Chapter 6: Transportation

I. INTRODUCTION

The purpose of the Transportation Plan element of the Comprehensive Plan is to provide guidance to the City of North Mankato, as well as existing and future landowners in preparing for future growth and development. As such, whether an existing roadway is proposed for upgrading or a land use change is proposed on a property, this Plan provides the framework for decisions regarding the nature of roadway infrastructure improvements necessary to achieve safety, adequate access, mobility, and performance of the existing and future roadway system. The primary goal of this Plan is to establish local policies, standards, and guidelines to guide major transportation investments and policy decisions. To accomplish these objectives, the Transportation Plan provides information about:

- Previous planning through the Mankato Area Transportation Planning Study (MATAPS) in 2011 which identified existing and potential deficiencies of the existing arterial-collector street system.
- The functional hierarchy of streets and roads related to access and capacity requirements.
- Access management policies and intersection controls.
- Future planning through the Mankato Area Planning Organization's (MAPO) 2045 Long Range Transportation Plan. This plan will be completed in 2015/16 and will identify future transportation system improvement needs.

II. TRANSPORTATION SYSTEM PRINCIPLES AND STANDARDS

The transportation system principles and standards included in this Plan create the foundation for developing the transportation system, evaluating its effectiveness, determining future system needs, and implementing strategies to fulfill the goals and objectives identified.

III. FUNCTIONAL CLASSIFICATION

It is recognized that individual roads and streets do not operate independently in any major way. Most travel involves movement through a network of roadways. It becomes necessary to determine how this travel can be channelized within the network in a logical and efficient manner. Functional classification defines the nature of this channelization process by defining the part that any particular road or street should play in serving the flow of trips through a roadway network. Functional classification is the process by which streets and highways are grouped into classes according to the character of service they are intended to provide. Functional classification involves determining what functions each roadway should perform prior to determining its design features, such as street widths, speed, and intersection control.

The Minnesota Department of Transportation (MnDOT) has developed definitions and criteria for roadway classification based on function. The functional classification system typically consists of four major classes of roadways: Principal Arterials, Minor Arterials, Major Collectors, and Minor Collectors. Roadways are classified as either arterials, collectors, or local streets based on several criteria including (but not limited to) geographic units connected, types of streets connected, length of trip served, distance between streets of the same classification, volume of traffic carried by the facility, speed limit and design (right-of-way width and access provisions).

The existing roadway classifications in North Mankato are described below.

A. Principal Arterials

Roadways of this classification typically connect large urban areas to other large urban areas or they connect metro centers to regional business concentrations via a continuous roadway without stub connections. They are designed to accommodate the longest trips. Their emphasis is focused on mobility rather than access. They connect only with other Principal Arterials, interstate freeways, and select Minor Arterials and Collector Streets. There are two Principal Arterial roadways in the City of North Mankato, US 14 and US 169. US 14 provides east-west connectivity across the southern portion of the state of Minnesota. US 169 runs north-south with connections into Iowa on the south and to the Twin Cities metropolitan area and beyond on the north.

B. Minor Arterials

Roadways of this classification typically link urban areas and rural Principal Arterials to larger towns and other major traffic generators capable of attracting trips over similarly long distances. Minor Arterials service medium length trips, and their emphasis is on mobility as opposed to access in urban areas. They connect with Principal Arterials, other Minor Arterials, and Collector Streets. Connections to Local Streets should be avoided if possible. Minor Arterials are responsible for accommodating thru-trips, as well as trips beginning or ending outside the North Mankato area. Minor Arterial roadways are typically spaced approximately ½ to 1 mile in developed areas and approximately 1 to 2 miles in developing areas. All or portions of Lookout Drive, Lor Ray Drive, Lee Boulevard, Belgrade Avenue, Range Street, Center Street and Sherman Street are identified as Minor Arterial roadways in North Mankato.

C. Major Collectors

Roadways of this classification typically link neighborhoods together within a city or they link neighborhoods to business concentrations. In highly urban areas, they also provide connectivity between major traffic generators. A trip length of less than 5 miles is most common for Major Collector roadways. A balance between mobility and access is desired. Major Collector street connections are predominately to Minor Arterials, but they can be connected to any of the other four roadway functional classes. Local access to Major Collectors should be provided via public streets and individual property access should be avoided. Generally, Major Collector streets are predominantly responsible for providing circulation within a city. However, the natural features associated with wetland and drainage complexes and parks, and location of principal arterials through the community results in circulation within North Mankato being reliant on a combination of the Minor Arterial and Major Collector roadways. Major Collectors

are typically spaced approximately ¼ to ¾ mile in developed areas and approximately ½ to 1 mile in developing areas. Portions of Lookout Drive (CSAH 13), Howard Drive, Commerce Drive, Lee Boulevard, Lake Street, Webster Avenue, Lind Street and Center Street are functionally classified as Major Collector roadways in the North Mankato area.

D. Minor Collector Streets

Roadways of this classification typically include city streets and rural township roadways, which facilitate the collection of local traffic and convey it to Major Collectors and Minor Arterials. Minor Collector streets serve short trips at relatively low speeds. Their emphasis is focused on access rather than mobility. Minor Collectors are responsible for providing connections between neighborhoods and the Major Collector/Minor Arterial roadways. These roadways should be designed to discourage short-cut trips through the neighborhood by creating jogs in the roadway (i.e. not direct, through routes). CSAH 41 within the City of North Mankato is classified as a minor collector.

IV. Roadway Capacity

Capacities of roadway systems vary based on the roadway's functional classification. Based on accepted standards, roadway capacity per lane for divided arterials is 700 to 1,000 vehicles per hour and 600 to 900 vehicles per hour for undivided arterials. These values tend to be around 10% of the daily physical roadway capacity.

A. Principal and Minor Arterials

Based on the above figures, a two-lane arterial roadway has a daily capacity of 12,000 to 18,000 vehicles per day, a four-lane divided arterial street has a daily capacity of 28,000 to 40,000 vehicles per day, and a four-lane freeway has a daily capacity of approximately 70,000 vehicles per day. The variability in capacities are directly related to many roadway characteristics including access spacing, traffic control, adjacent land uses, as well as traffic flow characteristics, such as percentage of trucks and number of turning vehicles. Therefore, it is important that the peak hour conditions are reviewed to determine the actual volume-to-capacity on roadway segments with average daily traffic volumes approaching these capacity values.

B. Major Collectors and Minor Collector Streets

Major Collector and Minor Collector streets have physical capacities similar to those of a two-lane arterial street, however the acceptable level of traffic on a residential street is typically significantly less than the street's physical capacity. The acceptable level of traffic volumes on Major Collectors and Minor Collector streets vary based on housing densities and setbacks, locations of parks and schools, and overall resident perceptions. Typically, traffic levels on Major Collector streets in residential/educational areas are acceptable when they are at or below 50% of the roadway's physical capacity, resulting in an acceptable capacity of 6,000 to 9,000 vehicles per day. Acceptable traffic levels on Minor Collector streets are considerably less. Typically, a daily traffic volume of 1,000 to 1,500 vehicles per day is acceptable on Minor Collector streets in residential areas.

Table 1 – Roadway Types and Capacities, identifies various roadway types and the estimated daily capacities that the given roadway can accommodate.

Table 1 – Roadway Types and Capacity	
Roadway Type	Daily Capacities
Minor Collector Street	Up to 1,000
Urban 2-Lane	7,500 – 12,000
Urban 3-Lane or 2-Lane Divided	12,000 – 18,000
Urban 4-Lane Undivided	Up to 20,000
Urban 4-Lane Divided	28,000 to 40,000
4-Lane Freeway	Up to 70,000

The capacity of a transportation facility reflects its ability to accommodate a moving stream of people or vehicles. It is a measure of a supply side of transportation facilities. Level of Service (LOS) is a measure of the quality of flow. The concept of LOS uses qualitative measures that characterize operational conditions with a traffic stream and their perception by motorists. Six LOS are defined for roadways. They are LOS A, B, C, D, E, and F. LOS A represents the best operating conditions and LOS F represents the worst. The LOS of a multilane roadway can be dictated by its volume-to-capacity (v/c) ratio. The LOS of a two-lane roadway is defined in terms of both percent time-spent-following and average travel speed. LOS F is determined when v/c ratio is over 1.00. The criteria for LOS and general v/c ratio for multilane highways and speed for two-lane highways are provided in **Table 2** below:

Table 2 – Highway Level of Service		
LOS	Multilane	Two-Lane
	v/c Ratio	Avg. Travel Speed (mph)
A	<0.28	>55
B	>0.28 – 0.45	>50-55
C	>0.45 – 0.65	>45-50
D	>0.65 – 0.86	>40-45
E	>0.86 – 1.00	≤40
F	> 1.00	v/c >1.00

For roadways in urban sections, the urban street class and average travel speed determine the LOS. This is generally similar to the LOS for two-lane highways but takes into account the free flow speed of the facility (average speed achieved with no other vehicles present on roadway) and the addition of traffic control. This criteria is established in **Table 3** below:

Table 3 – Urban Street Level of Service				
Range of Free-Flow Speed	55 to 45	45 to 35	35 to 30	35 to 25
LOS	Average Travel Speed (mph)			
A	>42	>35	>30	>25
B	>34-42	>28-35	>24-30	>19-25
C	>27-34	>22-28	>18-24	>13-19
D	>21-27	>17-22	>14-18	>9-13
E	>16-21	>13-17	>10-14	>7-9
F	≤16	≤13	≤10	≤7

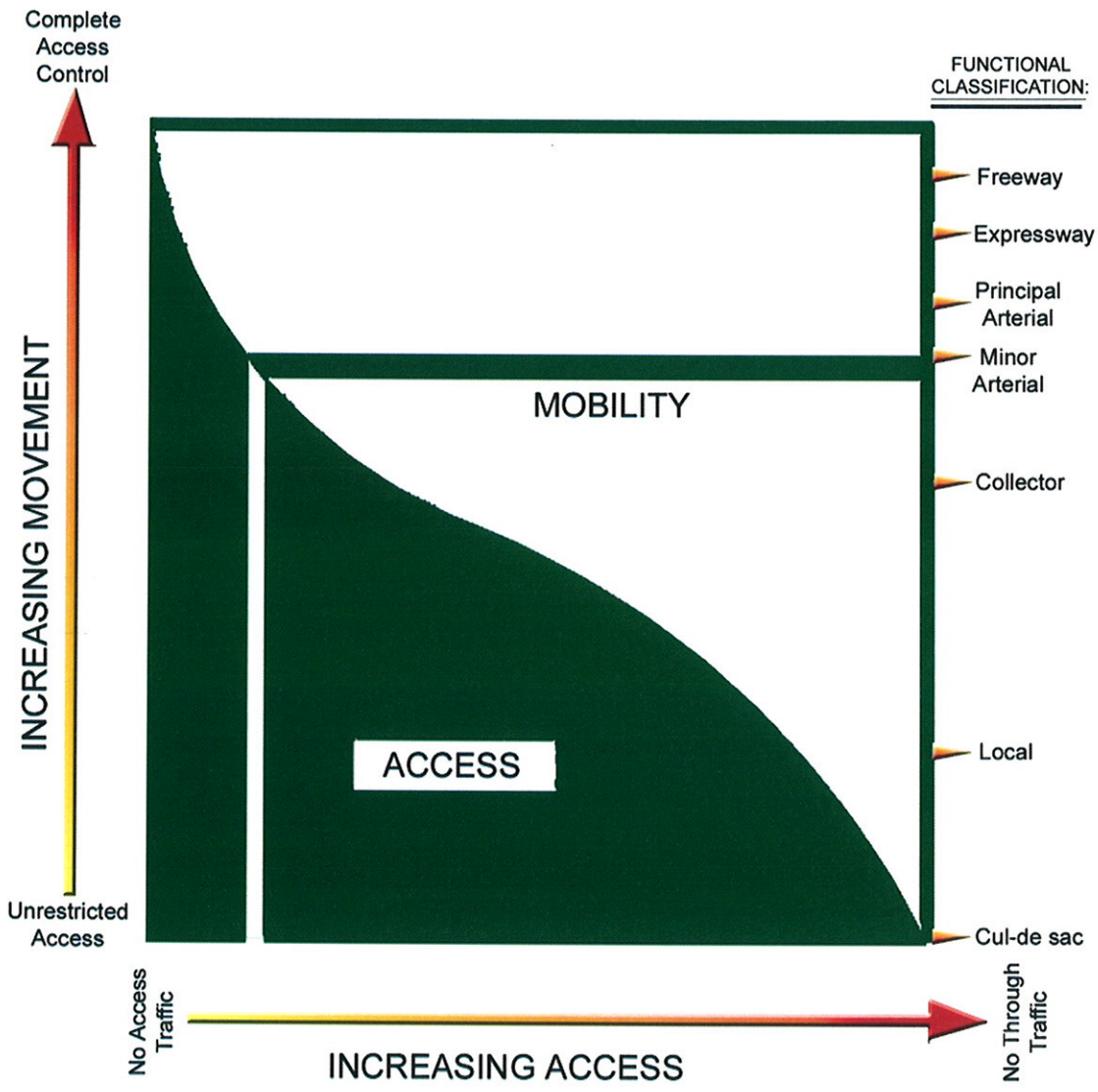
Generally, the City of North Mankato should consider capacity improvements on roadways with a LOS D or worse and volume-to-capacity ratios over 0.75 during the peak hours.

V. ACCESS MANAGEMENT GUIDELINES

Access management guidelines are developed to maintain traffic flow on the network so each roadway can provide its functional duties, while providing adequate access for private properties to the transportation network. This harmonization of access and mobility is the keystone to effective access management.

Mobility, as defined for this Transportation Plan, is the ability to move people, goods, and services via a transportation system component from one place to another. The degree of mobility depends on a number of factors, including the ability of the roadway system to perform its functional duty, the capacity of the roadway, and the operational level of service on the roadway system.

Access, as applied to the roadway system in North Mankato, is the relationship between local land use and the transportation system. There is an inverse relationship between the amount of access provided and the ability to move through-traffic on a roadway. As higher levels of access are provided, the ability to move traffic is reduced. The graphic below illustrates the relationship between access and mobility.



Each access location (i.e. driveway and/or intersection) creates a potential point of conflict between vehicles moving through an area and vehicles entering and exiting the roadway. These conflicts can result from the slowing effects of merging and weaving that takes place as vehicles accelerate from a stop turning onto the roadway, or deceleration to make a turn to leave the roadway. At signalized intersections, the potential for conflicts between vehicles is increased, because through-vehicles are required to stop at the signals. If the amount of traffic moving through an area on the roadway is high and/or the speed of traffic on the roadway is high, the number and nature of vehicle conflicts are also increased.

Accordingly, the safe speed of a road, the ability to move traffic on that road, and safe access to cross streets and properties adjacent to the roadway all diminish as the number of access points increase along a specific segment of roadway. Because of these effects, there must be a balance between the level of access provided and the desired function of the roadway.

In North Mankato, access standards and spacing guidelines are recommended as a strategy to effectively manage existing ingress/egress onto City streets and to provide access controls for new development and redevelopment. The proposed access standards (driveway dimensions) are based on MnDOT State-Aid design standards. **Tables 4 and 5** below present the proposed access standards and access spacing for the North Mankato roadway network:

Table 4 – Roadway Access Standards

Driveway Dimensions	Residential	Commercial or Industrial
Driveway Access Width	11 feet – 22 feet, 16 feet desired	16 feet – 32 feet 32 feet desired
Minimum Distance Between Driveways	20 feet	20 feet
Minimum Corner Clearance from a Collector Street	60 feet	80 feet

Table 5 – Access Spacing Guidelines for Collector Roadways in North Mankato (1) (2)

Type of Access by Land Use Type	Minor Arterial/Major Collector	Minor Collector
Low & Medium Density Residential		
Private Access	Not Permitted (3)	As Needed (4)
Minimum Corner Clearance from a Collector Street	660'	300'
Commercial, Industrial or High Density Residential		
Private Access	Not Permitted (3)	As Needed (4)
Minimum Corner Clearance from a Collector Street	660'	660'

(1)Some existing City streets that are currently functionally classified as Minor Arterial, Major Collector, or Minor Collector do not meet these criteria. These guidelines should be used for new streets and roadways that will functionally classified as Minor Arterial, Major Collector, or Minor Collector

(2)These guidelines apply to City streets only. Nicollet County and MnDOT have access authority for roadways under their jurisdiction.

(3) Access to Minor Arterials and Major Collectors should be limited to public street access. .Steps should be taken to redirect private accesses on Major Collectors to other local streets. New private access to Major Collectors is not permitted unless deemed necessary.

(4) Private access to Minor Collectors is to be evaluated by other factors. Whenever possible, residential access should be directed to non-continuous streets rather than Minor Collector roadways. Commercial/Industrial properties are encouraged to provide common accesses with adjacent properties when access is located on the Minor Collector system. Cross-traffic between adjacent compatible properties is to be accommodated when feasible. A minimum spacing between accesses of 660' in commercial, industrial, or high density residential areas is encouraged for the development of turn lanes and driver decision reaction areas.

VI. GEOMETRIC DESIGN STANDARDS

Geometric design standards are directly related to a roadway's functional classification and the amount of traffic that the roadway is designed to carry. The following is a discussion of various geometric design elements and how each element relates to a particular roadway's ability to perform its function in the roadway network.

A. Roadway Width

Roadway and travel lane widths are directly associated with a roadway's ability to carry vehicular traffic. On Minor Arterial roadways, Major Collector roadways and Minor Collector streets, a 12' lane is required for each direction of travel. The 24' total travel width is needed to accommodate anticipated two-way traffic volumes without delay. In addition to the travel width, minimum shoulder/parking lane widths are also required to accommodate parked or stalled vehicles. Roadway widths not meeting the Geometric Design Standards will result in decreased performance of the particular roadway and additional travel demand on the adjacent roadway network components. For example, a substandard Major Collector roadway may result in additional travel demand on an adjacent Minor Collector street resulting in an overburden for adjacent landowners. Similarly, additional local circulation may result on an adjacent Minor Arterial resulting in reduced mobility for regional trips.

B. Sidewalk/Trail

Sidewalks and/or trails are recommended to be adjacent to all Minor Arterial, Major Collector and Minor Collector roadways within North Mankato to accommodate pedestrian, bicycle, and other non-motorized travel in a safe and comfortable manner. These roadways are expected to carry a significant amount of vehicular traffic and separation of travel modes is necessary. In commercial and industrial areas, the requirements for trails and sidewalks may vary to accommodate additional pedestrian and bicycle traffic.

Along Minor Arterials and Major Collector roadways, an 8-foot wide bituminous or concrete trail and/or 6-foot wide concrete sidewalk is recommended on either side of the roadway to accommodate local pedestrian and bicycle travel. The pedestrian facilities on both sides of these roadways allow for pedestrian travel within the corridor without introducing excessive crossing demand on Minor Arterials and Major Collectors. A sidewalk and trail will accommodate pedestrian and bicycle travel along the corridor, as well as provide a safe, comfortable link between lower volume residential streets and the other pedestrian and trail facilities within the community. A 10-foot wide trail would be more desirable as the 10-foot width would better accommodate two-way bicycle traffic. The City of North Mankato's comprehensive trail plan will be utilized to determine where bike trails are required.

Along Minor Collector roadways, a 6-foot concrete sidewalk is recommended on at least one side of the roadway both sides being preferred. With the anticipated vehicular volumes on Minor Collector streets, pedestrians can safely cross the roadway, however, pedestrian travel along the roadway may become uncomfortable.

C. Design Speed

The design speed of a roadway is directly related to the roadway's function in the roadway system. The focus of Minor Arterial roadways is mobility; therefore these roadways should be designed to

accommodate higher travel speeds. Likewise, Minor Collector roadways are more focused on accessibility and should be designed to accommodate lower travel speeds. The function of Major Collectors is balanced between mobility and accessibility; therefore these roadways should be designed accordingly. **Table 6** below presents the recommended design speed for the North Mankato roadway network.

Table 6 – Roadway Design Speed Guidelines	
Functional Classification	Design Speed (1)
Minor Collector Street	30 mph
Major Collector Roadway	35 – 40 mph
Minor Arterial Roadway	45 – 55 mph
(1) At the discretion of the City Engineer for City roadways, with approval by the City Council.	

D. Right-of-Way Width

Right-of-way width is directly related to the roadway's width and its ability to carry vehicular and pedestrian traffic in a safe and efficient manner. For Minor Collector streets in residential areas, a minimum right-of-way width of 80' is recommended for the added roadway width, as well as to provide added setback distance between the roadway and homes along the roadway. Right-of-way widths of 80 feet to greater than 100 feet may be required on Minor Arterials and Major Collector roadways within commercial areas to accommodate the potential for higher traffic volumes and the need for additional lanes.

For the City of North Mankato, geometric design standards for the reconstruction or construction of new Minor Arterial, Major Collector, and Minor Collector Streets will be based on MnDOT State-Aid standards.

VII. ROADWAY JURISDICTION

Roadway jurisdiction directly relates to functional classification of roadways. Generally, roadways with higher mobility functions (such as arterials) should fall under the jurisdiction of a regional level of government. In recognizing these roadways serve greater areas resulting in longer trips and higher volumes, jurisdiction of Principal Arterial and Minor Arterial roadways should fall under the jurisdiction of the state and county, respectively. Similarly, roadways with more emphasis on local circulation and access (such as collectors) should fall under the jurisdiction of the local government unit. These roadways serve more localized areas and result in shorter trip lengths and lower volumes. Major Collector and Minor Collector roadways should fall under the jurisdiction of the City of North Mankato.

As roadway segments are considered for turn-back to the City, efforts will be taken to evaluate the roadway features for conformance to current standards, structural integrity, and safety. This effort will help the City develop short and long-range programs to assume the responsibilities of jurisdictional authority.

VIII. TRANSPORTATION ISSUES

The Mankato Area Transportation and Planning Study (MATAPS), completed in 2011, included a comprehensive technical analysis and public outreach effort to identify transportation issues for the MATAPS area. The following major issues were identified specific to North Mankato:

- US 14/US 169 interchange – safety and connectivity concern (eastbound on US 14 to northbound US 169); high-crash location
- US 169 at Lind Street and Webster Avenue – local access and safety concerns
- Commerce Drive – segment safety from CSAH 13 to Lor Ray Drive
- North-south connectivity – Need to improve connectivity within North Mankato Industrial Park
- Lee Boulevard – capacity concern from Roe Crest Drive to Lor Ray Drive
- Lee Boulevard at Belgrade Avenue – access/queues (problem with left turn movements)
- CSAH 41 (Judson Bottom Road) – safety and design issues (limited visibility and high speeds)
- North Mankato Transit Hub – need for convenient transfer location for local and regional transit service
- Trail expansion – potential trail expansion throughout the MATAPS study area
- Multi-modal planning – residential, commercial and industrial developments need to accommodate varying modes of transportation

IX. EXISTING TRANSPORTATION SYSTEM

This section of a typical Transportation Plan would include an analysis of the existing transportation system including a discussion of existing traffic volumes, capacity concerns and safety issues. However, the writing of this Transportation Plan element of the Comprehensive Plan falls between two significant regional transportation planning efforts that also include an analysis of North Mankato's transportation system. The following summarizes each of these planning efforts:

- Mankato Area Transportation and Planning Study (MATAPS) - This multi-jurisdictional study was completed in 2011. It documents the development of a 25-year vision for the Mankato and North Mankato region including a review of existing transportation conditions, future year transportation deficiencies and issues, potential transportation improvements and recommended multi-modal transportation projects and supporting policies.

- Mankato Area Transportation Planning Organization (MAPO) 2045 Long-Range Transportation Plan – This plan will be the first Metropolitan Long Range Transportation Plan for MAPO. The planning process began in 2014 and will be completed by 2015/16. The plan will:
    - advise MAPO policymakers about the metropolitan area's major transportation assets,
    - present key technical findings that inform policy discussion,
    - provide data on the multimodal improvements needed to maintain and upgrade the transportation infrastructure, and
    - provide a fiscally constrained program of projects for future public investments.

The City of North Mankato's participation in each of the above planning efforts is substantial.

Consistent with their MATAPS involvement, the city will continue to have both technical and policy board representation in the MAPO 2045 Long Range Transportation Plan.

Because the timing of the City's Comprehensive Plan and this associated Transportation Plan falls between these two large regional planning efforts, it was agreed there was little value in re-analyzing existing transportation conditions for this Transportation Plan. Instead, the city encourages interested individuals to refer to the MATAPS report and figures for this information. The MATAPS report and figures can be found online at http://www.mankato-mn.gov/mataps/Page.aspx or by contacting the city. This report includes the following relevant figures:

- Average Daily Traffic (2010)
- Existing Roadway Capacity Deficiencies
- Intersection and Segment Crashes
- Truck Traffic
- Transit Service Concerns
- Roadway/Bicycle Compatibility
- 2035 Traffic Volumes
- 2035 Capacity Analysis
- Long Range Major Roadway Projects
- Bus Rapid Transit Concept Plan
- Proposed Non-Motorized System Plan

When complete, the MAPO 2045 Long Range Transportation Plan will also produce a report and graphics documenting existing conditions; future traffic forecasts; issues; goals; objectives and performance measures; range of alternatives; financial plan; and recommended future network and implementation report. Information relevant to North Mankato's Transportation System should be incorporated in an update to this Transportation Plan.

X. FUTURE TRANSPORTATION SYSTEM

As described above, a full analysis of North Mankato's future transportation system needs was not conducted as part of this Transportation Plan. However, the City has begun discussions with MAPO representatives and MnDOT to consider an update of their functional classification system. As of this writing, the MAPO Technical Advisory Committee is working with Mn/DOT to update the functional classifications for the roadway systems within the MAPO planning area (including the City of North Mankato). Figure 6.1 shows the proposed functional classification system for existing roadways in the City of North Mankato and for future roadways within the growth areas identified in this Comprehensive Plan. The functional classification of the existing and future roadway network will be revisited as part of MAPO's 2045 Long Range Transportation Plan and any changes should be incorporated as an update to this Transportation Plan as well.

Several scenarios for modifications to the Trunk Highway 169/Trunk Highway 14 interchange and for access modifications to the segment of TH 169 from the TH 14 interchange to Webster Avenue have been developed in the past. The primary objectives of the proposed improvements for the interchange are to eliminate the need to cross lanes of traffic when making the following turning movements:

- Eastbound TH 14 to northbound TH 169

- Northbound TH 169 to westbound TH 14

Most of the improvement scenarios also included modification to the existing access conditions at the Lind Street and/or Webster Avenue intersections. Options considered included the removal of signals, closing access completely, or modifying access to right in/right out at one or both locations.

During the last MATAPS updates in 2003 and 2011, the City of North Mankato staff and Council voiced opposition to any option that eliminated or reduced the level of access at Webster Avenue. Based on discussions with City staff and City Council, the position of the City of North Mankato has not changed on this issue and the City will only support options for improvements within this corridor that no not restrict access at the TH 169/Webster Avenue intersection from that which presently exists.

XI. TRANSPORTATION SYSTEM GOALS, OBJECTIVES, AND POLICIES

The following section outlines the primary goals for the transportation system followed by a series of objectives and policies intended to influence future development efforts that align with the community visions in this plan.

GOAL 1: Provide input in the preparation of the Mankato Area Transportation Planning Organization (MAPO) 2045 Long-Range Transportation Plan (LRTP)

Policy 1.1.1: The City Planner and City Engineer, as MAPO Technical Advisory Committee (TAC) members, will provide input and feedback in the preparation of the 2045 LRTP.

Policy 1.1.2.: The City Councilperson designated as the MAPO Policy Board member, will provide input and feedback in the preparation of the 2045 LRTP.

Policy 1.1.3: The City's TAC representatives and Policy Board representative will periodically update the City Council on the progress of the LRTP preparation and, when appropriate, seek input on decisions impacting the City of North Mankato's transportation system

Policy 1.1.4: The City will promptly provide the information technical information requested throughout the preparation of the LRTP.

Policy 1.1.5: Continue to support options for the TH 169/TH 14 interchange and adjacent TH 169 corridor to the south that will maintain full access conditions at the TH 169/Webster Avenue intersection.

GOAL 2: Implement and enforce standards for new streets and roadways within identified growth areas

Objective 2.1: Assign appropriate functional classification to existing and new streets and roadways

Policy 2.1.1: City Planner and City Engineer will provide the MAPO TAC and Policy Board with recommendations regarding functional classification of new streets and roadways.

Policy 2.1.2: City Planner and City Engineer will monitor traffic and other transportation characteristics of existing streets and roadways and

make recommendations regarding changes to the functional classification of the existing streets and roadways

Objective 2.2: Implement and enforce standards for existing and new streets and roadways

Policy 2.2.1: Incorporate standards related to access management standards and geometric design standards as outlined herein and as developed in the LRTP into the City's zoning ordinances related to new streets and roadways.

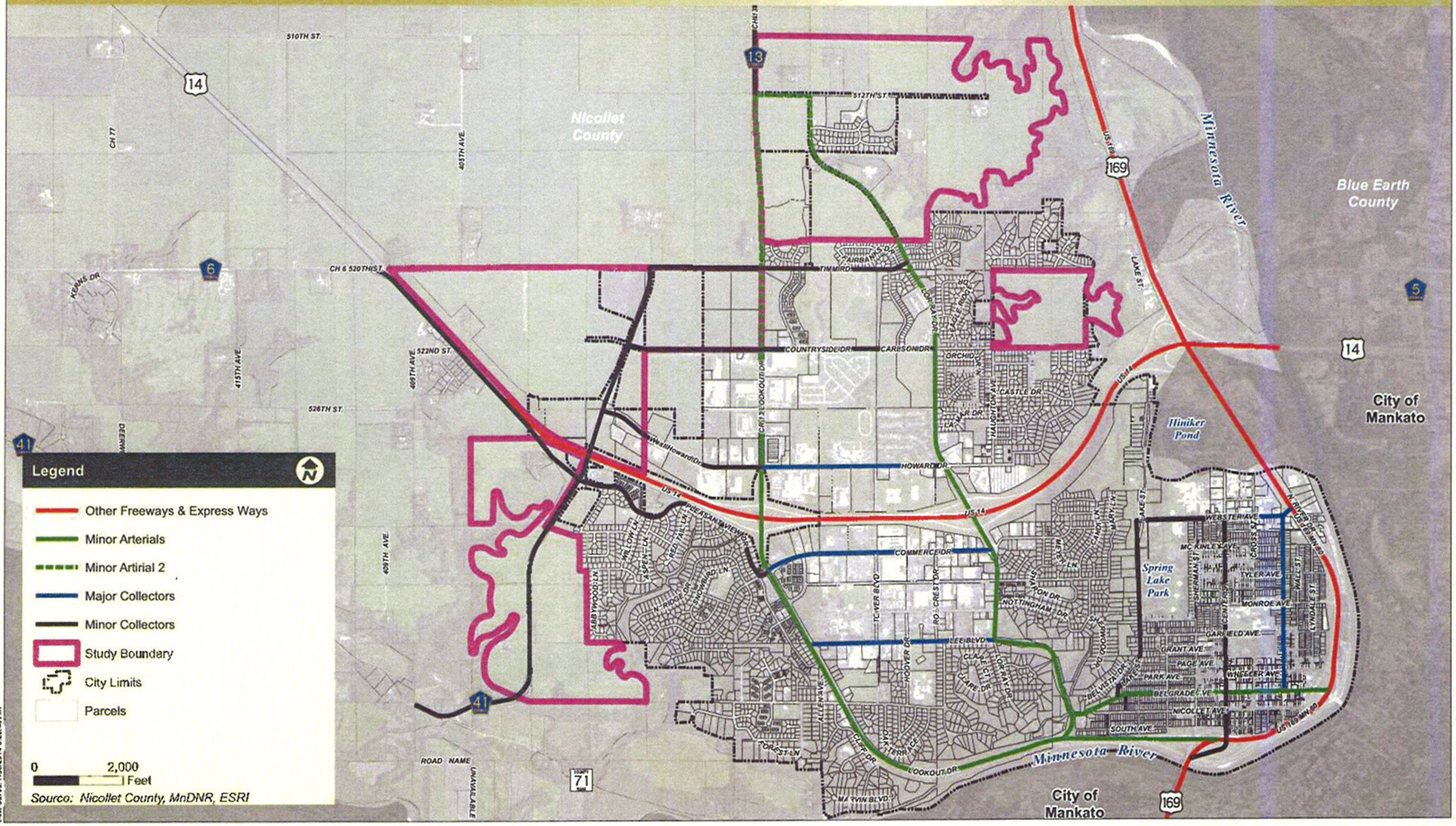
Policy 2.2.2: Monitor opportunities to incorporate standards related to access management standards and geometric design standards as outlined herein and as developed in the LRTP into the reconstruction of existing streets and roadways and implement to the extent practical.

2014 Comprehensive Plan

City of North Mankato

Figure 6.1 Proposed Functional Classification

July, 2014



Chapter 7: Public Utilities

I. INTRODUCTION

The City of North Mankato has a significant investment in its existing public utilities systems (water, wastewater and stormwater). The continued expansion and development within the growth areas identified in this Comprehensive Plan will require the extension of public utilities into those areas. In general, the existing infrastructure system is well-positioned and of adequate size to support the required expansion into the growth areas. However, coordination will be required between community development and the required expansion of the utility system. In some cases, the cost of providing utility service may dictate where and when future growth will occur and when.

The following sections provide a general description of the existing water system, wastewater system and storm drainage system within the City of North Mankato. Also included are schematic concepts demonstrating how the public utility systems may be expanded into most of the growth areas identified in this plan. This Chapter is not intended to be a detailed infrastructure master plan, but rather a source of information that will assist stakeholders (citizens, City staff, and potential developers) with the information about these systems and factors that may impact decision-making regarding development strategies.

II. WATER SYSTEM

A. Existing Systems

The City of North Mankato operates an extensive water treatment and supply system, serving residential, commercial and industrial users in two pressure zones: the upper system and the lower system.

Under normal circumstances, the two systems operate independently, each with their own supply, treatment, storage, and distribution systems. However, there is a connection between the two systems to facilitate the transfer of water between systems in the event of an emergency.

Water supply in the lower system is provided by two groundwater wells, Well No. 5 and Well No. 6, both located near Water Treatment Plant No. 1 at intersection of Belgrade Avenue and Nicollet Avenue. The upper system is currently provided by two groundwater wells, Well No. 7 and Well No. 8. Well No. 7 is located near Water Treatment Plant No. 2 on Howard Drive. Well No. 8 is located in the Caswell Park complex, just east of Water Treatment Plant No. 2. A third well, Well No. 9, is currently in the design phase and will be constructed in 2014 and 2015. Table 1 below shows a summary of the well characteristics:

Table 7.1 - Well Data					
Well No.	**5-Lower**	**6-Lower**	**7-Upper**	**8-Upper**	**9-Upper (Proposed)**
Year Constructed	1950	1959	1975	1986	2014-2015
Well Depth (ft)	680	687	860	845	845
Casing Diameter (in)	16	24/20	24/20	30/24/18	30/24/18
Water Bearing Foundation	Ironton / Galesville / Mt. Simon	Ironton / Galesville / Mt. Simon	Franconia / Mt. Simon	Mt. Simon	Mt. Simon
Pump Type	Vertical Turbine	Vertical Turbine	Vertical Turbine	Vertical Turbine	Vertical Turbine
Capacity (gal/min)	1000	1440	1100	1100	1100

As mentioned previously, two water treatment plants treat the well water before it is pumped into the distribution system. Treated water for the lower system is provided by Water Treatment Plant No. 1, located at the intersection of Belgrade Avenue and Nicollet Avenue. This facility was initially construction in 1959 with rehabilitation work completed most recently in 1994. The facility consists of a steel gravity filter which treats the raw water for iron and manganese and has a capacity of 1,500 gallons per minute (gpm). Treated water for the upper system is provided by Water Treatment Plant No. 2, located on Howard Drive just east of the Caswell Park athletic complex. This facility was constructed in 1975 and most recently rehabilitated in 2001, and expanded. The treatment capacity was increased to 2200 gpm in 2001.

The existing treated water storage for the City of North Mankato consists of five reservoirs. Three ground-level storage reservoirs provide a total of 750,000 gallons of water storage for the lower system. One of the ground storage reservoirs (500,000 gallons) is located at Water Treatment Plant No. 1. The other two reservoirs for the lower system with a combined capacity of 250,000 gallons are located in the hillside bluff overlooking the lower North Mankato area and thus act as elevated reservoirs for the lower system. The upper system is served by two 500,000 gallon elevated water towers, one located on Tower Drive, constructed in 2011 and one located on Carlson Drive, constructed in 1993. In addition, a 750,000 gallon ground storage reservoir is located adjacent to Water Treatment Plant No. 2.

High service pumps are utilized to pump water from the two ground storage reservoirs located at the water treatment plants. Two high service pumps at Water Treatment Plant No. 1 are capable of pumping 1,200 gpm each and approximately 2,000 gpm when operating together. In addition, the pumps at this plant are capable of transferring water from the lower system to the upper system at a rate of approximately 1,000 gpm. High service fixed speed pumps at Water Treatment Plant No. 2 are capable of delivering 2,200 gpm from the ground storage reservoir ar Water Treatment Plant No. 2. A variable speed pump at this location is capable of delivering up to 1,100 gpm to the distribution system.

The existing water distribution system consists of 4-inch diameter through 16-inch diameter mains. The oldest watermains are in the lower area. Those that have not been replaced with ductile iron or polyvinyl chloride (PVC) pipe within the past 20 to 25 years are cast iron pipe. Most of the upper system is ductile iron or PVC pipe. Dead end mains have, in general, been minimized, which provides for adequate circulation and very few areas of stagnant water throughout the lower and upper systems. The City's water department staff flushes the system on

a regular basis in order to clean sediment and rust from the system. Numerous reconstruction projects over the past 25 to 30 years, primarily in the lower system, have greatly improved the water supply and pressure, and have increased the reliability of the system. The existing water system in North Mankato is shown on Figure 7.1.

B. Future Improvements

With the proposed construction of new Well No. 9 in the upper system, the well capacity is adequate to meet the projected water demands throughout the planning period. Firm capacity, calculated over 24 hours with the largest well in each system out of service is 1.6 million gallons per day (mgd) in the lower system and 3.2 mgd in the upper system. Projected future peak day demands for the planning period are 1.2 million gallons per day in the lower system and 2.5 million gallons per day in the upper system. The City will continue to implement an on-going well maintenance program in order to maximize the useful lives of the well casings, pumps, piping and equipment. Periodic repairs and replacements will be performed as required.

The capacity of the water treatment plants and high service pumping should equal the maximum day demands for the planning period. The projected future peak day demands for the planning period are 1.2 mgd in the lower system and 2.5 mgd in the upper system. Treatment capacity of Plant No. 1 is 1.8 and Plant No. 2 is 2.6 mgd. Since the capacity of each treatment plant exceeds the projected peak day demand for each facility, the treatment capacity is adequate for the planning period. However, Water Treatment Plant No. 1 is 55 years old and was most recently rehabilitated 20 years ago. Water Treatment Plant No. 2 is 39 years old and was most recently rehabilitated 13 years ago. Therefore it is likely that both water treatment facilities will need to be rehabilitated or reconstructed within the planning period. At such time that significant rehabilitation is required at one or both of the facilities, consideration should be given to the cost-effectiveness of maintaining two separate water treatment facilities as compared to the option of expanding Water Treatment Plant No. 2 and decommissioning Water Treatment Plant No. 1.

Water storage for the City of North Mankato is located in both the upper and lower distribution zones. Storage adequacy can be assessed in several ways. The recommended water storage volume is based on fire demand, emergency reserve and equalization. Based on average day demand, a worst case fire event, and equalization volume equal to 20 percent of the average daily flow, an analysis indicates that the water storage provided in the upper area by the ground storage/high service pumps and the two elevated water towers is adequate to meet the projected storage requirements through the planning period. A similar analysis indicates that the lower system is currently deficient in storage by approximately 200,000 gallons. Since water demand in the lower system is not expected to increase significantly during the planning period, the lower system will be approximately 200,000 deficient in storage at the end of the planning period. However, water from the upper system can be diverted to the lower system without limiting services in the upper system, so the need to add storage in the lower system is not anticipated. However, the hillside ground storage reservoirs in the lower system are over 50 years and the rehabilitation or replacement of these reservoirs will likely be required at some point during the planning period. It is recommended that the reservoirs be drained, inspected and maintained every 3 to 5 years.

In general the water distribution system for the City of North Mankato is well maintained and well managed. Although much of the old cast iron watermain system has been replaced through numerous reconstruction projects in the lower system in recent years, portions of the old system still remain. These segments should be replaced and, where required, increased in size as street construction projects are implemented. As previously noted, most of the upper system is much newer (relatively speaking) than the lower system and consists primarily of ductile iron and cast iron pipe. As with the lower area, the existing watermain system in the upper system should be evaluating for improvement and/or replacement when the City is contemplating street reconstruction projects.

Most of the water system improvements in the upper area will be driven by residential, commercial and/or industrial development in the undeveloped areas within the City limits and the projected growth areas beyond the

City limits. A system of trunk watermains ranging in size from 10 to 16 inches in diameter will be extended into these growth areas as they develop. The approximate configuration of the trunk watermain systems within the projected growth areas is shown in Figures 7.2, 7.3, and 7.4.

C. Water System Goals, Objectives, and Policies

The following section outlines the primary goals for the water system followed by a series of objectives and policies intended to influence future development efforts that align with the community visions in this plan.

GOAL 1: Expand existing water system infrastructure to meet the demands generated by continued development

Objective 1.1: Expand the trunk watermain system into future growth areas

Policy 1.1.1: Implement the expansion of the trunk watermain system as areas outside the limits of the existing water distribution system are developed.

Policy 1.1.2: The trunk watermain system within the future growth areas should generally follow the configuration as shown in Figures 7.2, 7.3 and 7.4. Final trunk watermain sizes and locations should be based on the type, location and sequence of development within the projected growth areas.

Policy 1.1.3.: Develop a financing strategy for funding the expansion of the trunk watermain system.

GOAL 2: Monitor, evaluate and improve the condition of the City's existing water system infrastructure

Objective 2.1: Replace aging water distribution system infrastructure

Policy 2.1.1: Prepare a study to document the condition of deficient watermains based on age, materials and history of breaks, leaks, freezing and other deficiencies.

Policy 2.2.2: Utilize the information from the watermain condition study, in conjunction with the condition information for other infrastructure elements, to develop, expand and prioritize projects to be included in the capital improvements.

Objective 2.2: Monitor the condition of existing water supply, treatment, and storage infrastructure and replace as required

Policy 2.2.1: Monitor changes in drinking water quality standards and identify possible changes to the treatment processes currently utilized by the City's two water treatment facilities.

Policy 2.2.2: Monitor the condition of Water Treatment Plant No. 2 and continue with regular maintenance and miscellaneous equipment replacement as required.

Policy 2.2.3: Prepare a study to evaluate the condition of Water Treatment Plant No. 1, to determine the estimated remaining useful life of the existing equipment, to develop alternatives for upgrades or replacement, and to develop alternatives for

financing any required improvements.

Policy 2.2.4: Monitor the condition of the existing wells and related equipment and continue with regular inspections, maintenance and miscellaneous equipment replacement as required.

Policy 2.2.5: Monitor the condition of the water storage facilities and related equipment and continue with regular inspections, maintenance and miscellaneous equipment replacement as required.

III. WASTEWATER SYSTEM

A. Existing Systems

The existing wastewater collection system within the City of North Mankato consists of a network of sanitary sewers ranging in size from 8 inches to 24 inches in diameter. There are also 12 lift stations located throughout the City which collect and pump the wastewater from those areas which cannot be served by gravity sewers. The sanitary sewers and lift stations throughout the City collect into three main trunk sewers. Each of the trunk sewers flow to Lift Station No. 1 and Lift Station No. 2 located on the east side of Trunk Highway (T.H.) 169 at Pierce Avenue. Lift Stations No. 1 and No. 2 operate in tandem to pump all of the wastewater generated within the City North Mankato, across the Minnesota River to the City of Mankato's wastewater treatment facility. Figure No. 7.5 shows the three trunk sewers as well as with the areas served by each.

The capacity of the existing wastewater collection system is controlled, for the most part, by the capacity of the existing lift stations and trunk sewers. The sanitary sewer system and the lift stations within the City of North Mankato are well maintained and well managed. The sanitary sewers are cleaned and televised on a regular basis, and the lift stations are also inspected and maintained regularly. Although much of the old clay sanitary sewer systems in the lower North Mankato area have been replaced through numerous reconstruction projects in recent years, portions of the old system still remain. These segments should be replaced as street construction projects are implemented using newer materials less susceptible to inflow and infiltration of ground water and surface water into the system. Most of the sanitary sewer system in the upper North Mankato area is newer and consists primarily of plastic pipe. However, as with the lower area, the existing sanitary sewers in the upper system should be also be evaluating for improvement and/or replacement when the City is contemplating street reconstruction projects.

The City is currently undertaking improvements to Lift Station No. 1 and one of the trunk sewer lines (Belgrade Avenue Hill and ravine). With these improvements, the wastewater collection system has adequate capacity to accommodate wastewater flows from the existing residential, commercial and industrial developed areas. The City will continue to implement an on-going well maintenance and equipment replacement program to maximize the useful lives of the lift stations. Periodic repairs and replacements will be performed as required.

B. Future Improvements

Most of the areas projected for future development are located within or adjacent to the existing city limits in the upper North Mankato area. The trunk sewer line on Carlson Drive and Countryside Drive will serve these future development areas. This trunk sewer line and Lift Station No. 2 were constructed in the mid-1990's and have capacity for the projected wastewater flows within the planning period of this Comprehensive Plan.

A system of sanitary sewers will be extended from the trunk sewer into the development areas. These trunk sewers will range in size from 8 inches to 15 inches in diameter. The exact size and configuration of the sanitary

sewer system will be dependent on the type and density of development, existing and proposed topography, and in the case of commercial and industrial areas, the extent of water usage/wastewater discharged. The approximate configuration of the primary network of sanitary sewers and lift stations within the projected development areas is shown in Figures 7.6, 7.7, and 7.8.

C. Wastewater System Goals, Objectives, and Policies

The following section outlines the primary goals for the wastewater system followed by a series of objectives and policies intended to influence future development efforts that align with the community visions in this plan.

GOAL 1: Expand existing wastewater system infrastructure to meet the demands generated by continued development

Objective 1.1: Expand the trunk wastewater system into future growth areas

Policy 1.1.1: Implement the expansion of the trunk sanitary sewer system as areas outside the limits of the existing wastewater collection system are developed.

Policy 1.1.2: The trunk wastewater collection system within the future growth areas should generally follow the configuration as shown in Figures 7.6, 7.7 and 7.8. Final trunk sanitary sewer and lift station sizes and locations should be based on the type, location and sequence of development within the projected growth areas.

Policy 1.1.3.: Develop a financing strategy for funding the expansion of the trunk sanitary sewer system.

GOAL 2: Monitor, evaluate and improve the condition of the City's existing wastewater system infrastructure

Objective 2.1: Replace aging sanitary sewer system infrastructure

Policy 2.1.1: Prepare a study to document the condition of deficient sanitary sewers and collection system lift stations based on age, materials and deficiencies identified in sewer televising reports.

Policy 2.1.2: Utilize the information from the sanitary sewer condition study, in conjunction with the condition information for other infrastructure elements, to develop, expand and prioritize projects to be included in the capital improvements.

Objective 2.2: Monitor the condition of existing wastewater pumping and treatment infrastructure and replace as required

Policy 2.2.1: Monitor changes wastewater quality standards and identify possible changes to the treatment processes currently utilized by the City of Mankato's wastewater treatment facility and potential impacts to the treatment costs paid by the City of North Mankato.

Policy 2.2.2: Monitor the condition of the City's two main lift stations (Lift Station No. 1 and Lift Station No. 2) continue with regular inspections, maintenance and miscellaneous equipment replacement as required.

IV. STORMWATER SYSTEM

A. General

The goal of the plan is to maintain and improve surface water quality and minimize impacts of increased water quantity through appropriate planning, policy enforcement and capital improvement projects.

Most Minnesota cities have existing pipe networks that were designed to relieve ponding within the original platted city limits. When these systems were designed, the concern for the downstream properties was not a consideration. The goal was the efficient and cost effective removal of stormwater runoff from developed areas. In North Mankato's case, this meant the construction of direct pipelines to the Minnesota River.

As little as 20 years ago, the urban storm sewer pipe design recommended by the Minnesota Department of Transportation (MnDOT) on County State Aid Highways for cities the size of North Mankato was a 3-year design storm. That is, the pipe system was designed to handle less than a typical 3.5-inch rainfall. Now, as rainfall intensities appear to be increasing and construction costs are increasing faster than material costs, the recommended design is for the pipes to handle a 10-year storm while ensuring that overflow spillway routes prevent property damage for larger storms.

Based on the existing system, the effects of unmitigated growth on the downstream systems can be devastating and can lead to legal action against the governing authority. One of the best methods of mitigating the effects of growth is through the construction of stormwater retention basins. These basins are designed to store excess runoff at elevations where there is no adjacent property damage. The runoff is stored until the existing storm sewer system can take it away. Studies have shown that these basins not only provide flood protection, but can also help to remove stormwater pollutants.

Typically, the most efficient and most economical retention basins serve larger areas. Hence, an effort has been made to locate regional retention ponds as opposed to scattering smaller, localized development basins throughout the City. However, topography and available space must provide optimum locations for regional ponds. Regional ponds cannot be located in an existing wetland without the costly mitigation of the impacted wetland. They are also not recommended in floodplains. Recently, a Minnesota suburb was fined by the Minnesota Pollution Control Agency (MPCA) for illicit discharge of sediment into the Minnesota River associated with its floodplain stormwater treatment pond having its containment bank eroded away by the flooded river. This comprehensive plan considers these factors when recommending Best Management Practices (BMPs). It also considers information from long term residents of North Mankato and City staff regarding the observation of the natural ponding associated with heavy rainfalls when siting regional basins.

One drawback associated with regional pond planning is finding a funding mechanism to purchase the land needed and finding ways to have new development assist in their construction. Ideal planning of regional basins includes the purchase of the needed land while constructing the basin with funding generated from area charges on the new developments that generate the excess runoff. The trouble is that the land acquisition should be made before the development occurs, but the development fees are used to pay for the land and regional pond. Greater Minnesota cities are also reluctant to impose development charges, because their goal is to attract new businesses with low cost, and not to burden them with additional fees.

Although regional ponds are the most cost effective method of hydraulically managing flooding, they are not necessarily the best method of handling the new water quality regulations for stormwater. The water quality regulations for stormwater are ever changing. For example, since 2007, the City of North Mankato has been required to obtain a permit for its Municipally Separate Storm Sewer System (MS4). This MS4 permit is renewed every 5 years and the permit rules continue to evolve. Although the last cycle took more than 5 years for final acceptance, the most recent MS4 permit became enforceable in 2013. In this recent version of the MS4 permit

and in the coincidental 2013 Construction Stormwater Permit, municipalties and developers are required to reduce the runoff volume from new construction sites by removing the first 1-inch of runoff. To accomplish this, each new construction site having more than 1-acre of new impervious surfacing must take all appropriate measures to reduce the additional runoff volume created by the proposed new impervious surfaces (roofs and pavement).

Typically the most cost effective ways of accomplishing the required volume reduction is through infiltration or rainwater harvesting. Infiltration practices have the benefit of using the soil to assist in filtering the runoff. They also reduce runoff volumes from a developed area by taking a portion of the runoff and recharging the ground water. As such, they are often touted by surface water management agencies and review authorities. However, they must also be strategically placed to prevent the potential for contamination of City wells. Many cities have restricted the use of infiltration practices inside their wellhead protection area or well capture zone.

Filtration practices, such as filtration basins, biofilters, iron infused sand filters, etc., are similar to the more common infiltration practices, but are designed so that the stormwater filters through plants and filter media before draining into a storm sewer and not infiltrating into the ground. Filtration basins are recommended to manage stormwater runoff and improve water quality within the 1-year Wellhead Protection Area (WHPA). Filtration basins are recommended wherever they will fit into the designs and encouraged wherever local private property owners might request retrofitting them into their landscaping. Any private filtration basins that are installed will help lessen the load on the existing storm sewer system and improve water quality.

Lower North Mankato is ideally suited for infiltration because the underlying soils are predominately sandy. On the other hand, Upper North Mankato predominately consists clay soils that are not conducive to infiltration. The city may need to consider planning/allowing construction without infiltration in upper North Mankato because of the general inability for infiltration, while planning/requiring infiltration opportunities in lower North Mankato.

Rainwater harvesting – storing and reusing rainwater for irrigation or other non-potable uses - should also be encouraged wherever possible.

Because of these water quality regulation changes, it may be advantageous to plan regional ponds for flood prevention associated with extreme rainfall events, while planning smaller water quality BMPs on a neighborhood or individual development scale.

As part of the 2013 MS4 permit, the City will need to consider new opportunities to retrofit water quality measures associated with its reconstruction projects. Because retrofitting is often more difficult, the MPCA accepts less effective, but still beneficial alternative BMPs, such as vegetated buffer strips, grit chambers and proprietary sediment trap manholes as a viable aspect of reconstruction projects.

Finally, the City has a Total Maximum Daily Load (TMDL) goal (see discussion below).

B. Wetlands

In 1991, the Minnesota Legislature passed the Wetlands Conservation Act (WCA). The WCA is administered according to Minnesota Rules Chapter 8420 to implement the purpose of the Act, which is to:

1. Achieve no net loss in the quantity, quality, and biological diversity of Minnesota's existing wetlands;
2. Increase the quantity, quality and biological diversity of Minnesota wetlands by restoring or enhancing diminished or drained wetlands;
3. Avoid direct and indirect impacts from activities that destroy or diminish the quantity, quality, or biological diversity of wetlands;

4. Replace wetland values where avoidance of activities is not feasible and prudent. [1]

Pretreatment of all stormwater from new developments is required prior to discharge into any wetlands. Wetlands may be, and are currently being used for stormwater storage for larger rainfall events. They may continue to be used for this purpose – even after upstream development, provided that:

1. There is acceptable Best Management Practice pretreatment of the runoff in accordance with the MPCA NPDES/SDS Construction Permit, Section III.D., Permanent Stormwater Management System.
2. The bounce from the normal water level to the high water level does not exceed two feet.

The Minnesota Wetland Conservation Act (WCA) requires the designated Local Governmental Unit (LGU) in charge of administering the WCA to generate a Notice of Wetland Conservation Act Decision for any impact to wetlands within the City of North Mankato. For North Mankato, the wetland LGU is Michael Fischer with the City of North Mankato.

In all but minor decisions, the LGU will call for a Technical Evaluation Panel (TEP) review of the application or impact prior to issuing a decision. The LGU must give notice of proposed actions affecting wetlands to all of the following:

1. The Minnesota Board of Water and Soil Resources
2. The Soil and Water Conservation District
3. The Minnesota Department of Natural Resources
4. City of North Mankato (LGU)
5. The U.S. Army Corps of Engineers
6. Interested citizens requesting notification of such actions

If a TEP meeting is required, all listed parties are invited to review the proposed action. However, it is not uncommon for a TEP meeting to consist of only a small contingent of this list, as some invitees may have no jurisdiction over the proposed action.

C. NPDES Phase II Considerations

1. General City Permits

In 1987, the US Congress amended the Clean Water Act to include stormwater pollution and directed the Environmental Protection Agency (EPA) to initiate rulemaking. The first round of EPA rules were implemented in 1991 when NPDES Phase I permits were required for all cities exceeding 100,000 in population. Phase II was implemented in 2003 and targeted all cities with populations exceeding 10,000. In 2008, the Phase II rulemaking expanded the list of targeted cities to include cities with populations exceeding 5,000 and that discharge into an impaired water. The Minnesota Pollution Control Agency (MPCA) assumed responsibility for implementing the rules and issuing all Phase II permits. The NPDES Phase II rules apply to all construction disturbances of one acre or more. Furthermore, impaired waters like the Minnesota River mean that waste load allocations will be distributed to all potential contributors within the watershed in order to meet the Total Maximum Daily Load (TMDL) limitations that are required by federal law to facilitate correcting the impairment.

---

[1] Excerpt taken from the University of Minnesota Duluth website: http://www.d.umn.edu/fm/safety_envir/wetlands/pdf_pages/4.0%20Wetland%20Regulations.pdf

The primary targets of TMDL requirements are urban runoff and construction runoff. This is because urban runoff carries pollutants from cars, lawn fertilizers, pesticide spills and other contaminants into our lakes, wetlands and streams without entering wastewater treatment systems. Construction runoff is often laden with sediment caused by large areas of open, exposed soil that is loosened by excavation and grading.

The federal mandates are intended to regulate these sources of continued environmental degradation. New developments have become increasingly targeted. All new developments, creating more than one acre of impervious surfacing, are required to have some form of stormwater treatment. In general, this need can be satisfied by properly designed infiltration/filtration basins or wet retention basins.

The following is a listing of the available stormwater quality and quantity systems currently being designed to handle the water quality/quantity issue:

a. Regional Wet Retention Basins

   Numerous studies have been done on the water quality treatment afforded by wet retention basins, most notably one by William Walker Jr. for the Vadnais Lake Area Water Management Area (1987). The Walker study found that properly sized wet retention basins can effectively remove pollutants through sediment removal. When properly sized, these ponds can significantly reduce the contaminant levels, including phosphorus, commonly found in urban stormwater runoff. According to the MPCA's Stormwater Manual, on average wet retention basins can remove 84% of suspended solids, 50% of total phosphorus, and 30% of total nitrogen. Wet retention basins also provide flood storage. Wet retention basins are also well known for their stormwater quantity handling capabilities and work well for areas with Hydrologic Soil Group Type D (clay) soils.

b. Bioretention Systems

   Another method of managing stormwater runoff is to install bioretention practices in strategic locations where stormwater will be collected and allowed to filtrate through the planting media or be taken up by vegetation before entering the storm sewer.

c. Infiltration/Filtration Bioretention Basins

   According to the MPCA's Stormwater Manual,[2] bioretention facilities capture rainwater runoff to be filtered through a prepared soil medium. Pollutants are removed by a number of processes including adsorption, filtration, volatilization, ion exchange and decomposition (Prince George's County, MD, 1993). Filtered runoff from bioretention basins can either be allowed to infiltrate into the surrounding soil (functioning as an infiltration basin or rainwater garden), or collected by an under-drain system and discharged to the storm sewer system or directly to receiving waters ("filtration only" bioretention basin). Due to the groundwater vulnerability and the WHPA covering a portion of lower North Mankato, lined filtration basins are recommended for the areas of North Mankato within the 1-year WHPA. Runoff from larger storms is generally allowed to bypass the filled bioretention basin and flow directly to the storm drain system. Infiltration/filtration basins are typically designed for treating the water quality and not for the water quantity of urban stormwater runoff. That is, the MPCA requirement for water quality is to treat the first 1 inch of runoff from a site (water quality volume). This is in contrast to the larger amount of runoff that may be actually leaving the site for a 3 to 6 inch rainfall (water quantity). Because stormwater quality has become a greater issue, bioretention basins have become a significant design tool for municipal stormwater systems. Bioretention basins can remove 85% of suspended solids, 100% of total phosphorus, and 50% of total nitrogen.

[2] Minnesota Stormwater Manual wiki, July 2014. http://stormwater.pca.state.mn.us/index.php/Main_Page

2. NPDES Phase II Construction Permits

The NPDES Phase II construction stormwater permit requirements have also taken effect. As of August 1, 2013 a new NPDES permit is in effect. A construction permit is required for any disturbance of more than 1 acre. The permit process is best summarized in the following table:

Table 7.2 - Construction Stormwater Permit Requirements

Item	Requirement
Minimum Disturbance Triggering a permit	1 acre
New Homes	Permit required if part of the larger development
Permit Fee	$400
Stormwater Pollution Prevention Plan (SWPPP)	1. Must be on file 2. Must be submitted if over 50 acres and is within 1 mile and discharges into a Special Water
Responsibility for compliance	Contractor is responsible for erosion controls. Owner is responsible for implementation of the SWPPP
Responsibility after land sale	Transferred with the property until Notice of Termination

Inspection reports and certifications are required.

3. SWPPP for Construction Permits

The construction permit also requires the preparation of a Stormwater Pollution Prevention Plan (SWPPP) for the disturbed site. The SWPPP requirements are as follows:

a. Must be designed prior to permit application and available on site.

b. Should typically use BMPs that are recognized as effective.

c. Unique innovative designs may be used, but have formal review and monitoring requirements.

d. Owner must identify a person with approved training in accordance with the Permit who will oversee the implementation of the SWPPP.

e. Owner must identify a person with approved training in accordance with the Permit that will be responsible for long-term operation and maintenance of the permanent BMPs.

f. Owner must develop a chain of responsibility to ensure that the SWPPP will be implemented and stay in effect until termination. The SWPPP must have the following:

   1) Location and type of all temporary and permanent erosion controls and sediment control BMPs.

   2) Standard plates and specifications for the BMPs.

   3) A site map with existing and final grades, subwatershed limits and direction of flow for both the pre and post development drainage areas. The site map must include existing and proposed impervious surfaces and soil types.

4) Locations of areas not to be disturbed (construction limits).

5) Locations of areas of phased construction to minimize duration of exposed soil.

6) All surface waters and wetlands within 1 mile that can be identified on a quadrangle map and will receive runoff from the site.

7) Methods used for final stabilization of exposed soils.

8) The range of soil particles expected to be present at the site.

4. Permanent Sedimentation Pond Requirements

If more than one acre of new impervious surface is created by the construction, permanent water quality BMPs are required as part of the permanent SWPPP. If the filtration or infiltration alternatives listed above are not possible, a permanent wet retention basin is the most utilized method of meeting the requirements. The new construction stormwater permit requires that the stormwater volume equivalent of 1 inch over any new impervious surface area be retained on site through infiltration or other volume reduction practices. There are some exceptions to this requirement, including projects that have Hydrologic Soil Group D (clay) soils. In the case of D soils, a permanent stormwater pond is a good option. The **permanent pond requirements** are summarized as follows:

a. A permanent volume (dead storage) of 1,800 cubic feet per acre draining to the basin.

b. A water quality volume (equal to 1 inch multiplied by the new impervious surface) that cannot be discharged at a rate exceeding 5.66 cfs per acre of pond surface area (when the pond has both the permanent volume and water quality volume in it).

c. A 3 foot minimum depth and a 10 foot maximum depth.

d. Outlets placed to minimize short circuiting and designed to skim floating debris.

e. An emergency overflow.

f. Adequate public access (typically 8 feet wide).

5. Regional Pond Considerations

An area regional pond may be used provided that:

a. The regional pond is not a wetland.

b. Must be designed to meet the treatment pond criteria for all impervious surfaces.

c. Regional pond owner's authorization must be secured as part of the permitting process.

6. Existing Systems

The City of North Mankato is a Municipally Separate Storm Sewer System (MS4). The City of North Mankato ultimately drains to the Minnesota River. The City of North Mankato operates an extensive stormwater treatment system, serving residential, commercial and industrial users in two zones: the upper system and the lower system. There are several ravines that drain water from the upper system. Spring Lake, in the lower system, receives stormwater from North Mankato, and it is not an impaired water. There are also several stormwater ponds in the City's stormwater system. The majority of stormwater ponds are in the upper system, as that area was developed later when stormwater treatment was required and there was more space and flexibility to incorporate stormwater ponds into the development plans. There is also a difference in soils between the upper and lower systems; generally the lower system has soils that have higher infiltration rates and the upper system has soils that have lower infiltration rates.

All areas served by public ditches are subject to the rules governed by Minnesota Statute 103E and under the governance of Nicollet County. Minnesota Statute 103E states that all connections to the ditch, or in this case, the County Tile, must be petitioned to the County Auditor.

There is no other record that the City has entered into any water resource management related agreements with its neighboring cities, the county, watershed district, lake associations or the state of Minnesota. The City of North Mankato has been responsible for construction, maintenance, and other projects in or along the City's stormwater collection systems outside of the mainline County ditch and tile systems.

7. Total Maximum Daily Load Limits (TMDL)

We have reviewed the current 303d list of impaired waters on the MPCA website and found the following:

a. The Minnesota River is the ultimate receiving water for both the upper and lower stormwater systems. There are two segments of the river that receive stormwater from the City of North Mankato. Both the Minnesota River segment 07020007-504 (upstream of the confluence with the Blue Earth River) and segment 07020007-502 (downstream of the confluence with the Blue Earth River) are impaired and have an US Environmental Protection Agency (EPA)-approved Total Maximum Daily Load (TMDL) for Mercury in Fish Tissue. These river segments require a TMDL plan to be written for:

   1) Polychlorinated biphenyl (PCB) in Fish Tissue
   2) Turbidity

   These impairments affect Aquatic Consumption and Aquatic Life.

b. North Mankato is subject to the established Lower Minnesota River's Dissolved Oxygen TMDL, which has a waste load allocation of 30.5 lbs/day or a 30% reduction in phosphorus loading from the City's existing impervious surfacing as of the year 2000. This level is finite, meaning that, if the City grows, the impervious area grows as well, but the level of phosphorus loading is not allowed to increase.

   To meet this requirement, the City has had P8 phosphorus modeling performed to establish the baseline phosphorus loading in the year 2000 and the current phosphorus loading associated with the current development conditions. The MPCA and the model also considered the phosphorus removal rates of its existing BMPs to determine the level of retrofitting needed to meet the TMDL requirements.

   The City has a list of recommended retrofitting projects that will help it meet the TMDL requirements. In addition, the new volume restrictions associated with the new construction permit automatically includes phosphorus reduction techniques.

Additional TMDL restrictions can be may anticipated in the future as the Minnesota River is tested for other impairments. It is hoped that the measures taken to limit turbidity and phosphorus will automatically remove other impairments as well.

8. Future Improvements

Generally, the City will work to ensure erosion control and surface water quality standards are met through enforcement of the City's permitting requirements and implementation of Best Management Practices (BMPs) such as regional stormwater ponds. The City will ensure compliance with the National Pollutant Discharge Elimination System (NPDES) Phase II permits for municipal operations and for construction activity greater than 1 acre. City cooperation with the Minnesota Pollution Control Agency (MPCA) and Nicollet County is key to maintaining the relevance of the City's plan.

This comprehensive plan covers several growth areas. Many regional ponds and new storm sewer pipes are proposed for these as yet undeveloped areas, and the general locations are indicated on Figures 7.9, 7.10, and 7.11. In addition to those BMPs, the City of North Mankato intends to construct stormwater treatment BMPs in conjunction with 12 street improvement projects in the next 22 years. There are also 5 proposed regional pond locations. These will comply with the MPCA's requirements for stormwater treatment at the time they are constructed.

D. Stormwater System Goals, Objectives, and Policies

The following section outlines the primary goals for the stormwater system followed by a series of objectives and policies intended to influence future development efforts that align with the community visions in this plan.

GOAL 1: Expand existing stormwater management system infrastructure to meet the demands generated by continued development

Objective 1.1: Expand the stormwater collection, treatment and outfall system into future growth areas

Policy 1.1.1: Implement the expansion of the stormwater collection, treatment and outfall system as areas outside the limits of the existing stormwater collection system are developed, with a focus on regional stormwater ponds, where possible.

Policy 1.1.2: The stormwater collection, treatment and outfall system within the future growth areas should generally follow the configuration as shown in Figures 7.9, 7.10, and 7.11. Final collection, treatment and outfall sizes and locations should be based on the type, location and sequence of development within the projected growth areas.

Policy 1.1.3.: Develop a financing strategy for funding the expansion of the stormwater collection, treatment and outfall system.

GOAL 2: Monitor, evaluate and improve the condition of the City's existing stormwater system infrastructure

Objective 2.1: Replace aging storm sewer system infrastructure

Policy 2.1.1: Prepare a study to document the condition of deficient storm sewers and ponds based on age, materials and other known deficiencies.

Policy 2.1.2: Utilize the information from the storm sewer condition study, in conjunction with the condition information for other infrastructure elements, to develop, expand and prioritize projects to be included in the capital improvements.

Objective 2.2: Address sedimentation issues in the City's existing stormwater treatment ponds

Policy 2.2.1: Develop a study to determine the levels and characteristics of sediment in the City's existing stormwater ponds.

Policy 2.2.2: Develop a plan for cleaning sediment from ponds and for disposal of sediment.

Objective 2.3: Incorporate BMPs to Meet TMDL Limits

Policy 2.3.1 Implement the recommended retrofitting projects that will help it meet the TMDL requirements, targeting the current phosphorus TMDL and the future turbidity removal needs.

Policy 2.3.2 Develop a BMP strategy for undeveloped areas that is based on existing area soils and targets the current phosphorus TMDL and the future turbidity removal needs.

2014 Comprehensive Plan

City of North Mankato

Figure 7.2 Future Water System Improvements

July, 2014

BOLTON & MENK Engineers & Surveyors

Legend

- Study Boundary
- 10"-16" Watermain
- Existing Hydrants
- Existing Valves
- Existing Resevoir
- Existing Tower
- Existing Wells
- Existing Watermain
- Existing Fire Service
- Parcels
- City Limits
- Lakes & Ponds

0 800 Feet

Source: Nicollet County, MnDNR

Map Document: \\Arcserver1\gis\NMAN_BasemapIESRI\Maps\2014\Nman-Comp Plan Water System 1-11x17.mxd
Date Saved: 7/29/2014 7:50:28 AM

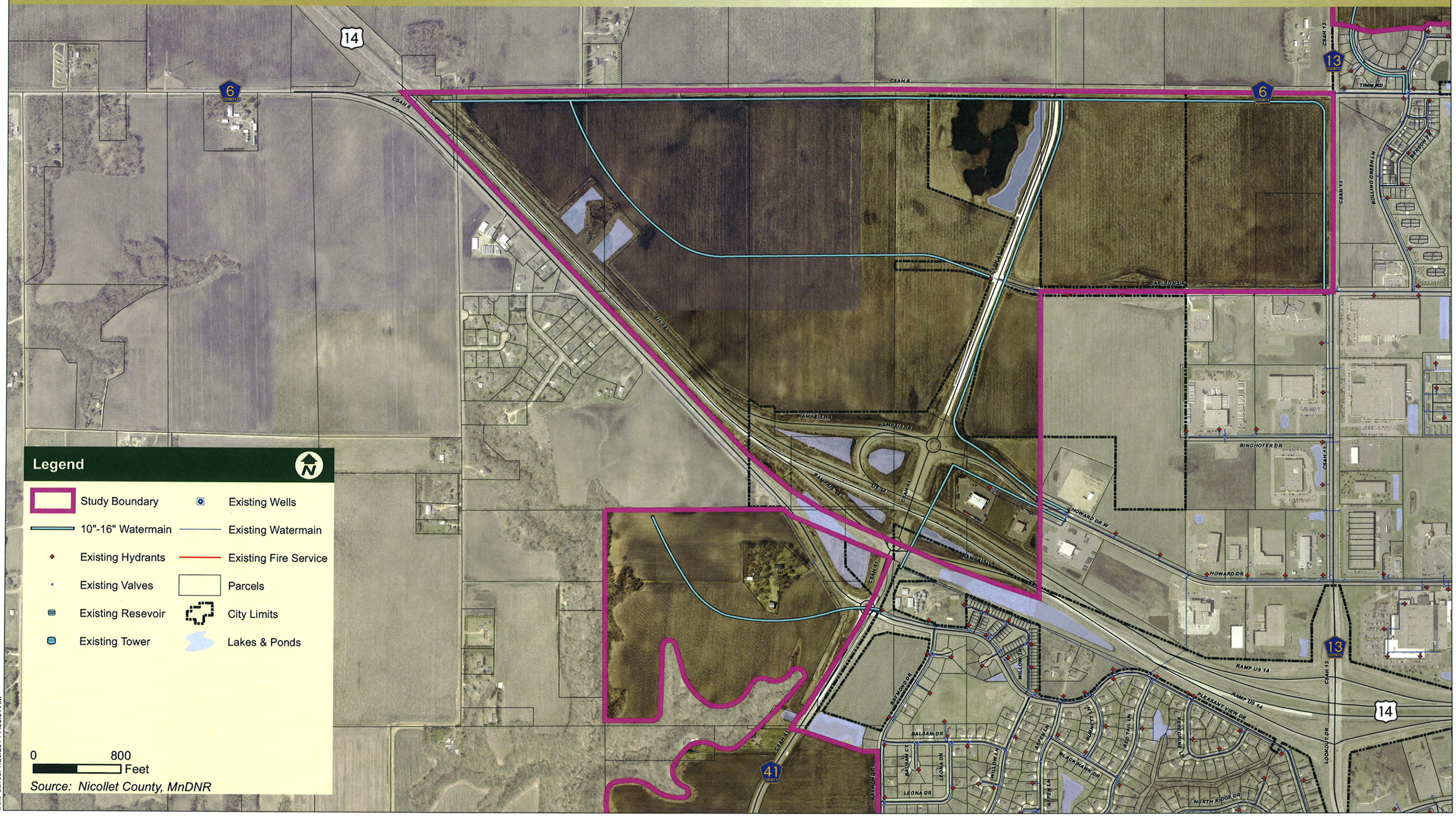
2014 Comprehensive Plan

City of North Mankato

Figure 7.3 Future Water System Improvements

July, 2014

BOLTON & MENK Engineers & Surveyors



Legend

- Study Boundary
- 10"-16" Watermain
- Existing Hydrants
- Existing Valves
- Existing Resevoir
- Existing Tower
- Existing Wells
- Existing Watermain
- Existing Fire Service
- Parcels
- City Limits
- Lakes & Ponds

0 800 Feet

Source: Nicollet County, MnDNR

Map Document: \\Arcserver1\gis\NMAN_Basemap\ESRIMaps\2014\Nman-Comp Plan Water System 2-11x17.mxd
Date Saved: 7/29/2014 7:56:31 AM

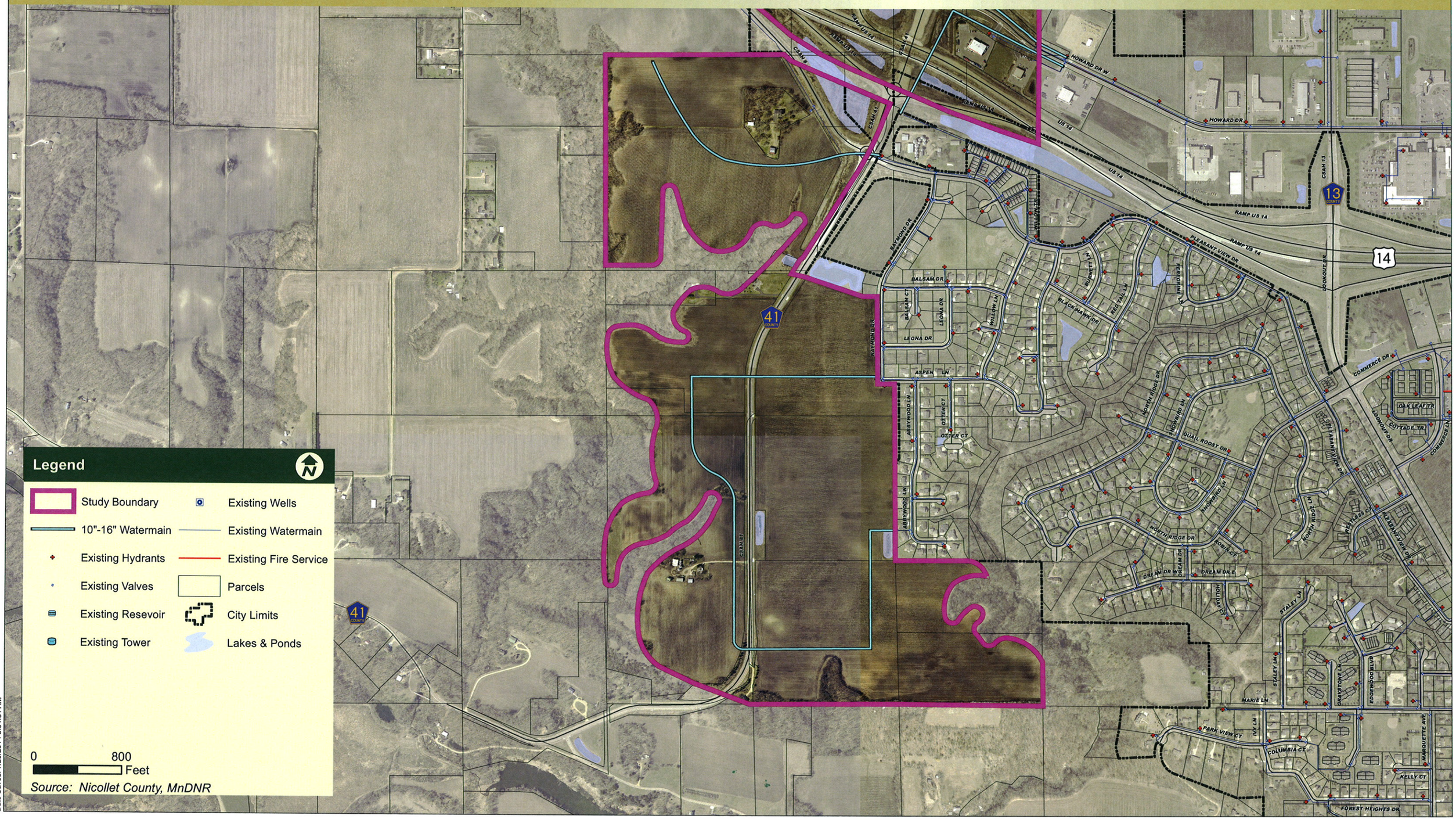
2014 Comprehensive Plan

City of North Mankato

Figure 7.4 Future Water System Improvements

July, 2014

BOLTON & MENK Engineers & Surveyors



Legend

- Study Boundary
- 10"-16" Watermain
- Existing Hydrants
- Existing Valves
- Existing Resevoir
- Existing Tower
- Existing Wells
- Existing Watermain
- Existing Fire Service
- Parcels
- City Limits
- Lakes & Ponds

0 800 Feet

Source: Nicollet County, MnDNR

Map Document: \\Arcserver1\gis\NMAN_Basemap\ESRIMaps\2014\Nman-Comp Plan Water System 3-11x17.mxd
Date Saved: 7/29/2014 8:01:51 AM

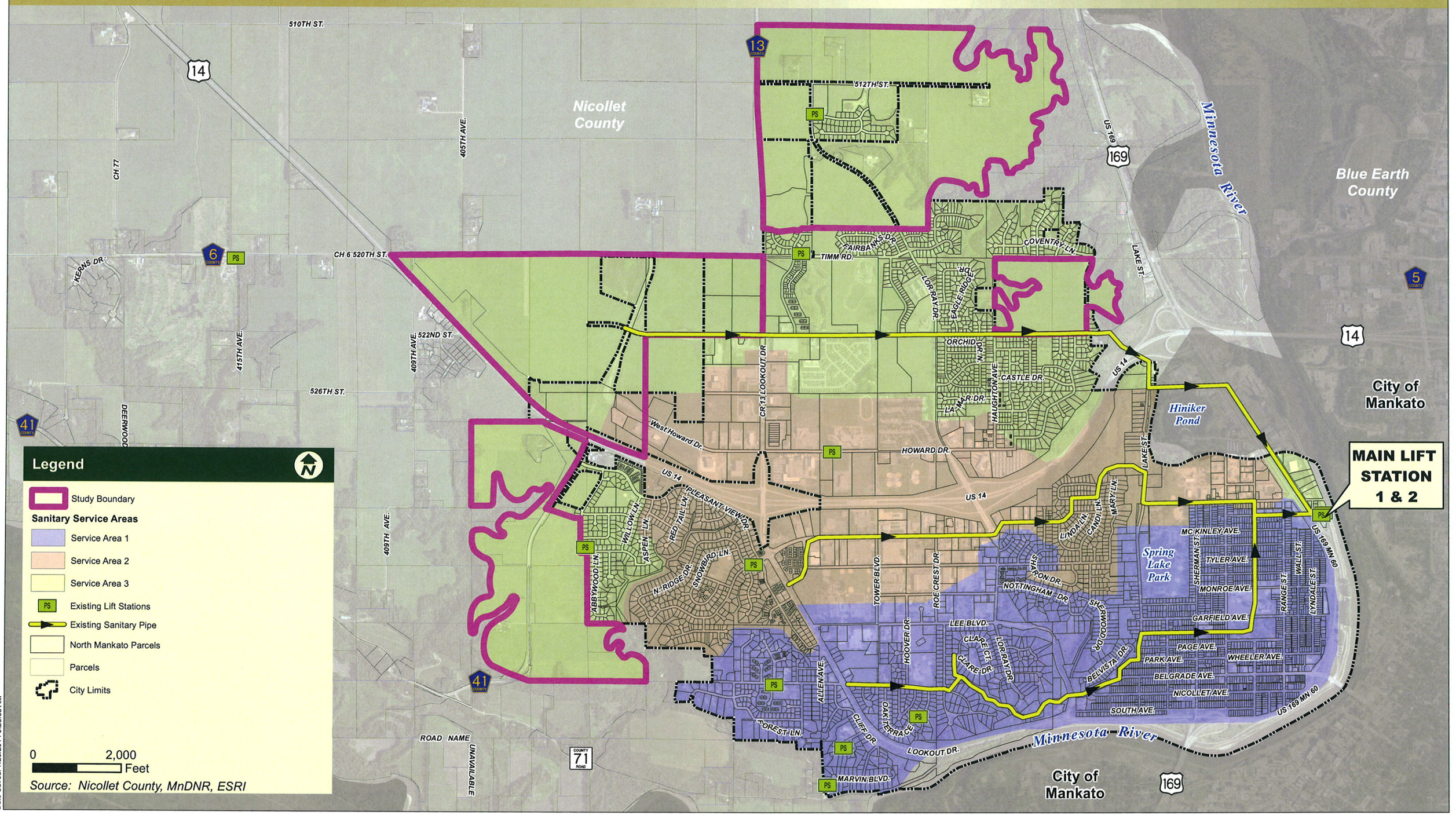
2014 Comprehensive Plan

City of North Mankato

Figure 7.5 Existing Sanitary Trunk Sewer & Service Areas

July, 2014

BOLTON & MENK Engineers & Surveyors



Map Document: \\Arcserver1\gis\NMAN_Basemap\ESRI\Maps\2014\Nman-Comp Plan Sanitary System Trunk Sewer and Service Areas-11x17.mxd
Date Saved: 7/29/2014 9:23:03 AM

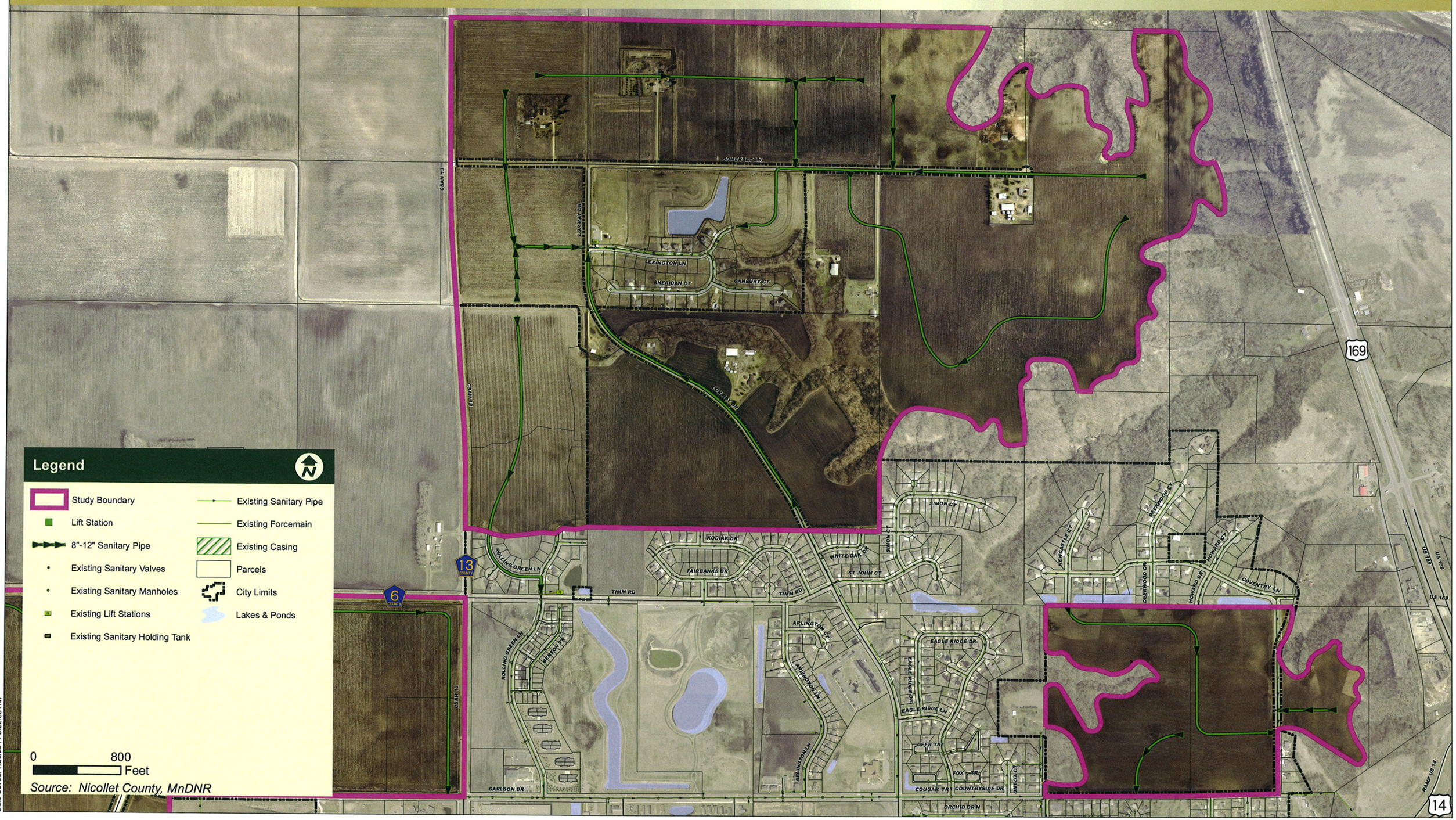
2014 Comprehensive Plan

City of North Mankato

Figure 7.6 Future Sanitary Sewer System Improvements

July, 2014

BOLTON & MENK Engineers & Surveyors



Legend

- Study Boundary
- Lift Station
- 8"-12" Sanitary Pipe
- Existing Sanitary Valves
- Existing Sanitary Manholes
- Existing Lift Stations
- Existing Sanitary Holding Tank
- Existing Sanitary Pipe
- Existing Forcemain
- Existing Casing
- Parcels
- City Limits
- Lakes & Ponds

0 800 Feet

Source: Nicollet County, MnDNR

Map Document: \\Arcserver1\gis\NMAN_BasemapIESRI\Maps\2014\Nman-Comp Plan Sanitary System 1-11x17.mxd
Date Saved: 7/29/2014 8:22:08 AM

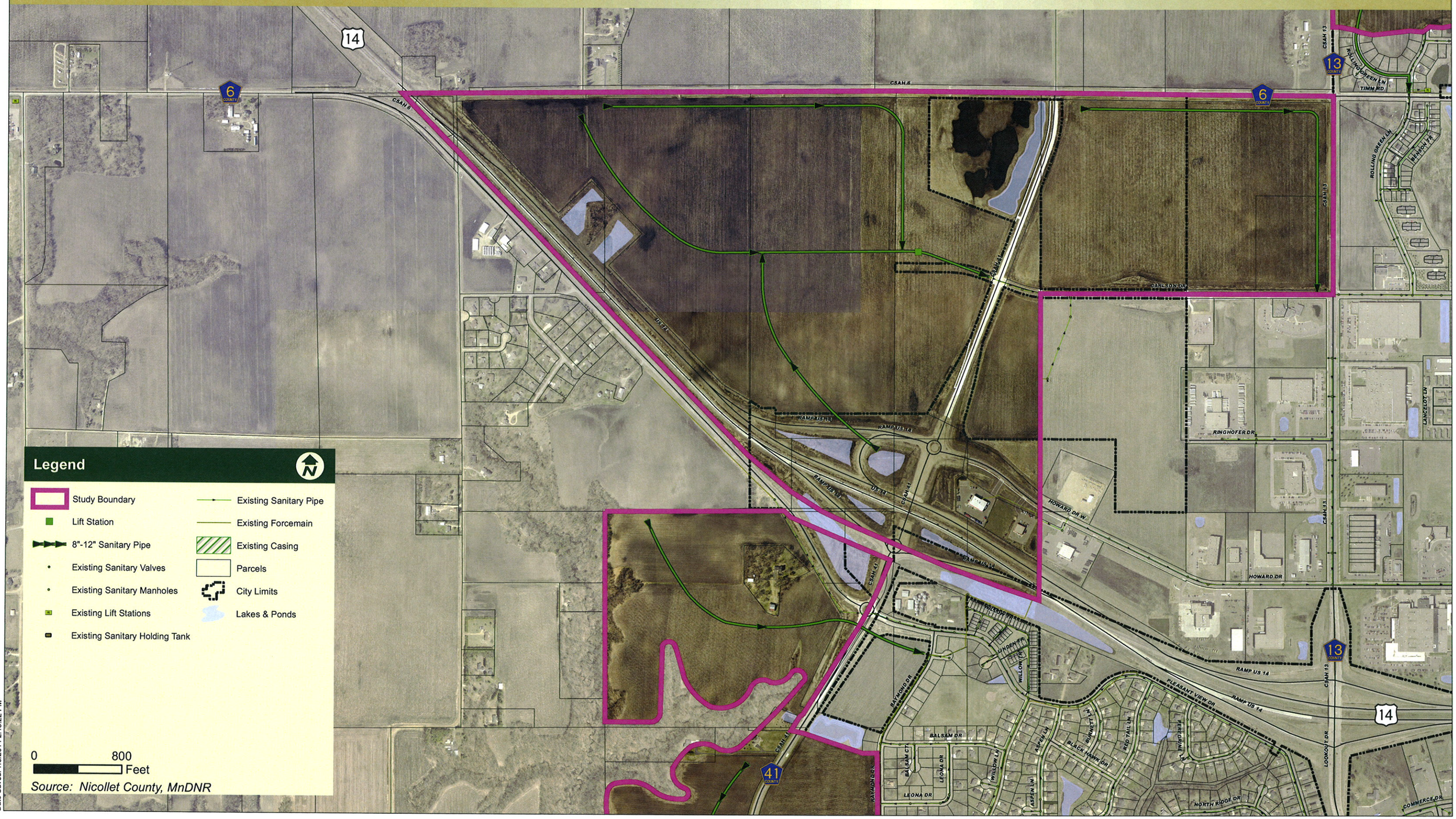
2014 Comprehensive Plan

City of North Mankato

Figure 7.7 Future Sanitary Sewer System Improvements

July, 2014

BOLTON & MENK Engineers & Surveyors



Legend

- Study Boundary
- Lift Station
- 8"-12" Sanitary Pipe
- Existing Sanitary Valves
- Existing Sanitary Manholes
- Existing Lift Stations
- Existing Sanitary Holding Tank
- Existing Sanitary Pipe
- Existing Forcemain
- Existing Casing
- Parcels
- City Limits
- Lakes & Ponds

0 800 Feet

Source: Nicollet County, MnDNR

Map Document: \\Arcserver1\gis\NMAN_Basemap\ESRI\Maps\2014\Nman-Comp Plan Sanitary System 2-11x17.mxd
Date Saved: 7/8/2014 2:15:22 PM

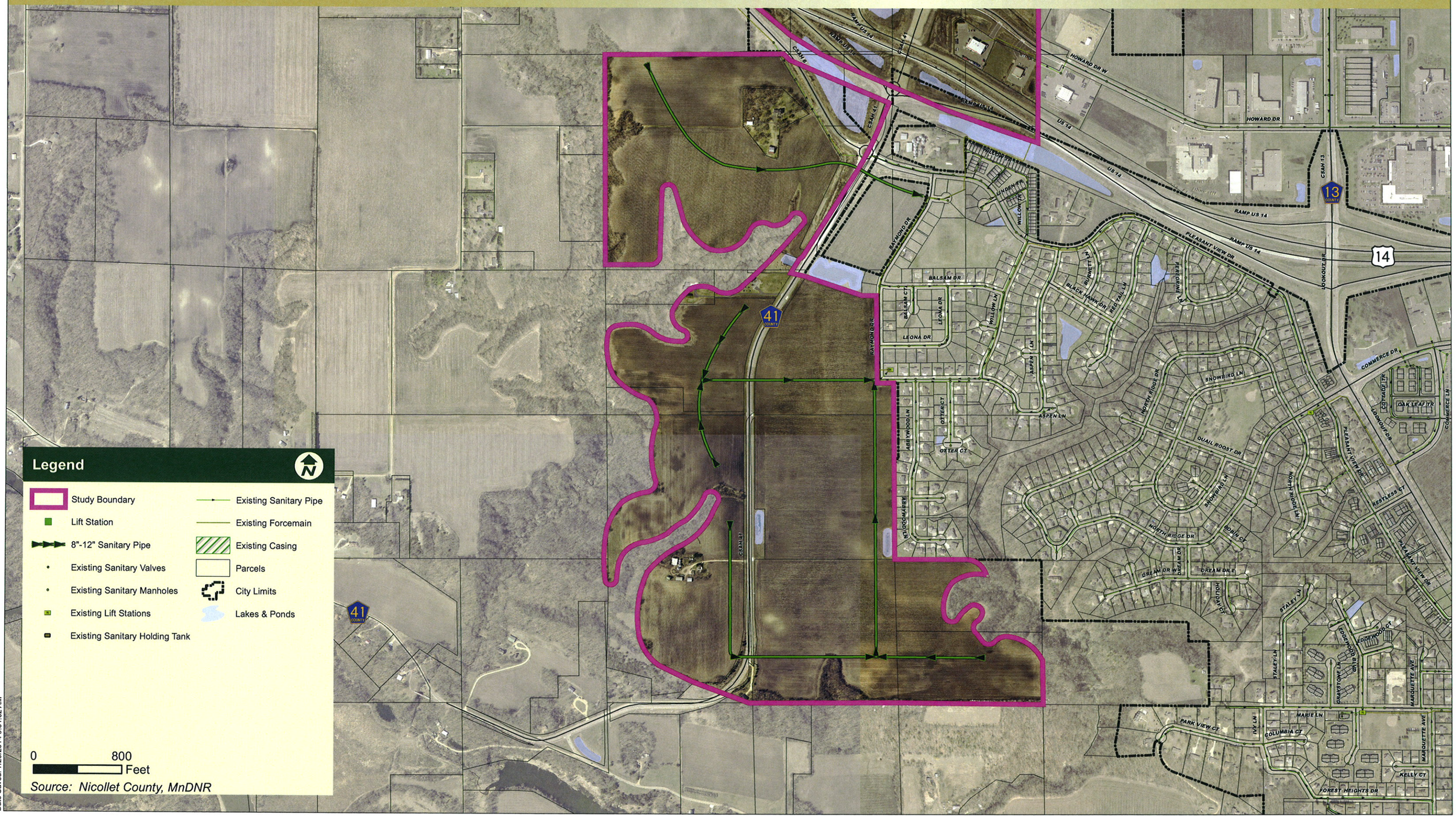
2014 Comprehensive Plan

City of North Mankato

Figure 7.8 Future Sanitary Sewer System Improvements

July, 2014

BOLTON & MENK Engineers & Surveyors



Legend

- Study Boundary
- Lift Station
- 8"-12" Sanitary Pipe
- Existing Sanitary Valves
- Existing Sanitary Manholes
- Existing Lift Stations
- Existing Sanitary Holding Tank
- Existing Sanitary Pipe
- Existing Forcemain
- Existing Casing
- Parcels
- City Limits
- Lakes & Ponds

0 800 Feet

Source: Nicollet County, MnDNR

Map Document: \\Arcserver1\gis\NMAN_BasemapIESRI\Maps\2014\Nman-Comp Plan Sanitary System 3-11x17.mxd
Date Saved: 7/29/2014 9:01:02 AM

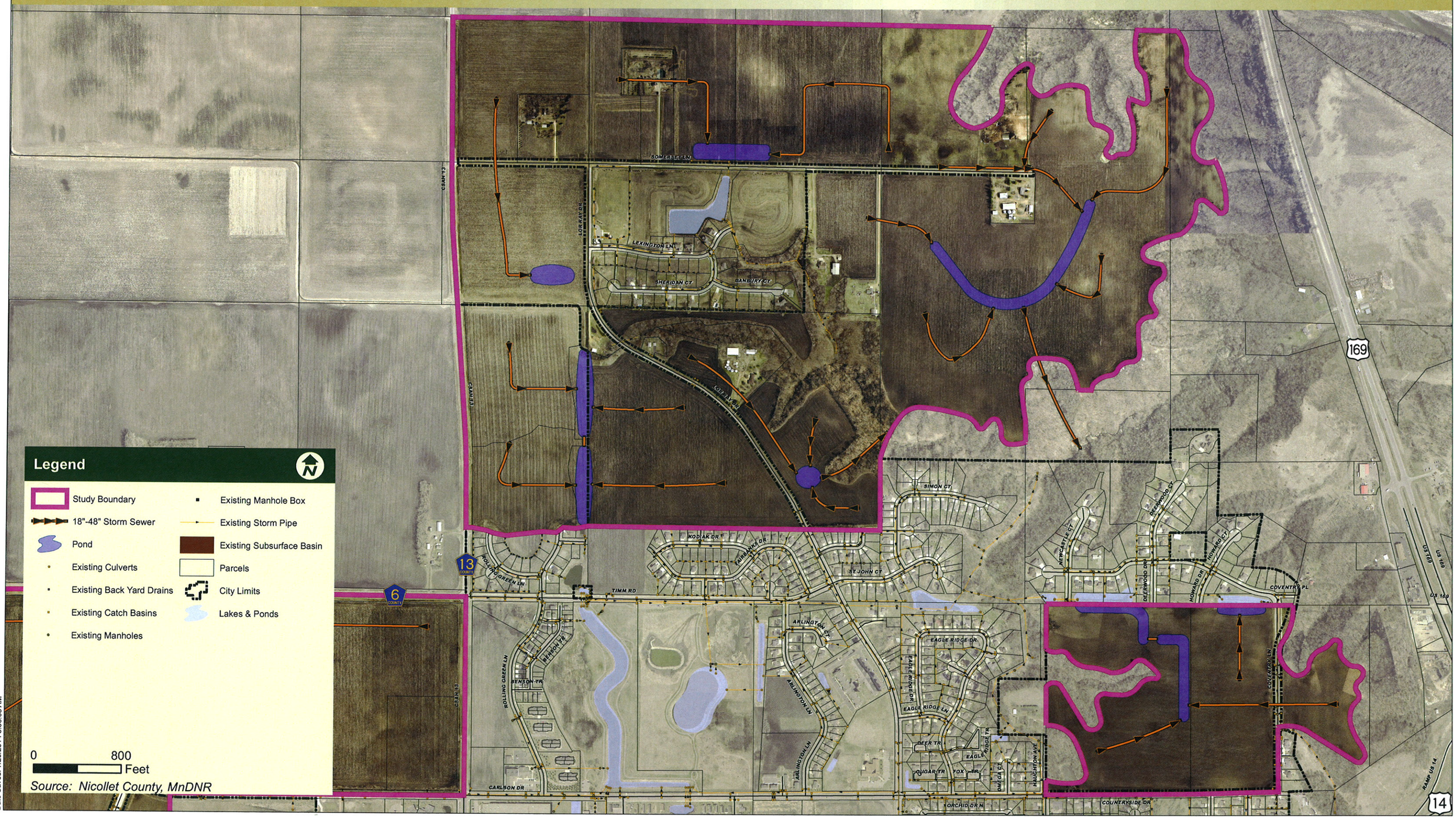
2014 Comprehensive Plan

City of North Mankato

Figure 7.9 Future Storm Sewer System Improvements

July, 2014

BOLTON & MENK
Engineers & Surveyors



Legend

- Study Boundary
- 18"-48" Storm Sewer
- Pond
- Existing Culverts
- Existing Back Yard Drains
- Existing Catch Basins
- Existing Manholes
- Existing Manhole Box
- Existing Storm Pipe
- Existing Subsurface Basin
- Parcels
- City Limits
- Lakes & Ponds

0 800 Feet

Source: Nicollet County, MnDNR

Map Document: \\Arcserver1\gis\NMAN_Basemap\ESRIMaps\2014\Nman-Comp Plan Storm System 1-11x17.mxd
Date Saved: 7/29/2014 8:35:08 AM

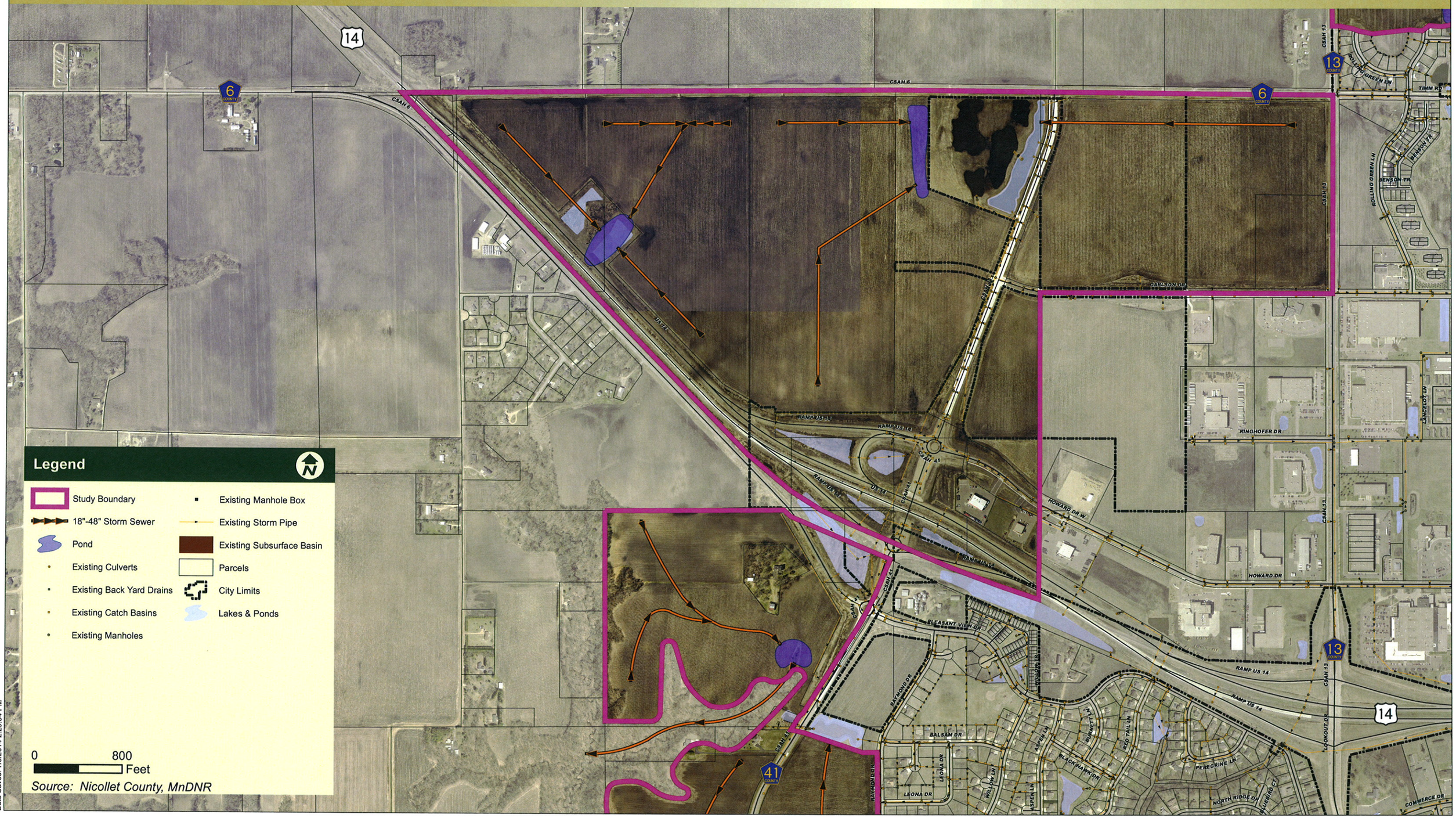
2014 Comprehensive Plan

City of North Mankato

Figure 7.10 Future Storm Sewer System Improvements

July, 2014

BOLTON & MENK Engineers & Surveyors



Legend

- Study Boundary
- 18"-48" Storm Sewer
- Pond
- Existing Culverts
- Existing Back Yard Drains
- Existing Catch Basins
- Existing Manholes
- Existing Manhole Box
- Existing Storm Pipe
- Existing Subsurface Basin
- Parcels
- City Limits
- Lakes & Ponds

0 800 Feet

Source: Nicollet County, MnDNR

Map Document: \\Arcserver1\gis\NMAN_Basemap\ESRI\Maps\2014\Nman-Comp Plan Storm System 2-11x17.mxd
Date Saved: 7/8/2014 2:29:54 PM

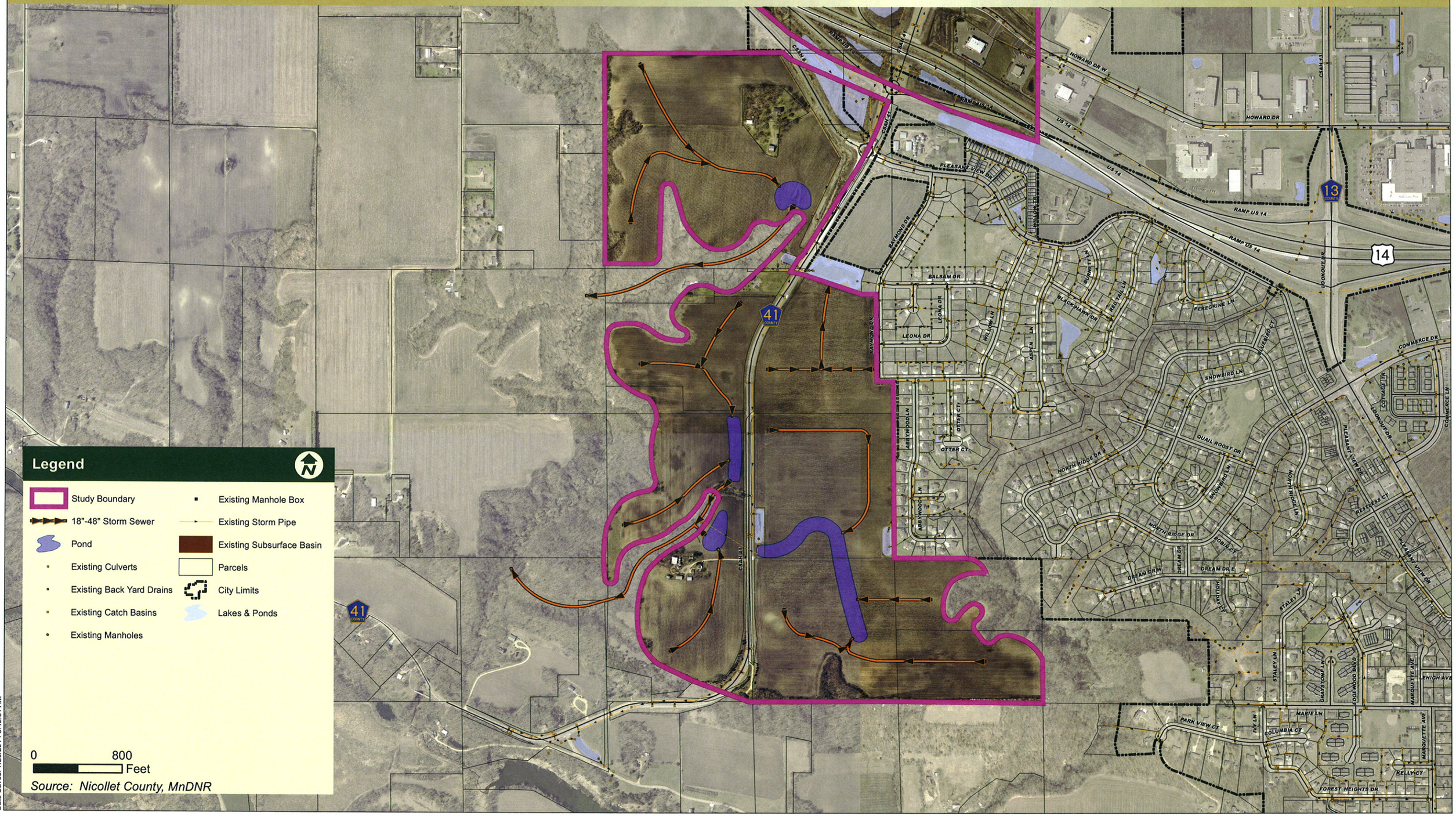
2014 Comprehensive Plan

City of North Mankato

Figure 7.11 Future Storm Sewer System Improvements

July, 2014

BOLTON & MENK Engineers & Surveyors



Legend

- Study Boundary
- 18"-48" Storm Sewer
- Pond
- Existing Culverts
- Existing Back Yard Drains
- Existing Catch Basins
- Existing Manholes
- Existing Manhole Box
- Existing Storm Pipe
- Existing Subsurface Basin
- Parcels
- City Limits
- Lakes & Ponds

0 800 Feet

Source: Nicollet County, MnDNR

Map Document: \\Arcserver1\gis\NMAN_Basemap\ESRI\Maps\2014\Nman-Comp Plan Storm System 3-11x17.mxd
Date Saved: 7/29/2014 8:42:01 AM

Chapter 10: Downtown Redevelopment

Introduction

The City of North Mankato values its downtown as a vital community asset. The downtown is located in the southeast part of the City, the heart of which is Belgrade Avenue. It extends from Highway 169 to property on the west side of Center Street. Belgrade Avenue has been a key commercial corridor within the City for many years. There are numerous established businesses that serve the commercial needs of area residents, as well as a variety of housing densities. The higher density nature of the downtown provides for a more naturally walkable environment by having numerous residents and businesses within close proximity. The downtown serves as a gathering place for community events such as Blues on Belgrade and Oktoberfest.

Opportunities exist to reimagine the impact the downtown can have on North Mankato. As a point of entry into the community, Belgrade Avenue is a gateway and provides visitors with a first impression. Therefore, a healthy downtown is critical for developing a successful image of the city, as well as a strong sense of place. The future downtown should be memorable, vibrant, attractive and welcoming to pedestrians. Several sites within the downtown may be suitable for redevelopment. Redevelopment of these sites would revitalize the downtown by bringing in additional businesses and residents. Revitalization of the downtown will not happen overnight; however, the policies and objectives outlined in this chapter are intended to ensure that the values expressed will be realized as development and redevelopment occurs.

The ideas expressed in this chapter apply to the area identified on **Figure 3-2: Future Land Use Map** designated as the Central Business District.

Previous Planning Efforts

Downtown Planning Study, 2011-2012 – I&S Group

In 2012, I&S Group completed a study of the downtown area (200-400 blocks of Belgrade Avenue). This plan casts a vision for the downtown and provides a framework for future build out options of these blocks. It offers design concepts, façade and streetscape improvements, parking enhancements, and guidance on next steps. A public involvement component was also conducted as part of this plan. This chapter aims to emphasize the themes that evolved from the public processes of both plans.

Existing Conditions

The downtown currently consists mostly of one and two story buildings, many of which date back to the early part of the 20th century. These buildings are all in various states of physical condition. Some are still able to accommodate modern uses while others remain vacant and may need to be redeveloped to attract future commercial tenants. Several modern buildings are also mixed within. The downtown

currently has a very healthy mixture of neighborhood serving uses including restaurants, offices, retail stores, service businesses and residential uses, both single- and multi-family.

The 200 block of Belgrade Avenue contains the highest concentration of businesses and is predominantly commercial on both sides of the street, although upper levels of some buildings are used as apartments. The 300 and 400 blocks contain more single family homes, apartments, and some larger commercial users. As the downtown has grown, numerous single family homes along Belgrade Avenue have been converted for commercial use.

The development pattern and many of the existing buildings provide a sense of community, which residents value. Most buildings are built close to the street or sidewalk and have parking located in the rear or side of the building. Throughout the downtown sidewalks are provided on both sides of the street. These qualities contribute to making the downtown pedestrian friendly and could be incorporated in new development as a way to maintain the existing downtown character. Existing characteristics such as large storefront windows, awnings, façade details and unique signage also contribute to an engaging pedestrian atmosphere.

Key Issues and Opportunities

The following provides an overview of the key issues and opportunities pertaining to downtown redevelopment. These topics help provide guidance for future development decisions in the downtown.

Walkability and the Pedestrian Realm

A key element of successful downtowns is walkability and the creation of a comfortable and attractive pedestrian realm. Ensuring that this environment is safe, comfortable, and inviting is essential for providing people this opportunity. Through the public involvement process of this plan, as well as the Downtown Planning Study completed by I&S group, creating an attractive and walkable pedestrian realm was desired by the community.

Where possible, sidewalks should be widened to accommodate pedestrian flow. The sidewalk should be kept free of potential barriers such as utility poles or street signs wherever possible.

Creating an attractive pedestrian realm can also go a long way towards creating a destination where people want to be. Various streetscape features can be incorporated to enhance the appearance of the downtown and should be explored by the City. This could be in the form of boulevard trees and plantings, outdoor seating, plazas, signage, fountains, decorative lighting, sidewalk pavers, and other pedestrian amenities. The Downtown Planning Study lays out very detailed streetscape recommendations that could be implemented.

The City should work with businesses in the downtown and future developers to encourage attractive storefronts and ground level facades that engage pedestrians. Some examples of how this could be achieved include large storefront windows, architectural details at the ground level, landscaping, awnings, seating, buildings that open up to the sidewalk, and interesting signage. . The City should also work with property owners of older buildings to ensure their upkeep and prevent any deterioration.

Community events and festivals held downtown which draw in people from outside the City, provide an opportunity to further brand North Mankato. Currently, there are banners that hang from streetlights along Belgrade that aid in this regard. Other possible improvements could be the implementation of a landscaping plan or consistent color scheme throughout the downtown.

Because of its connection to the City of Mankato and Highway 169, Belgrade Avenue must be viewed as a gateway into the community, which provides a first impression to visitors. Therefore, the importance of the appearance and impression of Belgrade Avenue should not be understated. An attractive and unified public realm can enhance the branding for North Mankato, making it memorable and reflecting a positive image for the City.

Business Mix

Downtown North Mankato currently provides a healthy mix of businesses, many of which serve the neighborhood. A variety of different business types are desired to allow residents the opportunity to meet different commercial needs in close proximity to one another. It is desired that new businesses will locate in the downtown in the future to create a wider draw to the area. In addition to neighborhood serving businesses, it is important to have destination type businesses that will draw people in from a wider area. An example of a destination type business might include a specialized retail store. Making the downtown desirable to potential businesses will depend on several factors, including zoning,, upkeep and appearance of surrounding buildings and the streetscape, and available parking, which are all addressed in this chapter and other portions of this plan.

The physical state or conditions of some buildings in the downtown may result in those buildings no longer being desirable to potential commercial tenants. The City should work with existing property owners and businesses to explore where redevelopment should occur. For cases of redevelopment, mixed use buildings are encouraged to support an increase in the downtown residential population, while also providing additional commercial opportunities; however, standalone residential or commercial uses are also supported. Older buildings that are in good condition and remain desirable for commercial use should be preserved to maintain some of the historic feel to the downtown.

As the economy changes and new types of businesses are created, it is important to review existing zoning standards and regularly update the zoning code. The list of permitted and conditional uses should be updated to include any desirable uses that may not currently be permitted. In addition, the list of performance standards should be regularly reviewed to ensure that businesses are not unnecessarily constrained by zoning requirements. An up-to-date zoning code can have a significant impact on the development potential of a community.

Parking

Development patterns typical of most downtowns tend to provide mixed opinions about the availability of parking. In many downtowns, it is typical to incorporate a variety of different parking strategies to achieve an adequate supply of parking such as on-street parking, shared parking and municipal lots. Several businesses currently have parking in the rear or side of their property. On-street parking is

currently allowed along most of Belgrade Avenue throughout the downtown, with the exception of the north side of the 200 block.

The Downtown Planning Study found that although there is a perceived shortage of parking, the supply is generally sufficient for the existing uses during most times of the day. Some of the available parking may be perceived as inconvenient and may lack visibility. Improved way-finding signage could help visitors and residents make better use of the existing parking supply. However, as the downtown grows and new businesses and residential units are added, the parking supply will also need to increase. This will likely occur through a combination of parking provided on-site, on-street parking and shared parking lots. The City should look to identify property that could be developed for future parking lots specifically designated for downtown businesses. Ideally, these properties would be either north or south of property adjacent to Belgrade Avenue but would not front Belgrade Avenue themselves. Redevelopment of these lots could be funded privately, publicly, or through a partnership between the City and downtown businesses.

Vision for Downtown Redevelopment

Downtown North Mankato will be a bustling commercial and residential district. Higher densities will allow for a greater number of businesses and residents within close proximity. The downtown will be highly walkable, attractive, and inviting for the pedestrian. A wide variety of businesses will draw people to the area.

Goals, Objectives, and Policies

The following is a series of goals for downtown redevelopment followed by a series of objectives and policies intended to influence future land use decisions in a direction that is aligned with the Vision Statement above.

GOAL 1: Expand the number and variety of businesses and residential varieties in the downtown.

Objective 1.1: Redevelop underutilized parcels or outdated and deteriorating buildings.

Policy 1.1.1: Work with property owners and businesses to determine which buildings are no longer well suited or marketable for commercial use to identify redevelopment areas.

Policy 1.1.2: Actively recruit and match entrepreneurial start-up businesses with underutilized buildings.

Policy 1.1.3: Pursue state and federal grants which aid in the revitalization of downtown districts.

Policy 1.1.4: Assess the potential for creating tax increment financing (TIF) districts to aid in downtown revitalization.

Policy 1.1.5: Work with property owners and explore "outside-the-box" solutions for accommodating businesses that wish to expand their business in the downtown.

Policy 1.1.6: Work with property owners that have deteriorating buildings and connect them to resources for making improvements.

Objective 1.2: Increase the number of businesses and residents in the downtown.

Policy 1.2.1: Conduct a market study to determine commercial and residential needs, existing capacity and areas for growth within the downtown.

Policy 1.2.2: Incorporate principles that support a "live, work, play" mentality for the downtown.

Policy 1.2.3: Identify locations for small public spaces which will attract residents and provide greater visibility for businesses.

Policy 1.2.4: Explore opportunities for additional downtown events and festivals to expand the branding of downtown North Mankato and increase awareness of the downtown businesses.

Policy 1.2.5: Regularly review the list of permitted and conditional uses for the Central Business District to ensure that an ideal mix and type of uses are allowed in the downtown.

Policy 1.2.6: Review the list of performance standards for the Central Business District and remove any standards that may unnecessarily constrain existing or potential future businesses.

Policy 1.2.7: Support the transition of residential homes to commercial uses along Belgrade Avenue.

Objective 1.3: Ensure adequate parking for all businesses.

Policy 1.3.1: Assess and where necessary amend the parking requirements for commercial uses in the downtown area.

GOAL 2: Create a safe and inviting pedestrian realm.

Objective 2.1: Improve safety for pedestrians

Policy 2.1.1: Study the need for intersection improvements where conditions may be dangerous for pedestrians crossing the street and implement improvements at those intersections.

Policy 2.1.3: Provide adequate pedestrian lighting in the downtown at night.

Policy 2.1.4: Where possible, remove barriers from the pedestrian realm.

Policy 2.1.5: Incorporate wide sidewalks where possible.

Objective 2.2: Improve the appearance of the streetscape and façades in the downtown.

Policy 2.2.1: Implement streetscape policies consistent with the improvements called for in the Downtown Planning Study completed by I & S Group.

Policy 2.2.2: Encourage and work with businesses to allow them to place items in the pedestrian realm that enhance their storefronts such as planter boxes, seating, public art, sandwich board signs, etc.

Policy 2.2.3: Encourage façade characteristics that enhance the pedestrian realm such as large storefront windows, awnings, architectural detail at the ground level, and interesting signage.

Policy 2.2.4: Develop a streetscape plan to promote a positive and unified image for downtown.

Policy 2.2.5: Consider implementing design standards to enhance the downtown character. Explore the idea of implementing form based codes.

Chapter 11: Community Design

Introduction

Community design is about the cohesiveness of many different elements of a city, including scale, character, mobility, and density among others. Good community design results in places that are inviting, comfortable, and user friendly. It influences how people interact and move about within their environment. A key component of community design is the relationship between the natural and built environment. Development patterns such as block shape and form, the sidewalk, and landscaping are also part of community design. Many issues and topics covered in other parts of this plan have an influence on community design.

Existing Conditions

The City of North Mankato has several areas which developed at different time periods, resulting in different development patterns and building forms.

Lower North is the older part of the city which developed consistent with early 20th century development patterns. City blocks in Lower North are mostly on a grid network. Most single family homes in Lower North are older and well maintained. Many also have detached garages in the rear yard and many blocks have alley access. Residential lots are generally smaller in Lower North than in residential areas that developed at a later time period. Homes are also generally built with limited setbacks. Most streets have a sidewalk on both sides of the street and trees have been well preserved. Lower North is comprised mostly of low density residential with parks, schools, institutional uses and some higher density residential uses mixed in. Belgrade Avenue serves as the primary commercial corridor in Lower North and is the City's downtown. Many of the original buildings in the downtown remain. These buildings are built to the sidewalk and have relatively narrow storefronts creating a pedestrian friendly atmosphere. The combination of older houses and the downtown give Lower North a distinguishable quaint character and small town feel.

Upper North consists of newer development with more modern suburban style subdivisions. Residential lots are generally bigger than those in Lower North and are not on a grid network. Most single family homes have driveways off the front of their lots with garages in front of the home. Commercial, industrial and institutional uses are generally situated along arterial roadways. Sidewalks are generally located on at least one side of the street. Several small neighborhood parks are mixed throughout residential areas but several larger parks attract users from a wider area. In parts of Upper North, natural areas have been well preserved where residential subdivisions have been built around forested areas. Some areas in Upper North, such as Commerce Drive and Northport Industrial Park are designed with the consideration of accommodating large truck traffic in mind. Lot size, visibility, streets and intersections are all well designed for supporting a business friendly environment that should be considered attractive to existing and potential businesses.

Key Issues and Opportunities

The following provides an overview of the key issues and opportunities pertaining to community design for North Mankato.

Development Pattern

As mentioned above, North Mankato developed with two different development patterns over time. Both have value for the City by offering residents variety in neighborhood character. Land available for future development in the City is mostly to the north and west. Growth areas in Upper North are mostly planned for low density residential and industrial; however, the plan aims to mix in more commercial uses in close proximity to residential areas to minimize the distance required to travel, and allow for biking and walking. This is mostly in the form of key commercial nodes and corridors. As such, key streets should be designed to accommodate cyclists and pedestrians to get to their destinations. Special consideration should be given for enhanced landscaping between residential neighborhoods and key destinations where walkers and cyclists may go. With new subdivisions, any proposed street network should also be analyzed for connectivity and the ability to efficiently get from one point to another.

Climate Sensitive Design

Being in Minnesota, special design considerations are necessary for new infrastructure to ensure usability throughout all seasons. The winter months generally have the greatest implications for impacting livability. Snow and ice can create a wide variety of problems for mobility and safety. Available space for snow storage is something that should be analyzed for new developments. Standards such as driveway setbacks and permitted slopes are examples of controls that can help mitigate impacts from snow or storm water runoff. In the public realm, streets, sidewalks and bikeways should be designed to accommodate easy snow removal and storage and be compatible with snow removal equipment. Space should be provided between the sidewalk and the street to allow for snow storage. Landscaping enhancements could also be considered in key pedestrian areas for wind screening.

Public Spaces

Well-designed public spaces can be a tremendous asset to a community. These may be in the form of plazas, public squares, parks, amphitheaters, gardens or others. These spaces provide areas for residents to spend time outdoors and provide opportunities for social interaction. Much of the public space in North Mankato is in the form of parks. Neighborhood parks are evenly spread throughout the community to provide public space in close proximity to most residents. Many of these parks offer playground equipment, picnic areas, and athletic facilities for sports such as tennis, soccer, basketball or softball. How public spaces are designed should be thoroughly analyzed. It is important to not just provide public spaces, but that they also be designed to consider safety, comfort and aesthetics. Elements such as lighting and vegetation can be designed to help improve the perception of safety at night. Any amenities that are installed such as seating should be comfortable and attractively designed.

Architecture and Character

North Mankato contains a variety of buildings and homes with different architectural styles, which is partly due to the varying time periods over which different areas developed. There is a noticeable difference in architectural style between the homes in Lower North near the east end of Belgrade Avenue, homes constructed in the 1970s, and homes built in the last ten years. Many of the homes in Lower North were constructed in the early part of the 20th century but have been well preserved and maintained over the years. These charming neighborhoods provide a classic small town feel that is valued by many of the residents. Over the years, North Mankato has continued to see an influx of new residential development. New development has generally moved towards the north and west over time. Homes built towards the latter half of the 20th century offer a more traditional suburban style home. Many of the homes built in the last ten years present a more modern architectural style. The wide range of architectural styles of homes and buildings is an asset to the community because it provides a wide range of housing options, as some residents may prefer one style of home over another. The City of North Mankato will continue to support a varying degree of architectural styles through new development and redevelopment of existing areas.

Transportation

The ability for residents to move quickly and easily throughout the City is an important factor that influences livability. The transportation network should be designed to efficiently and safely accommodate all modes of travel during all seasons. Roads are designed based on the amount of traffic and speeds they are intended to accommodate. The expected type of traffic, such as large truck traffic, can also influence road design. This means that the location and design of new roadways is greatly influenced by land use. For example, larger commercial uses that tend to generate more traffic should be located adjacent to roadways that can accommodate such traffic. Residential streets are generally narrow and may not be striped while arterial roadways may be several lanes across. Buildings may be designed differently based on the type of roadway they are adjacent to. For example, a commercial use adjacent to a larger roadway with faster speeds will generally want to be setback farther from the roadway and have a wider storefront for improved visibility.

The design of roadways should always consider the user friendliness of alternative modes of transportation all while preserving on-street parking where feasible. **This does not mean that a bike lane should be striped on every street; however, if one is not provided, sufficient width should be provided to accommodate space for cyclists with two-way traffic.** In some areas, it may be beneficial to construct off-road trails as an alternative to biking on the street. Design of these trails should be wide enough to allow for bikes traveling in each direction. Barriers and structures should not be located directly adjacent to paths or impede visibility at intersections. Directional signage and pavement markings can also help with flow and safety. For pedestrians, sidewalks should generally be located a few feet off the street to provide some separation from vehicles and provide space for snow storage. In key pedestrian areas, landscaping enhancements should be considered to improve the aesthetics of the surroundings.

Vision for Community Design

The City of North Mankato will incorporate and support community design that enhances the livability and quality of life for residents. Strategic improvements will enhance the functionality of the public realm and result in a more enjoyable and aesthetically attractive environment.

Goals, Objectives, and Policies

The following is a series of goals for community design followed by a series of objectives and policies intended to influence future development decisions in a direction that is aligned with the Vision Statement above.

GOAL 1: Enhance the livability of North Mankato through quality design.

Objective 1.1: Make enhancements that improve the functionality of the public realm.

Policy 1.1.1: In the design of new infrastructure, consider designs which accommodate seasonal variability and allow for use during all times of the year.

Policy 1.1.2: Make infrastructure and public realm improvements that complement the surrounding land uses.

Policy 1.1.3: Where appropriate, promote features that provide a physical buffer and transition between land uses of varying intensities, such as landscaping, fencing or setbacks.

Policy 1.1.4: Support the development of medium and high density housing near commercial or high traffic areas.

Policy 1.1.5: Make improvements to public spaces that improve the comfort and enjoyment of those areas.

Policy 1.1.6: Consider non-motorized modes of transportation in the design of new roadways. Explore opportunities for off-road trails where appropriate.

Policy 1.1.7: For new subdivisions, promote street patterns that maximize connectivity and efficiency of getting from one point to another.

Policy 1.1.8: Explore opportunities for new forms of public spaces such as plazas, public squares or outdoor performing areas.

Policy 1.1.9: Analyze existing pedestrian areas and public spaces for lighting and make improvements where necessary to increase safety at night.

Objective 1.2: Make decisions that enhance the appearance and attractiveness of the public realm.

Policy 1.2.1: Promote the protection and enhancement of natural resources as a means to maintain the integrity, heritage and local character of the community.

Policy 1.2.2: Consider revisions to the sign code that accommodate unique signage in the downtown.

Policy 1.2.3: Consider landscaping improvements along key pedestrian and bike corridors and in other public spaces.

Policy 1.2.4: When installing amenities such as seating, trash receptacles, pedestrian lightings, or others similar types of features, explore the feasibility of more attractive options.

Policy 1.2.5: Encourage reuse of existing buildings where feasible.

Policy 1.2.6: Consider developing a plan or implementation tool that offers incentives for infill development and removal of substandard buildings or consolidating of land where feasible.