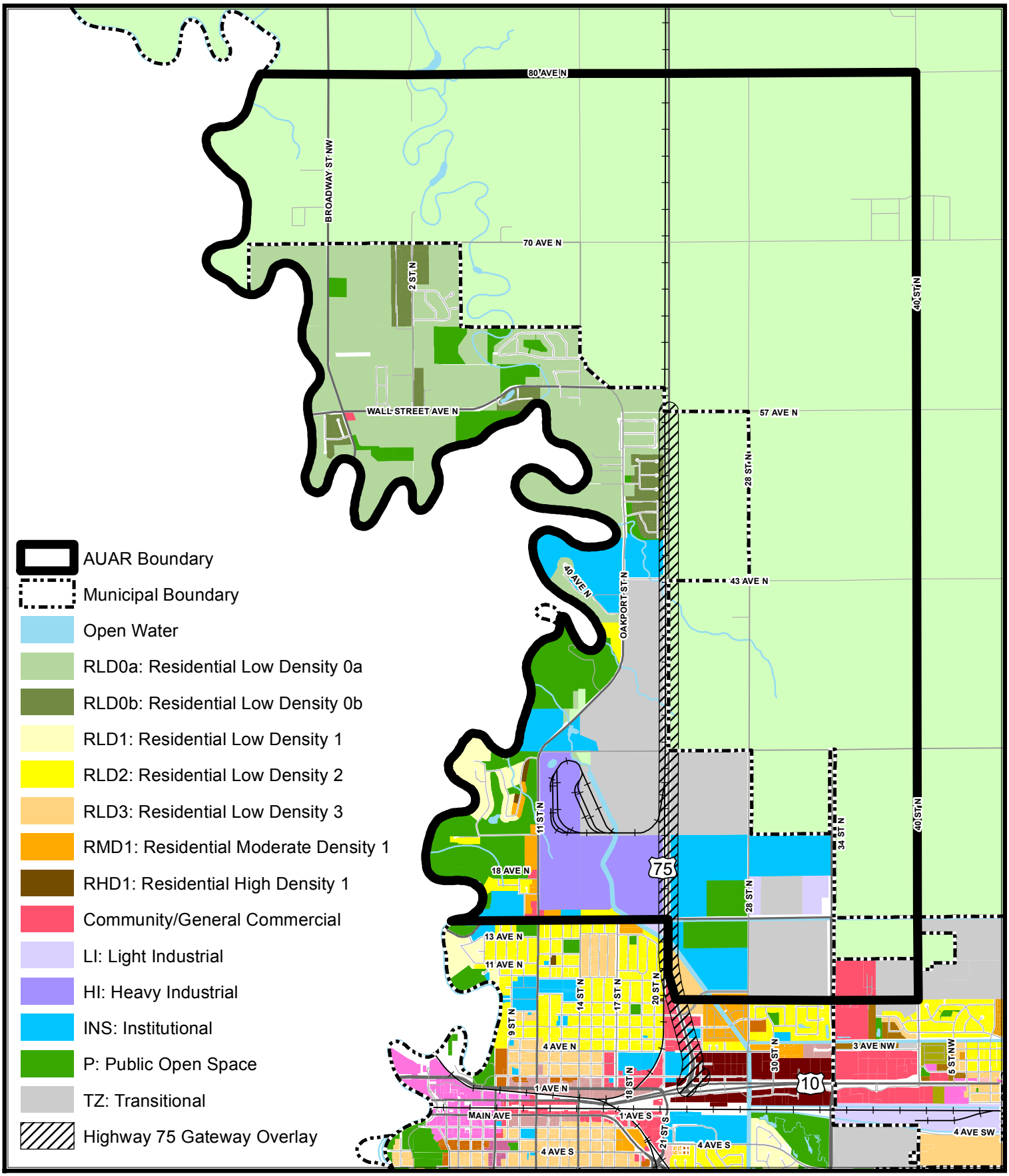
October 19, 2017

N

4,000 0 4,000 Feet

Stantec

V:\1938\active\193803429\GIS\Projects\AUAR\North AUAR Zoning.mxd



Existing Zoning Designations

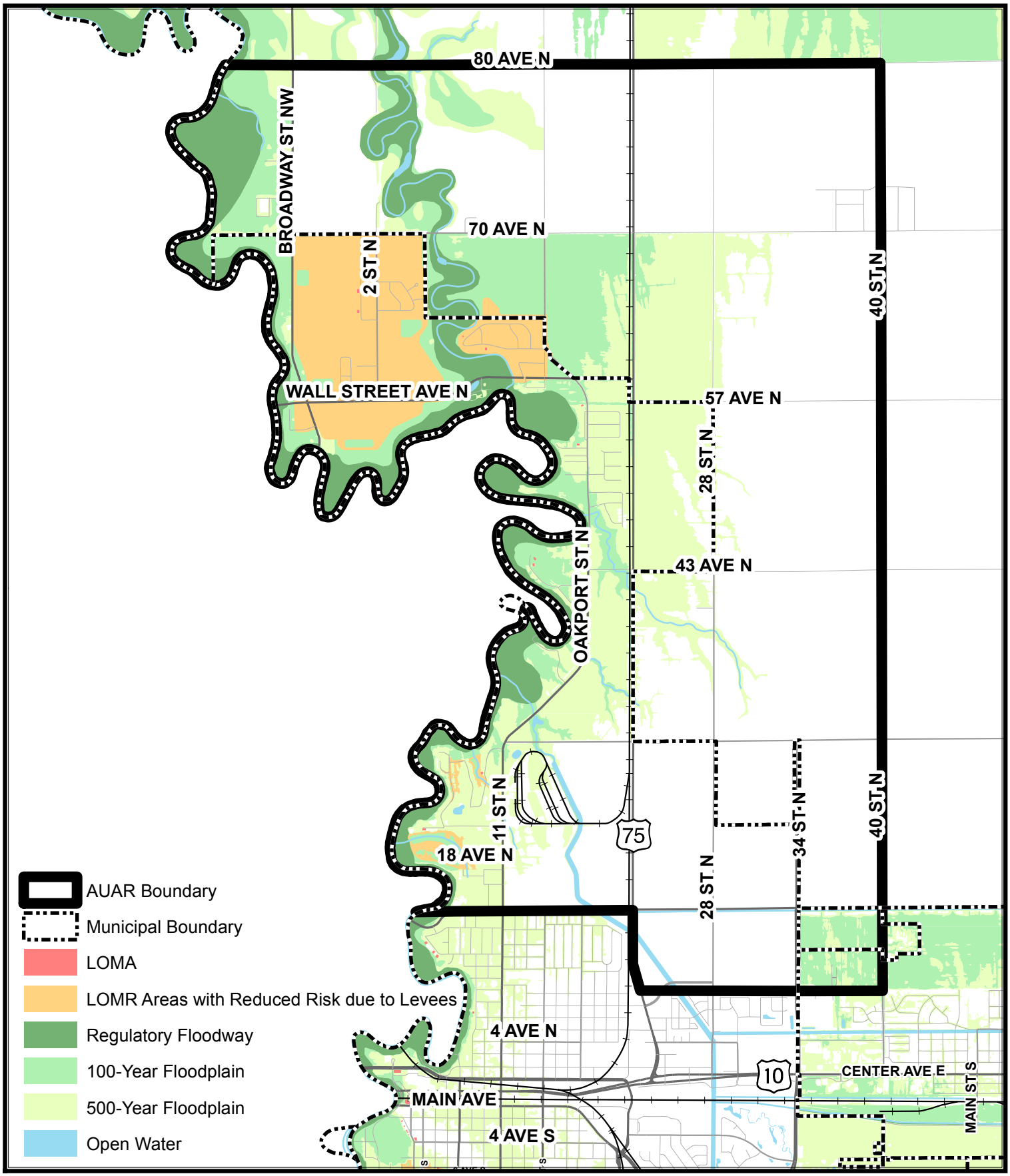
North Moorhead/Oakport Township AUAR Update

Figure 9.3

February 9, 2018

Stantec

V:\1938\active\193803429\GIS\Projects\North AUAR Zoning_GatewayOverlay.mxd



FEMA Floodplains

North Moorhead/Oakport Township AUAR Update

Figure 9.4

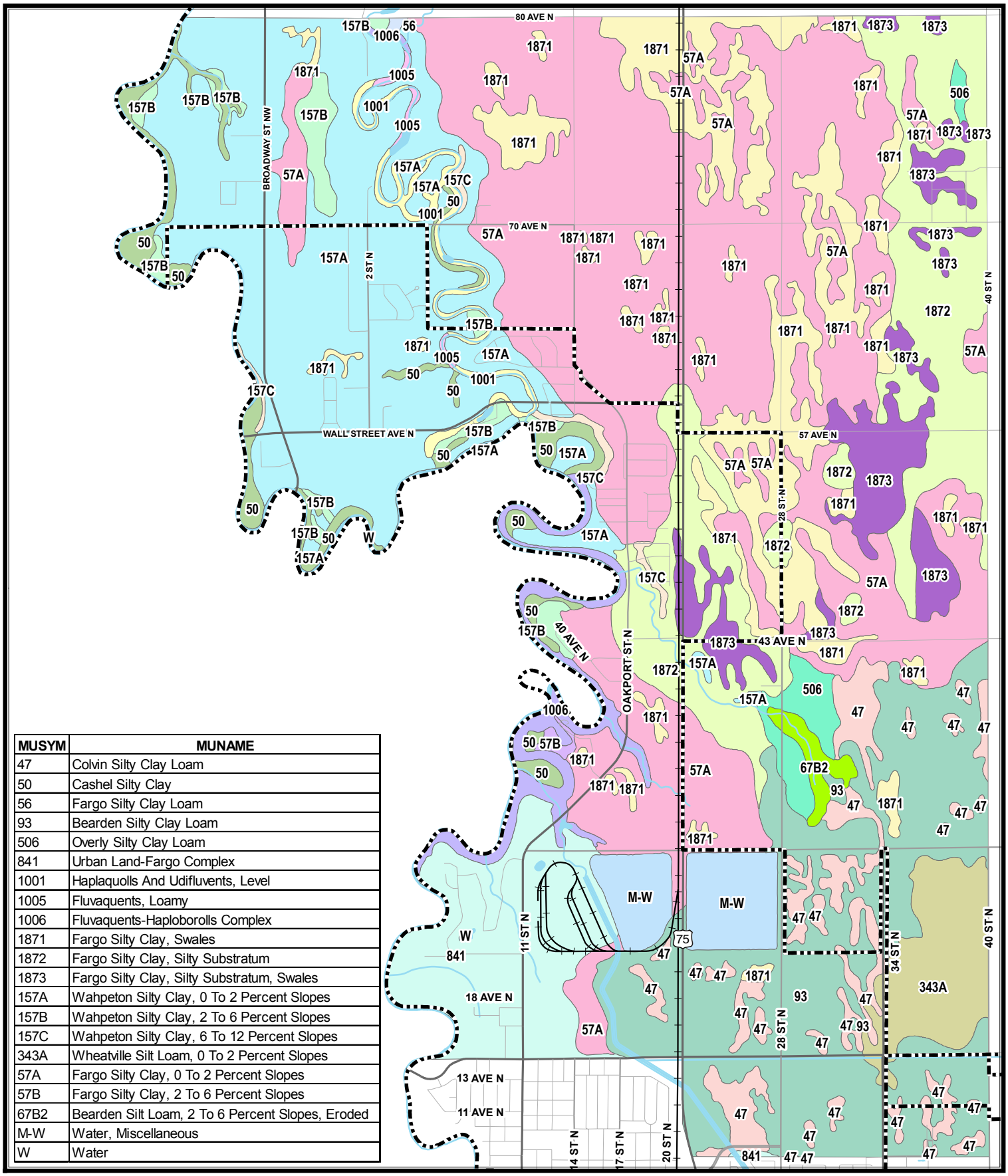
September 18, 2018

N

4,000 0 4,000 Feet

Stantec

V:\1938\active\193803429\GIS\Projects\AUAR\North AUAR Floodplain.mxd



MUSYM	MUNAME
47	Colvin Silty Clay Loam
50	Cashel Silty Clay
56	Fargo Silty Clay Loam
93	Bearden Silty Clay Loam
506	Overly Silty Clay Loam
841	Urban Land-Fargo Complex
1001	Haplaquolls And Udifluvents, Level
1005	Fluvaquents, Loamy
1006	Fluvaquents-Haploborolls Complex
1871	Fargo Silty Clay, Swales
1872	Fargo Silty Clay, Silty Substratum
1873	Fargo Silty Clay, Silty Substratum, Swales
157A	Wahpeton Silty Clay, 0 To 2 Percent Slopes
157B	Wahpeton Silty Clay, 2 To 6 Percent Slopes
157C	Wahpeton Silty Clay, 6 To 12 Percent Slopes
343A	Wheatville Silt Loam, 0 To 2 Percent Slopes
57A	Fargo Silty Clay, 0 To 2 Percent Slopes
57B	Fargo Silty Clay, 2 To 6 Percent Slopes
67B2	Bearden Silt Loam, 2 To 6 Percent Slopes, Eroded
M-W	Water, Miscellaneous
W	Water

Soils

Figure 10.1

North Moorhead/Oakport Township AUAR Update

January 30, 2018

N

3,250 0 3,250 Feet

Stantec

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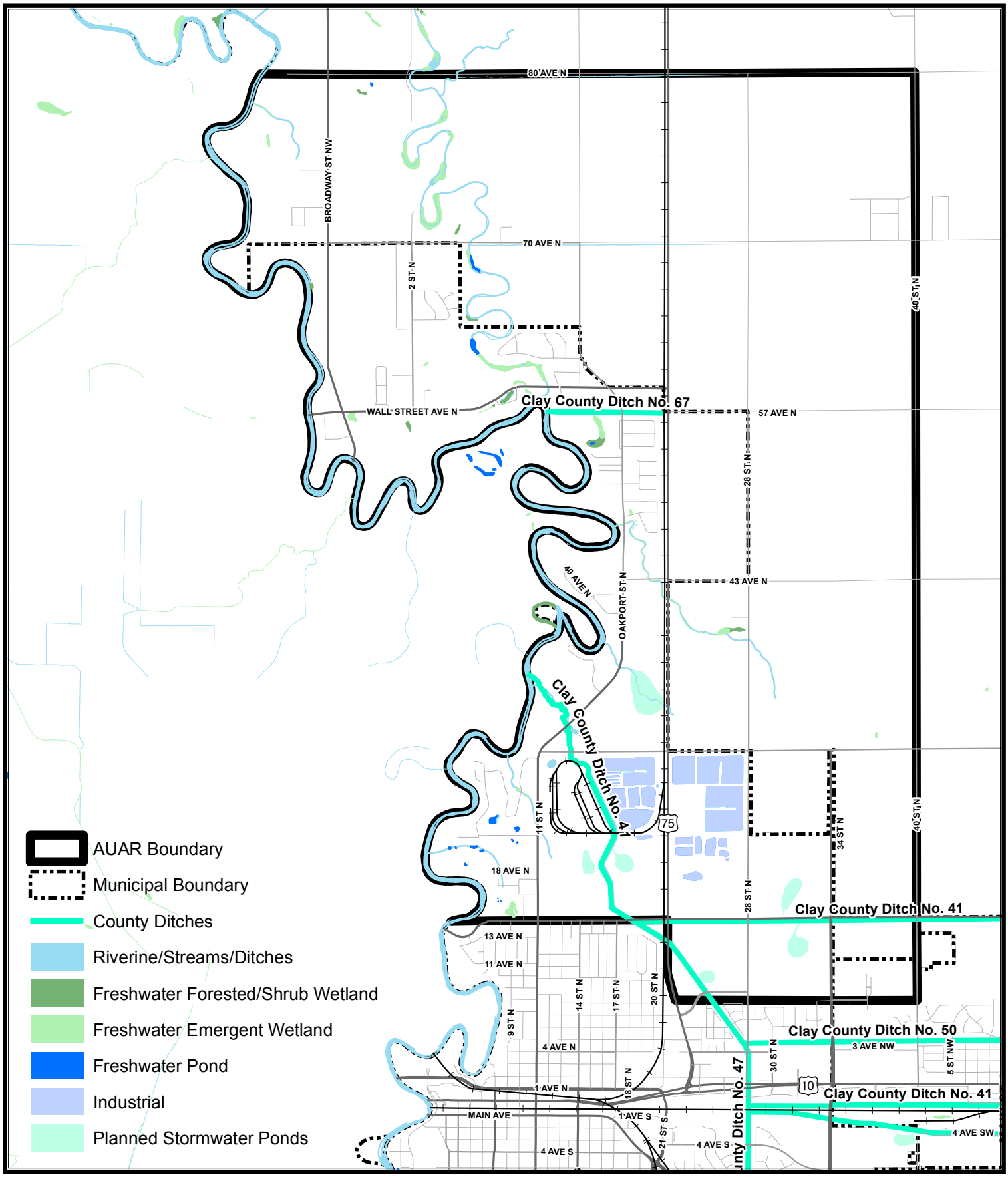


Surface Water

North Moorhead/Oakport Township AUAR Update

Figure 11-1

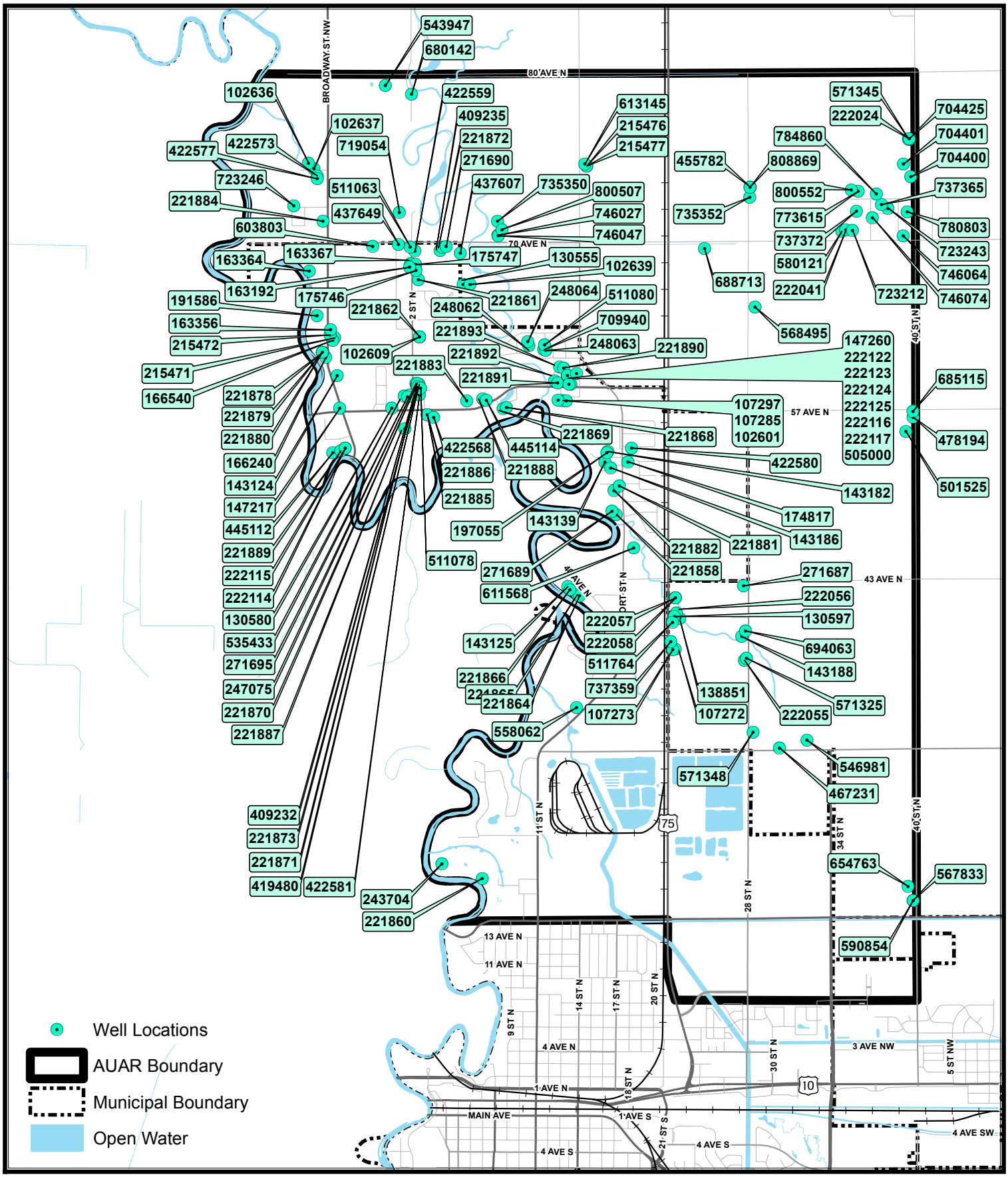
September 1, 2017

Stantec

N

4,000 0 4,000 Feet

V:\1938\active\193803429\GIS\Projects\AUAR\North AUAR Wetland.mxd



Well Locations

North Moorhead/Oakport Township AUAR Update

Stantec

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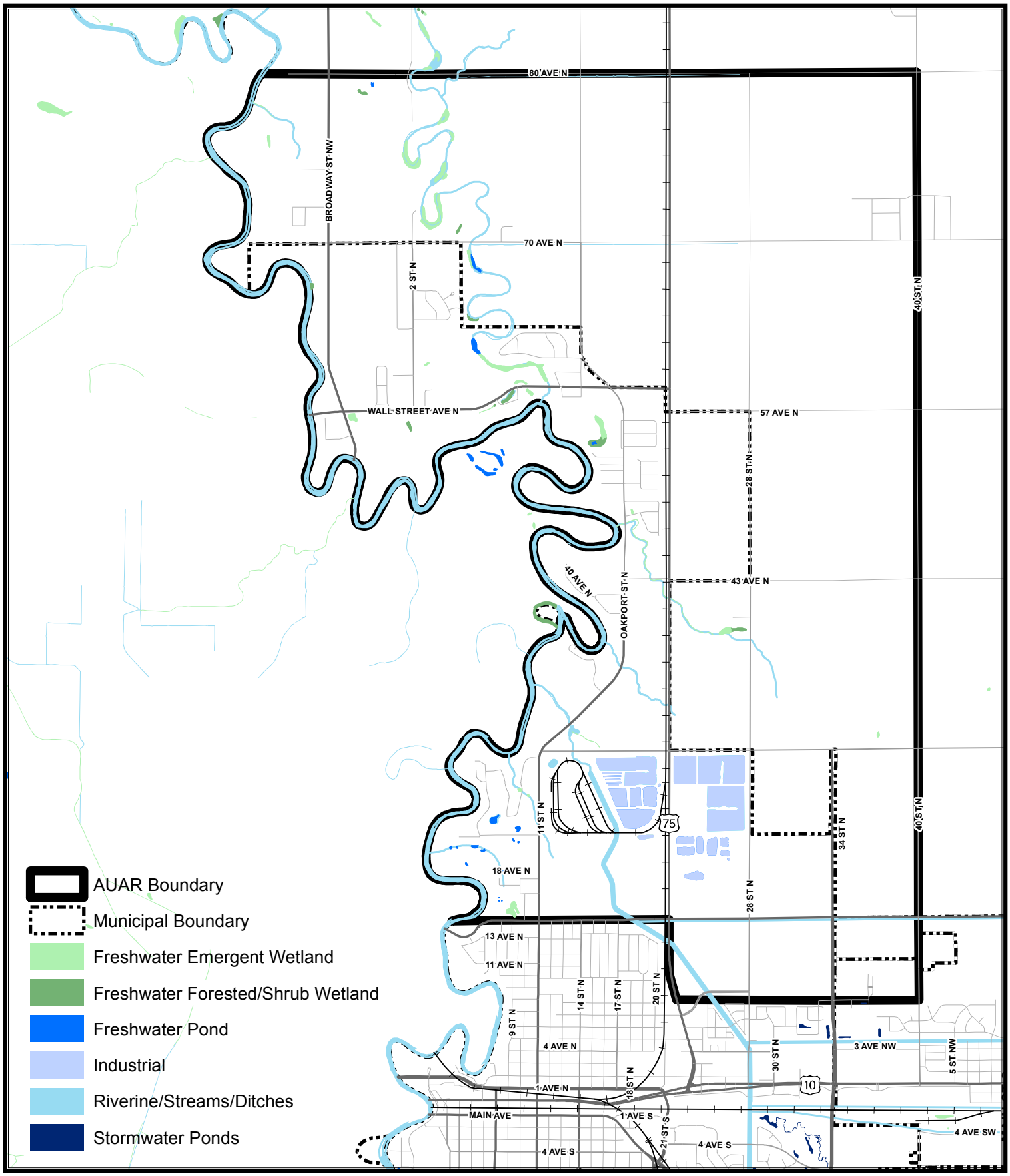


Surface Water and Wetland

North Moorhead/Oakport Township AUAR Update

Figure 11-3

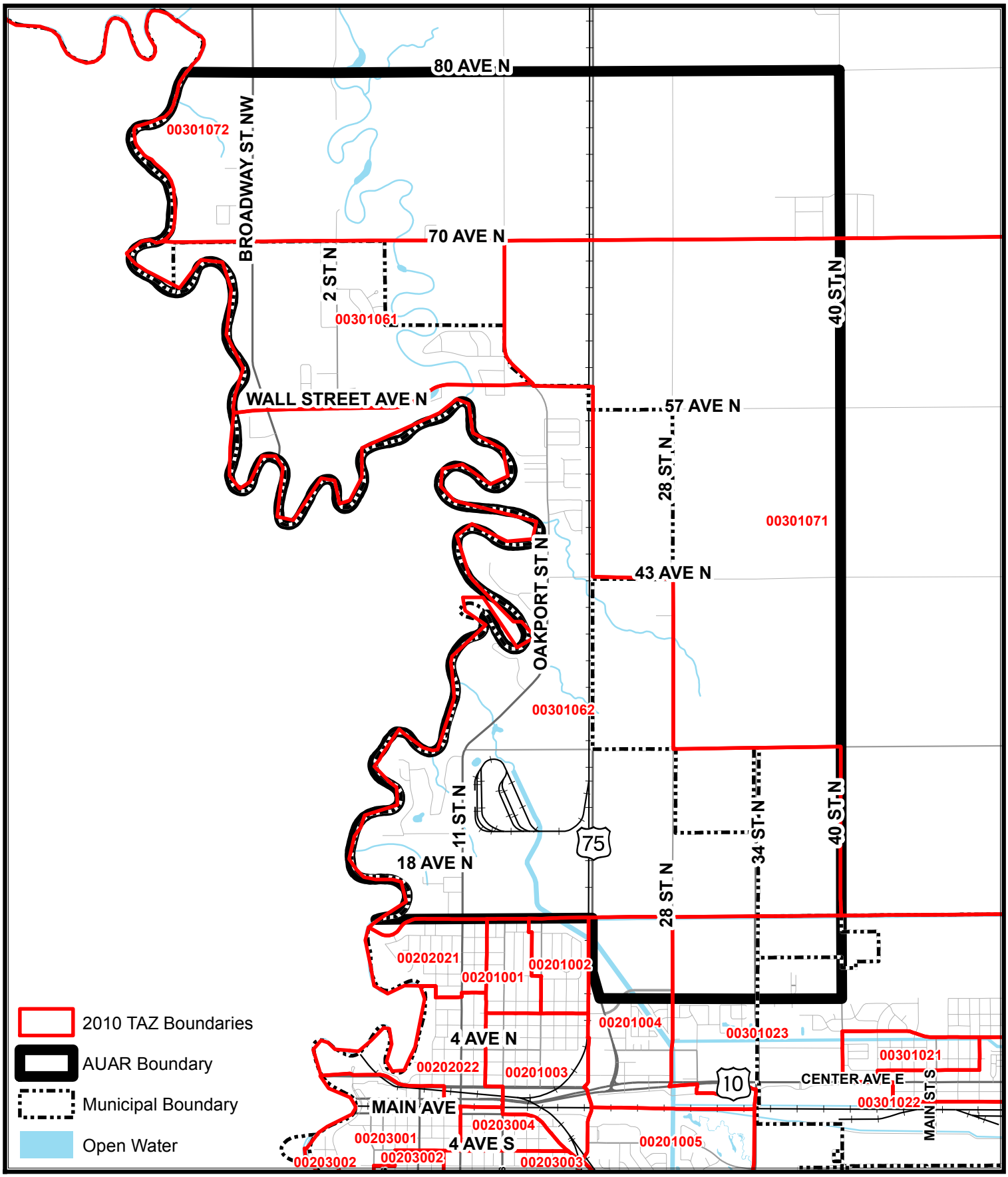
July 24, 2017

N

4,000 0 4,000 Feet

Stantec

V:\1938\active\193803429\GIS\Projects\AUAR\North AUAR Wetland.mxd



Traffic Analysis Zones (TAZs)

North Moorhead/Oakport Township AUAR Update

Figure 18-1

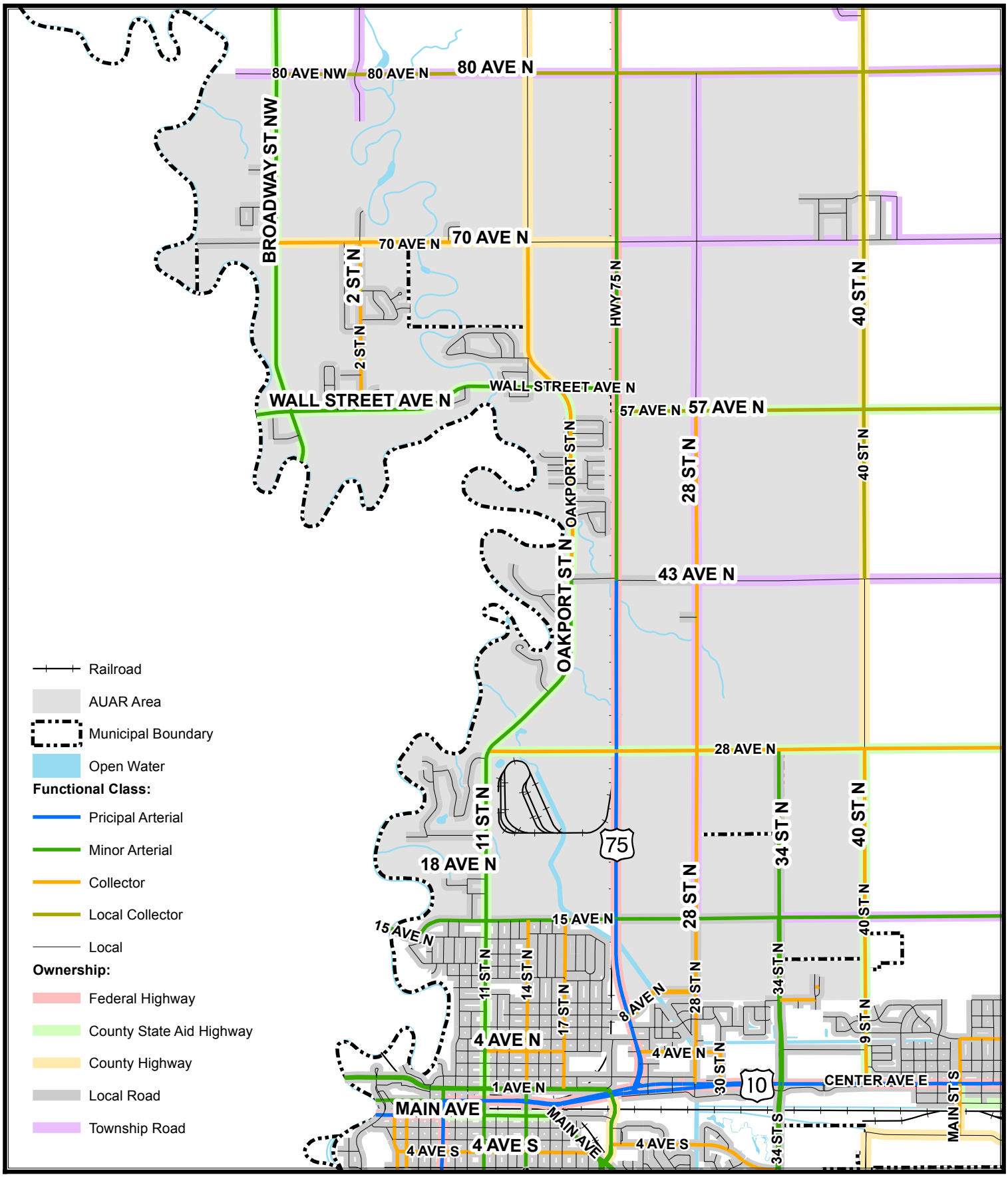
June 6, 2017

N

4,000 0 4,000 Feet

Stantec

V:\1938\active\193803429\GIS\Projects\AUAR\North AUAR TAZ.mxd



Existing Transportation System

North Moorhead/Oakport Township AUAR Update

Figure 18.2

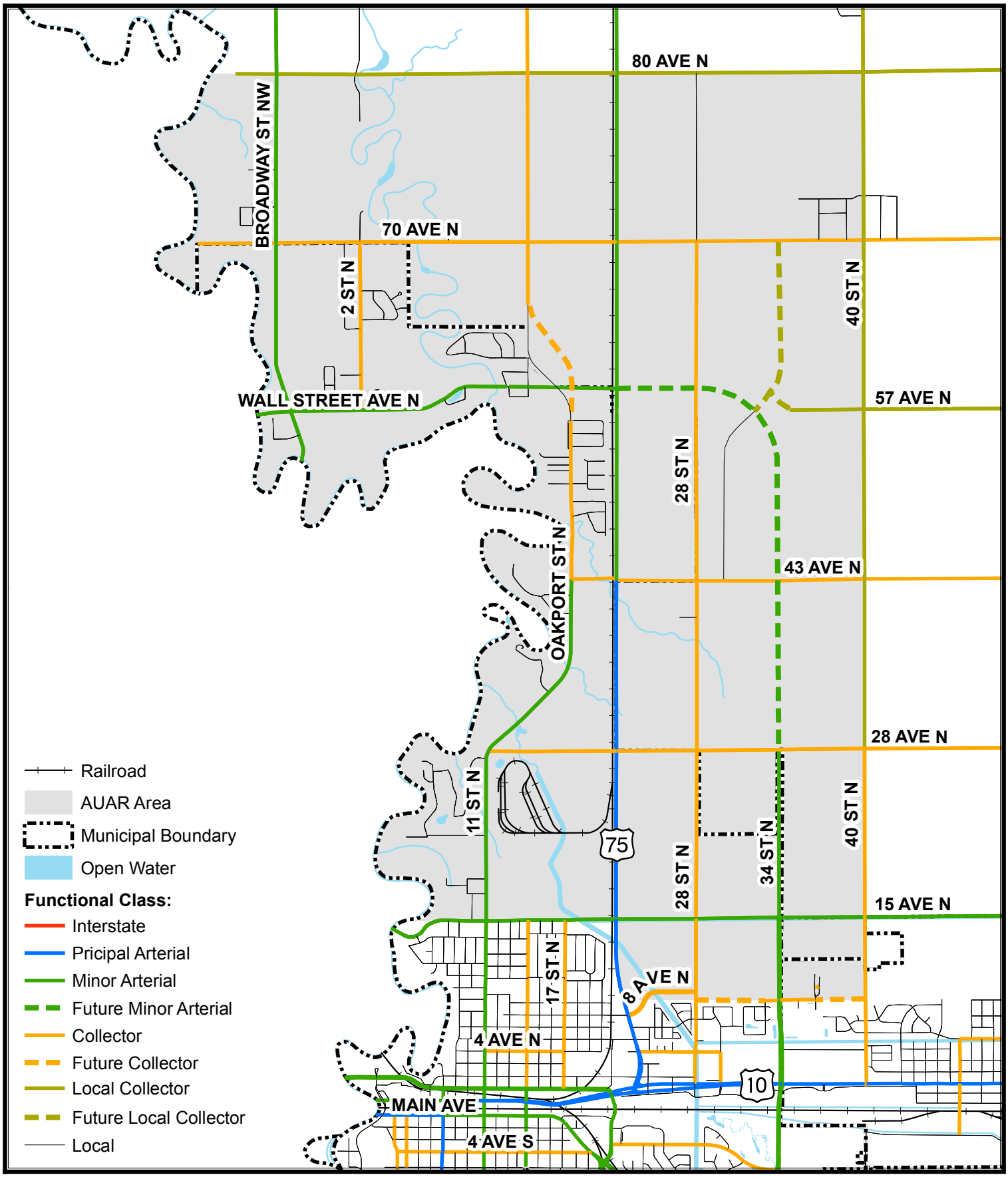
December 15, 2017

N

4,000 0 4,000 Feet

Stantec

V:\1938\active\193803429\GIS\Projects\AUAR\North AUAR Exist Trans System.mxd



Proposed Transportation System

North Moorhead/Oakport Township AUAR Update

Figure 18.3

January 4, 2018

N

4,000 0 4,000 Feet

Stantec

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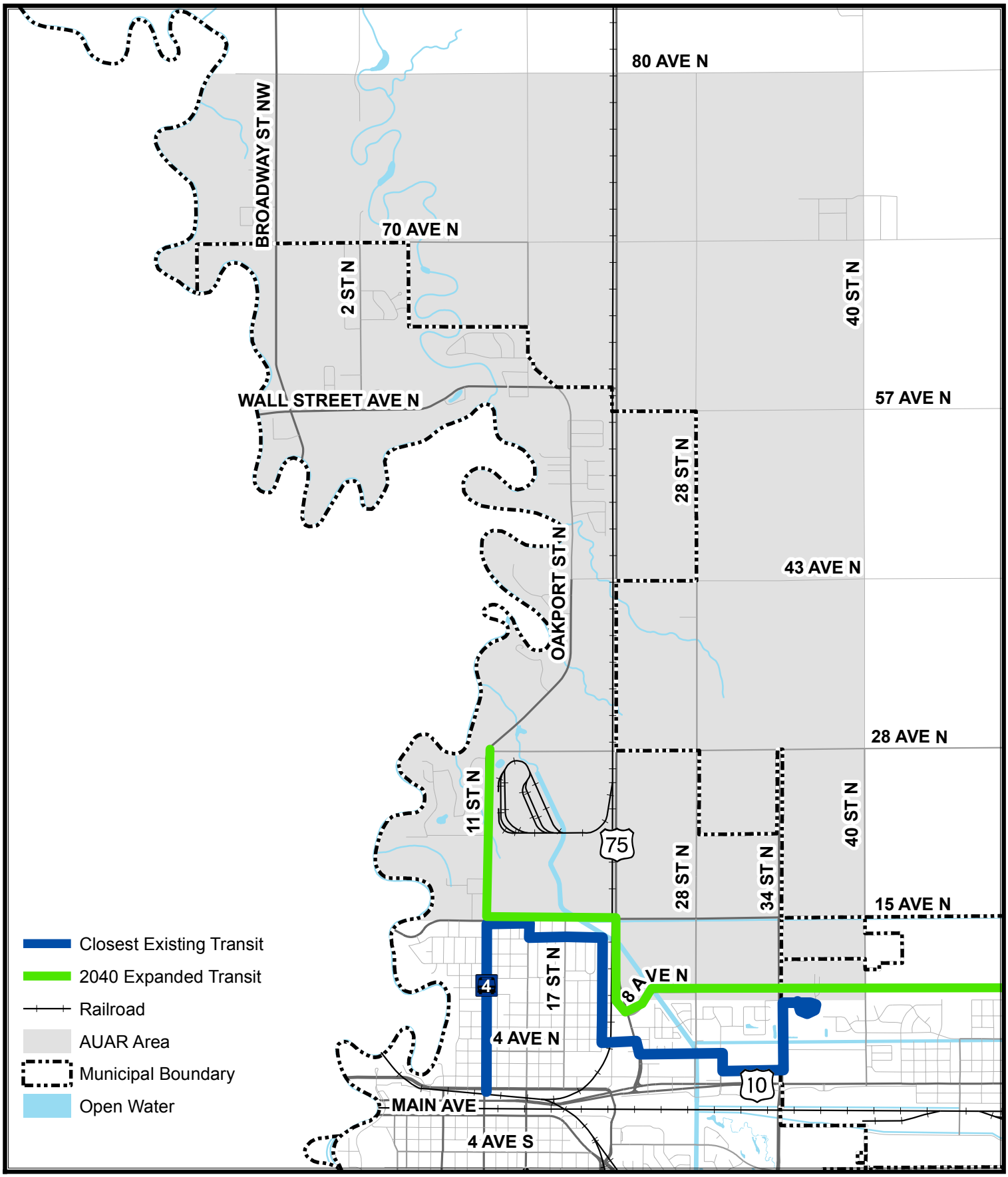

Transit Map

North Moorhead/Oakport Township AUAR Update

Figure 18.4

January 4, 2018

N

4,000 0 4,000 Feet

Stantec

V:\1938\active\193803429\GIS\Projects\AUAR\North AUAR Transit Map.mxd

Appendix B – National Land Cover Database Classification Descriptions

Class\ Value	Classification Description
Water	
11	**Open Water**- areas of open water, generally with less than 25% cover of vegetation or soil.
12	**Perennial Ice/Snow**- areas characterized by a perennial cover of ice and/or snow, generally greater than 25% of total cover.
Developed	
21	**Developed, Open Space**- areas with a mixture of some constructed materials, but mostly vegetation in the form of lawn grasses. Impervious surfaces account for less than 20% of total cover. These areas most commonly include large-lot single-family housing units, parks, golf courses, and vegetation planted in developed settings for recreation, erosion control, or aesthetic purposes.
22	**Developed, Low Intensity**- areas with a mixture of constructed materials and vegetation. Impervious surfaces account for 20% to 49% percent of total cover. These areas most commonly include single-family housing units.
23	**Developed, Medium Intensity** -areas with a mixture of constructed materials and vegetation. Impervious surfaces account for 50% to 79% of the total cover. These areas most commonly include single-family housing units.
24	**Developed High Intensity**-highly developed areas where people reside or work in high numbers. Examples include apartment complexes, row houses and commercial/industrial. Impervious surfaces account for 80% to 100% of the total cover.
Barren	
31	**Barren Land (Rock/Sand/Clay)** - areas of bedrock, desert pavement, scarps, talus, slides, volcanic material, glacial debris, sand dunes, strip mines, gravel pits and other accumulations of earthen material. Generally, vegetation accounts for less than 15% of total cover.
Forest	
41	**Deciduous Forest**- areas dominated by trees generally greater than 5 meters tall, and greater than 20% of total vegetation cover. More than 75% of the tree species shed foliage simultaneously in response to seasonal change.
42	**Evergreen Forest**- areas dominated by trees generally greater than 5 meters tall, and greater than 20% of total vegetation cover. More than 75% of the tree species maintain their leaves all year. Canopy is never without green foliage.
43	**Mixed Forest**- areas dominated by trees generally greater than 5 meters tall, and greater than 20% of total vegetation cover. Neither deciduous nor evergreen species are greater than 75% of total tree cover.
Shrubland	
51	**Dwarf Scrub**- Alaska only areas dominated by shrubs less than 20 centimeters tall with shrub canopy typically greater than 20% of total vegetation. This type is often co-associated with grasses, sedges, herbs, and non-vascular vegetation.
52	**Shrub/Scrub**- areas dominated by shrubs; less than 5 meters tall with shrub canopy typically greater than 20% of total vegetation. This class includes true shrubs, young trees in an early successional stage or trees stunted from environmental conditions.
Herbaceous	
71	**Grassland/Herbaceous**- areas dominated by gramanoid or herbaceous vegetation, generally greater than 80% of total vegetation. These areas are not subject to intensive management such as tilling, but can be utilized for grazing.
72	**Sedge/Herbaceous**- Alaska only areas dominated by sedges and forbs, generally greater than 80% of total vegetation. This type can occur with significant other grasses or other grass like plants, and includes sedge tundra, and sedge tussock tundra.
73	**Lichens**- Alaska only areas dominated by fruticose or foliose lichens generally greater than 80% of total vegetation.
74	**Moss**- Alaska only areas dominated by mosses, generally greater than 80% of total vegetation.
Planted/Cultivated	
81	**Pasture/Hay**-areas of grasses, legumes, or grass-legume mixtures planted for livestock grazing or the production of seed or hay crops, typically on a perennial cycle. Pasture/hay vegetation accounts for greater than 20% of total vegetation.
82	**Cultivated Crops** -areas used for the production of annual crops, such as corn, soybeans, vegetables, tobacco, and cotton, and also perennial woody crops such as orchards and vineyards. Crop vegetation accounts for greater than 20% of total vegetation. This class also includes all land being actively tilled.
Wetlands	
90	**Woody Wetlands**- areas where forest or shrubland vegetation accounts for greater than 20% of vegetative cover and the soil or substrate is periodically saturated with or covered with water.
95	**Emergent Herbaceous Wetlands**- Areas where perennial herbaceous vegetation accounts for greater than 80% of vegetative cover and the soil or substrate is periodically saturated with or covered with water.

Appendix C - Draft AUAR Comment Letters

Ecological and Water Resources
2115 Birchmont Beach Rd NE
Bemidji, MN 56601

August 28, 2018

Kristie Leshovsky & Bob Zimmerman
City Planner and Zoning Administrator & City Engineer
City of Moorhead
Moorhead City Hall
500 Center Ave, Box 779
Moorhead, MN 56561

North Moorhead Growth Area Plan Draft AUAR, Clay County MN

Ms. Leshovsky and Mr. Zimmerman,

Thank you for the opportunity to review the North Moorhead Growth Area Plan draft Alternative Urban Area Review (AUAR). We applaud you for looking to the future in your planning and city growth at a citywide level.

After reviewing the draft AUAR for the North Growth Area Plan we have the following comments and recommendations:

Environmental Analysis document, form and content

While this document is a great planning tool, the document does not appear to provide sufficient level of detail as indicated in MN Rule 4410.3610, Subp 4. Including additional details on associated flood damage reduction projects, ditching, and other items will help flesh-out the document to more fully describe potential impacts of development.

To ensure consistency with MN rule 4410.3610, Subp 5C, DNR recommends creating a stand-alone mitigation document that can be referenced quickly and easily during future build-out. Providing a more specific stand-alone mitigation plan will help to ensure mitigation is followed.

Wildlife and Rare Features

The City of Moorhead is licensed to access to the Natural Heritage Information System (NHIS) for rare species accounts. DNR recommends noting if NHIS was reviewed to clarify if this AUAR has the most

current rare species information. DNR staff found the following items in an internal review of several natural feature databases:

- There is one Rail Road Right-of-Way prairie remnant along the Burlington Northern and Santa Fe Railroad north of 57th Ave. This habitat is listed as mesic prairie. Any improvements to Hwy 75 may impact this rare feature. The AUAR notes this corridor is a Gateway Overlay district with buffers and landscaping for visual interest. Will this overlay district support the protection of this right-of-way prairie remnant?

- Lake Sturgeon and Black Sandshell (Minnesota Species of Special Concern) along the Red River of the North at Moorhead.

- The rusty patched bumble bee (*Bombus affinis*), a federally-listed endangered species, was just recently documented in the vicinity of the proposed project; likely added after your last NHIS data update. The rusty patched bumble bee typically occurs in grasslands and urban gardens with flowering plants from April through October. This species nests underground in abandoned rodent cavities or in clumps of grasses. Please reference the guidance at the USFWS rusty patched bumble bee website to determine if the project has the potential to impact this protected species.

Several of the species noted in the rare features section includes pollinator species. In a recent tour of Moorhead for the proposed Fargo-Moorhead Diversion project, city staff pointed out the City's planting of native prairie species in various locations. If Moorhead plans to continue this use of native landscaping in city parks and infrastructure, it may be appropriate to list this as a mitigation measure within this section of the document. Additional encouragement of landowners to plant native species in stormwater retention ponds and landscaping may also be appropriate mitigation measures.

Water appropriation

The AUAR does a good job at describing some of the challenges of appropriating water from the Moorhead Aquifer. However, there is concern that transitioning appropriation to utilize more of the Buffalo Aquifer and Red River may be problematic for the aquatic resource. The Buffalo Aquifer has a history of overuse which caused long-term declining water levels trends. Appropriation from the Red River may also be limited during periods of drought.

Moorhead Public Service (MPS) and DNR began working together in 2008 to develop long-term drought planning to limit impacts on the Buffalo Aquifer if the surface water was inadequate supply. The team drafted the Buffalo Aquifer management plan updated last in 2016. The numbers noted in this management plan for projected water use are not consistent with those found in the AUAR, but are much more conservative (an estimated higher use). DNR recommends the city reference the Buffalo Aquifer plan, the concerns noted in the plan, the multi-agency work to protect this aquifer, and the projected numbers associated with this plan and how they differ from projections in the AUAR.

Due to recent declining water level trends in the Moorhead and Buffalo aquifers and the desire to increase appropriation from groundwater, DNR recommends the following mitigation items:

- Additional groundwater monitoring of both aquifers
- Water conservation measures as preventative, rather than reactionary mitigation measures. With the existing water supplies at limited supply, implementing water conservation through sprinkling limitations, waterline leak detection, encouraging drought tolerant landscaping, and water-conservation centered fee scheduling are all recommended measures to implement as Moorhead expands.
- DNR recommends the City of Moorhead seek alternative water supplies should the monitoring indicate increased use of the aquifers will be sustainable.
- Continued work with DNR to model and predict aquifer sustainability in response to appropriations.

Stormwater

DNR recommends the AUAR describe any work on flood damage reduction projects within and around the AUAR that affect this area. The AUAR describes two projects, the Oakport and the North Moorhead Flood Mitigation Projects. DNR recommends showing these projects on a map. Are there additional planned construction of additional in-town levees within the AUAR area?

In addition, the potential construction of the Fargo-Moorhead Diversion project may also influence development within the project area. Please indicate if zoning would change with flood protection projects such as the Fargo-Moorhead Diversion.

DNR also recommends the AUAR provide maps of the designated floodway and flood fringe zones on a development map. Additional descriptions of mitigation for development within the floodplain such as flood resistant structure requirements, limiting development density, and prohibition of fill are also recommended as part of the mitigation plan.

Surface waters

The potential impacts to surface water are well described. However, DNR recommends clarifying if any upgrades will be required for Clay County Ditches 41, 47, and 50 and if any additional ditches will be required for development.

DNR also recommends further description of the coulee's and other surface water features as well as non-stormwater related mitigation strategies such as vegetated buffers, construction erosion control, and coordination with watershed district staff on water quality issues.

Plans

This section should also discuss how the AUAR proposes to be consistent with the Upper Red River of the North Watershed Restoration and Protection Strategies.

Cumulative effects

Noteworthy potential cumulative concerns seen within the Moorhead area are both the impacts to surface water from run-off and encroachment onto the floodplain, and the additional strains on the Moorhead and Buffalo aquifers. DNR recommends the geographic scale of cumulative potential effects be revised accordingly. The Buffalo Aquifer management plan should also be used as a source in describing potential cumulative effects.

Items that DNR recommends be included in this section include:

- DNR is currently reviewing the Dam Safety permit application for the Fargo-Moorhead Diversion, and is therefore likely a reasonably foreseeable project.
- DNR is also currently reviewing two other AUAR's by the City of Moorhead. These AUAR's mention specific items such as changes to groundwater appropriation and infrastructure and therefore may be also considered reasonably foreseeable project.
- DNR has concerns with cumulative impacts of groundwater use, and recommends including further description of groundwater issues within the area. This could also include a writeup of how the City of Moorhead, MPS, and DNR are collaborating on finding a sustainable water supply for the City. The collaboration includes building of the Buffalo aquifer model, sharing this model and data with DNR to facilitate our allocation of water resources, and continued meetings and discussions.
- Any planned and reasonably foreseeable flood damage reduction projects including in-town levees, and drainage projects should also be included in this section.

Thank you for the review of this draft AUAR. We hope you find our comments helpful and look forward to working with you in conservation.

Sincerely,

Nathan Kestner
NW Regional Manager
Ecological and Water Resources

CC: Jaimé Thibodeaux, Environmental Assessment Ecologists
Lisa Joyal, Endangered Species Review Coordinator
Rodger Hemphill, Area Hydrologist
Joshua Prososki, Groundwater Hydrologist
Jennifer Rose, Groundwater Specialist

Equal Opportunity Employer

DEPARTMENT OF ADMINISTRATION
STATE HISTORIC PRESERVATION OFFICE

August 28, 2018

Ms. Kristie Leshovsky
City Planner and Zoning Administrator
City of Moorhead
500 Center Avenue, Box 779
Moorhead, MN 56561

RE: AUAR – Moorhead North Growth Area
Moorhead, Clay County
SHPO Number: 2018-2565

Dear Ms. Leshovsky:

Thank you for providing this office with a copy of the Alternative Urban Areawide Review (AUAR) for the above-referenced development area.

Due to the nature and location of the propsed development, we recommend that a Phase IA literature review and archaeological assessment be completed to assess the potential for intact archaeological sites in the development area. If, as a result of this assessment, a Phase I archaeological survey is recommended, this survey should be completed. The survey must meet the requirements of the Secretary of the Interior's Standards for Identification and Evaluation, and should include an evaluation of National Register eligibility for any properties that are identified. For a list of consultants who have expressed an interest in undertaking this type of research and archaeological surveys, please visit the website **preservationdirectory.mnhs.org**, and select "Archaeologists" in the "Search by Specialties" box.

We will reconsider the need for survey if the development area can be documented as previously surveyed or disturbed. Any previous survey work must meet contemporary standards. **Note:** plowed areas and right-of-way are not automatically considered disturbed. Archaeological sites can remain intact beneath the plow zone and in undisturbed portions of the right-of-way.

In addition, there is one historic property located within the North Growth Area that is listed in the National Register of Historic Places (NRHP), the Randolph M. Probstfield House, and one historic property that has previously been determined eligible for listing in the NRHP, the American Crystal Sugar Plant. Any development in the area of these two properties should take into consideration any direct or indirect effects that the projects may have on the historic properties.

Please note that this comment letter does not address the requirements of Section 106 of the National Historic Preservation Act of 1966 and 36 CFR § 800. If any future projects are considered for federal financial assistance, or require a federal permit or license, then review and consultation with our office will need to be initiated by the lead federal agency. Be advised that comments and recommendations provided by our office for this review may differ from findings and determinations made by the federal agency as part of review and consultation under Section 106.

If you have any questions regarding our review of this AUAR, please contact David Mather, National Register Archaeologist, at (651) 201-3289.

Sincerely,

Sarah J. Beimers
Environmental Review Program Manager

DEPARTMENT OF ADMINISTRATION
STATE ARCHAEOLOGIST

August 28, 2018

Beth Elliott
Senior Urban Planner
Stantec Consulting
2553 Highway 36 West
St. Paul, MN 55113

RE: Moorhead North Growth Area Plan, Clay County

Dear Ms. Elliott:

Thank you for the opportunity to comment on the above listed project. Because numerous archaeological site exist within and surrounding the footprint of the proposed project area, and because the portions of the proposed project area are adjacent to the Red River, this project has a high potential for containing unrecorded archaeological sites or cemeteries. Thus, I recommend that a qualified archaeologist conduct a survey to determine if the project could impact unrecorded archaeological or cemetery sites. The Minnesota Historic Preservation Office maintains a list of qualified archaeologists at: http://www.mnhs.org/shpo/preservation-directory.

The Office of the State Archaeologist reviewed this project under the Minnesota Field Archaeology Act (MS 138.31 - .41), the Private Cemeteries Act (MS 307.08), and the Minnesota Environmental Policy Act (MS 116D).

Sincerely,

Amanda Gronhovd
State Archaeologist
200 Tower Avenue
Fort Snelling History Center
St. Paul, MN 55111
Amanda.Gronhovd@State.MN.US
612-725-2411

MINNESOTA POLLUTION CONTROL AGENCY

520 Lafayette Road North | St. Paul, Minnesota 55155-4194 | 651-296-6300

800-657-3864 | Use your preferred relay service | info.pca@state.mn.us | Equal Opportunity Employer

August 28, 2018

Kristi Leshovsky
City Planner and Zoning Administrator
City of Moorhead
500 Center Avenue, Box 779
Moorhead, MN 56561

Re: Moorhead North Growth Area Alternative Urban Areawide Review

Dear Kristi Leshovsky:

Thank you for the opportunity to review and comment on the Alternative Urban Areawide Review (AUAR) for Moorhead North Growth Area project (Project) in the city of Moorhead, Clay County, Minnesota. The Project consists of a 10,000 acre development in Moorhead and Oakport Township. Regarding matters for which the Minnesota Pollution Control Agency (MPCA) has regulatory responsibility or other interests, the MPCA staff has the following comments for your consideration.

Permits and Approvals Required (Item 8)

- Please note that if a Clean Water Act Section 401 Water Quality Certification is required due to wetland impacts, an Antidegradation Assessment, as a requirement and part of the 401 Water Quality Certification, is also required. For further information about the 401 Water Quality Certification process, please contact Bill Wilde at 651-757-2825 or William.wilde@state.mn.us.
- This section indicates that a sanitary sewer extension permits is required and the possibility that expansion of the wastewater treatment facility may be necessary. The MPCA recommends these future needs be communicated to the wastewater treatment facility by the Project proposer. Questions on the sanitary sewer extension permit process should be directed to Corey Mathisen at 651-757-2554 or Corey.Mathisen@state.mn.us.

Water Resources (Item 11)

Stormwater

- The MPCA suggests utilizing Better Site Design concepts found in the Minnesota Stormwater Manual to maintain pre-development hydrology for the development by reducing the amount of new impervious surfaces that will result in increased flows to the Red River of the North. This includes the use of infiltration areas to keep water on the site wherever possible. Where infiltration is prohibited due to high water tables or contaminated soils, consider water harvest and reuse practices.
- The existing wetlands on the site may not be utilized for stormwater treatment unless they have been mitigated for.
- The MPCA General Construction Stormwater (CSW) permit requires that a minimum of 50 feet of natural buffers are maintained near surface waters (including the wetlands) during and after construction. If construction requires encroachment of any buffer, redundant (double) downgradient sediment controls must be used during the construction. The buffer must be restored with native vegetation upon completion of the construction.

- Due to impairment of the Red River of the North, the construction activity must conform with the Additional Erosion and Sediment control requirements in Appendix A of the CSW permit. This includes a soil stabilization timeline of within 7 days for any portion of the construction where soil disturbance will temporarily or permanently cease for 7 days or more.
- The MPCA requires review and approval of Stormwater Pollution Prevention Plans for construction activities resulting in disturbance of 50 acres or more including Common Plans of Development (one proposed plan where multiple activities occur over time) as defined in the CSW permit. Questions regarding Construction Stormwater Permit requirements should be directed to Roberta Getman at 507-206-2629 or Roberta.Getman@state.mn.us.

Solid Wastes, Hazardous Wastes, Storage Tanks (Item 12)
Please note that this section of the AUAR is not utilizing the language/discussion points from the current EAW form. The discussion in the current EAW for this section is directed at contamination/hazardous materials/wastes. The MPCA recommends this section of the AUAR be reevaluated using the language/discussion points from the current EAW form available on the EQB website: https://www.eqb.state.mn.us/content/eaw-process.

Low Impact Design
The MPCA advocates the use of Low Impact Design (LID) practices to aid in the minimization of stormwater impacts. LID is a stormwater management approach and site-design technique that emphasizes water infiltration, values water as a resource, and promotes the use of natural systems to treat water runoff. Examples include:

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

LID concepts may be found in the State of Minnesota Stormwater Manual dated November 2005 located on the MPCA website at: http://www.pca.state.mn.us/water/stormwater/stormwater-manual.html.

In addition, the MPCA LID webpage provides a description and examples of LID features such as permeable pavement, rain gardens, and green roofs. Links to other resources on LID are available as well. The website is located at: https://www.pca.state.mn.us/water/stormwater-management-low-impact-development-and-green-infrastructure.

We appreciate the opportunity to review this Project. Please provide your specific responses to our comments and notice of decision on the need for an Environmental Impact Statement. 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 review of this AUAR, please contact me by email at Karen.kromar@state.mn.us or by telephone at 651-757-2508.

Sincerely,

for Karen Kromar
Project Manager
Environmental Review Unit
Resource Management and Assistance Division

KK:bt

cc: Dan Card, MPCA, St. Paul
Bill Wilde, MPCA, St. Paul
Roberta Getman, MPCA, Rochester
Corey Mathisen, MPCA, St. Paul
Jim Ziegler, MPCA, Detroit Lakes
Beth Elliott, Stantec Consulting

Appendix D - Response to Draft AUAR Comment Letters

Appendix D – Draft North AUAR Response to Comments

AUAR Guidelines: The final AUAR document must indicate a section specifically responding to each timely and substantive comment on the draft that indicates the way in which the comment has been addressed. Similar comments may be combined for purposes of responding.

The Moorhead East Growth Area Draft Alternative Urban Areawide Review (Draft AUAR) was prepared for the City of Moorhead and distributed to the Environmental Quality Board (EQB) and persons and agencies on the official EQB mailing list in accordance with EQB rules on July 23, 2018.

The 30-day comment period expired on August 28, 2018. Four agencies submitted comments on the Draft AUAR. Copies of all comment letters submitted are included in Appendix E in the order shown below.

Agency/Organization/Citizen	**Letter Dated**	**Signatory**
Minnesota Department of Administration State Historic Preservation Office	August 28, 2018	Sarah Beimers
Minnesota Department of Administration State Archaeologist	August 28, 2018	Amanda Gronhovd
Minnesota Department of Natural Resources	August 28, 2018	Nathan Kestner
Minnesota Pollution Control Agency	August 28, 2018	Karen Kromar

Responses are generally confined to substantive issues that "address the accuracy and completeness of the information provided in the draft analysis, potential impacts that may warrant further analysis, further information that may be required in order to secure permits for specific projects in the future, and mitigation measures or procedures necessary to prevent significant environmental impacts within the area when actual development occurs" (Minnesota Rules Part 4410.3610, Subp. 5). Although comments and recommendations that do not address these areas do not need to have a response, they have been duly noted for the record and are not necessarily specifically addressed in the responses. As required by MN Rules, the RGU has provided replies to comments that are *substantive* (involving matters with major or practical importance) and where necessary, note any corrections(s) to be made to the appropriate sections of the AUAR or Mitigation Plan. Responses to comments are organized by AUAR Item number.

Item 8 Permits

1. **Comment:** Please note that if a Clean Water Act (CWA) Section 401 Water Quality Certification is required due to wetland impacts, an Antidegradation Assessment, as a requirement and part of the 401 Water Quality Certification, is also required.

   Commenting Agency: Minnesota Pollution Control Agency (MPCA)

   Response: This has been noted and added to the permits required section of Item 8.

2. **Comment:** This section indicates that a sanitary sewer extension permit is required and the possibility that expansion of the wastewater treatment facility may be necessary. The MPCA recommends these future needs be communicated to the wastewater treatment facility by the Project proposer.

   Commenting Agency: MPCA

   Response: Noted as part of the record in this document.

Item 11 Water Resources

1. **Comment:** The MPCA suggests utilizing 'Better Site Design' concepts found in the Minnesota Stormwater Manual to maintain pre-development hydrology for the development by reducing the amount of new impervious surfaces that will result in increased flows to the Red River of the North. This includes the use of infiltration areas to keep water on the site wherever possible. Where infiltration is prohibited due to high water tables or contaminated soils, consider water harvest and reuse practices.

   Commenting Agency: MPCA

   Response: This information has been added.

2. **Comment:** The existing wetlands on the site may not be utilized for stormwater treatment unless they have been mitigated for.

   Commenting Agency: MPCA

   Response: This information has been added.

3. **Comment:** The MPCA General Construction Stormwater (GCS) permit requires that a minimum of 50 feet of natural buffers are maintained near surface waters

(including wetlands) during and after construction. If construction requires encroachment of any buffer, redundant downgradient sediment controls must be used during construction. The buffer must be restored with native vegetation upon completion of construction.
Commenting Agency: MPCA

Response: This information has been added.

4. **Comment:** Due to impairment of the Red River of the North, the construction activity must conform with the Additional Erosion and Sediment control requirements in Appendix A of the CSW permit. This includes a soil stabilization timeline of within 7 days for any portion of the construction where soil disturbance will temporarily or permanently cease for seven days or more.

   Commenting Agency: MPCA

   Response: This information has been added.

5. **Comment:** The MPCA requires review and approval of Stormwater Pollution Prevention Plans for construction activities resulting in disturbance of 50 acres or more including Common Plans of Development…as defined in the CSW permit.

   Commenting Agency: MPCA

   Response: This information has been added.

6. **Comment:** The potential impacts to surface water are well described. However, DNR recommends clarifying if any upgrades will be required for Clay County Ditch 41 and if any additional ditches will be required for development.

   Commenting Agency: MDNR

   Response: This information has been added.

7. **Comment:** The DNR also recommends non-stormwater related mitigation strategies such as vegetated buffers, construction erosion control, and coordination with watershed district staff on water quality issues.

   Commenting Agency: MDNR

   Response: This information has been added.

8. **Comment:** DNR recommends the AUAR describe any work on flood damage reduction projects within and around the AUAR that affect this area. Please

indicate whether the Fargo-Moorhead Diversion project will influence development within the AUAR area.

Commenting Agency: MDNR

Response: This information has been added.

9. **Comment:** DNR also recommends the AUAR provide maps of the designated floodway and flood fringe zones on the proposed development map. Would zoning change with potential flood protection projects such as the Fargo-Moorhead Diversion? Additional descriptions of mitigation for development within the floodplain such as flood resistant structure requirements, limiting development density, and prohibition of fill are also recommended as part of the mitigation plan.

   Commenting Agency: MDNR

   Response: This information has been added.

10. **Comment:** The MPCA advocates the use of Low Impact Design (LID) practices to aid in the minimization of stormwater impacts. LID is a stormwater management approach and site-design technique that emphasizes water infiltration, values water as a resource, and proposes the use of natural systems to treat water runoff.

    Commenting Agency: MPCA

    Response: The above has been taken into consideration and language regarding LID was incorporated into the AUAR.

11. **Comment:** The numbers noted in this management plan for projected water use are not consistent with those found in the AUAR, but are much more conservative (an estimated higher use). DNR recommends the city reference the Buffalo Aquifer plan, the concerns noted in the plan, the multi-agency work to protect this aquifer, and the projected numbers associated with this plan and how they differ from projections in the AUAR.

    Commenting Agency: MNDR

    Response: The above has been taken into consideration and language regarding the Buffalo Aquifer plan was incorporated into the AUAR.

12. **Comment:** Due to recent declining water level trends in the Moorhead and Buffalo aquifers and the desire to increase appropriation from groundwater, DNR recommends the following mitigation items:
    - Additional groundwater monitoring of both aquifers
    - Water conservation measures in the mitigation plan as preventative, rather than reactionary mitigation measures. With the existing water supplies at limited supply, implementing water conservation through sprinkling limitations, waterline leak detection, encouraging drought tolerant landscaping, and water-conservation centered fee scheduling are all recommended measures to implement as Moorhead expands.
    - DNR recommends the City of Moorhead seek alternative water supplies should the monitoring indicate increased use of the aquifers will be sustainable.
    - Continued work with DNR to model and predict aquifer sustainability in response to appropriations.

    Commenting Agency: MDNR

    Response: This information has been added.

Item 12 Solid Wastes, Hazardous Wastes, Storage Tanks

1. **Comment:** Please note that this section of the AUAR is not utilizing the language/discussion points form the current EAW form.

    Commenting Agency: MPCA

    Response: The question has been updated in the AUAR, and the language has been changed to address the updated question.

Item 13 Wildlife and Rare Features

1. **Comment:** The MDNR recommends noting if NHIS was reviewed to clarify if this AUAR has the most current rare species information.

    Commenting Agency: MDNR

    Response: This information was already included in the Draft AUAR. Stantec conducted a review of the NHIS database under license agreement L-876.

2. **Comment:** The rusty patched bumble bee… was just recently documented in the vicinity of the proposed project... Please reference the guidance with the USFWS rusty patched bumble bee website to determine if the project has the potential to impact this protected species.

Commenting Agency: MDNR

Response: A search of the USFWS Rusty Patched Bumble Bee (RPBB) Map (https://www.fws.gov/midwest/endangered/insects/rpbb/rpbbmap.html) did not reveal documentation of the RPBB within the AUAR area; however, it is understood that the MDNR data may be more up-to-date than the USFWS data. Language has been added to this section to address the potential for the RPBB to occur within the AUAR area, including mitigation strategies, planting of native species for pollinators, and the potential for species-specific surveys.

3. **Comment:** The AUAR currently states there are no mapped Sites of Biodiversity Significance within the AUAR or immediate vicinity. However, …one Rail Road Right-of-Way prairie [exists] along the western edge of the AUAR area… The railroad crossing along 50th Ave S will likely have some impact on this habitat and should be noted.

   Commenting Agency: MDNR

   Response: The AUAR language has been updated to state that there are no mapped Sites of Biodiversity Significance within the AUAR area. Additional language addressing the potential impacts to the prairie associated with improvements to 50th Avenue South were added to this section.

4. **Comment:** ...If Moorhead plans to continue [the use of planting native prairie species as landscaping] in the city parks and infrastructure, it may be appropriate to list this as a mitigation measure within this section of the document. Additional encouragement of landowners to plant native species in stormwater retention ponds and landscaping may also be appropriate mitigation measures.

   Commenting Agency: MDNR

   Response: This has been addressed in the section described above regarding the RPBB.

Item 14 Historic Properties

1. **Comment:** Due to the nature and location of the proposed development, we recommend that a Phase IA literature review and archaeological assessment be completed to assess the potential for intact archaeological sites in the development area. If, as a result of this assessment, a Phase I archaeological survey is recommended, this survey should be completed.

   Commenting Agency: MDA – SHPO

Response: No archaeological surveys were conducted during the preparation of the AUAR as no specific development is planned at this time. However, the preparer recognizes the concerns of the MNSHPO, and has added language to the AUAR stating that all appropriate literature reviews and archaeological assessments should be completed prior to site development. Furthermore, coordination with the MNSHPO during development was recommended.

2. **Comment:** Because numerous archaeological sites exist in the area of the proposed project, I recommend that a qualified archaeologist conduct background research and (if necessary) an archaeological survey to determine if the proposed project could impact unrecorded archaeological or cemetery sites.

   Commenting Agency: MDA – State Archaeologist

   Response: No archaeological surveys were conducted during the preparation of the AUAR as no specific development is planned at this time. However, the preparer recognizes the concerns of the MNSHPO, and has added language to the AUAR stating that all appropriate literature reviews and archaeological assessments should be completed prior to site development. Furthermore, coordination with the MNSHPO during development was recommended.

Item 19 Cumulative Effects

1. **Comment:** Noteworthy potential cumulative concerns seen within the Moorhead area are both the impacts to surface water from run-off and encroachment onto the floodplain and the additional strains on the Moorhead and Buffalo aquifers. DNR recommends the geographic scale of cumulative potential effects be revised accordingly. The Buffalo Aquifer management plan also should be used as a source in describing potential cumulative effects. Items that DNR recommends be included in this section include:
   - DNR is currently reviewing the Dam Safety permit application for the Fargo-Moorhead Diversion, and is therefore likely a reasonably foreseeable project.
   - DNR is also currently reviewing two other AUAR's by the City of Moorhead. These AUAR's mention specific items such as changes to groundwater appropriation and infrastructure and therefore may be also considered reasonably foreseeable projects.
   - DNR has concerns with cumulative impacts of groundwater use, and recommends including further description of groundwater issues within the area. This could also include a write-up of how the City of Moorhead, MPS, and DNR are collaborating on finding a sustainable water supply for the City. The collaboration includes building of the Buffalo aquifer model, sharing this model and data with DNR to

facilitate our allocation of water resources, and continued meetings and discussions.

- Any planned and reasonably foreseeable flood damage reduction projects including in-town levees, and drainage projects should also be included in this section.

Commenting Agency: MDNR

Response: The above has been taken into consideration and language was added to the AUAR to include and address these additional potential cumulative concerns.