

5. Environmental Resources

Organization

- A. Overview
- B. Goal
- C. Key Findings
- D. Objectives and Strategies

Purpose

The purpose of the Environmental Resources Chapter is to define environmentally significant areas and establish objectives and strategies for their preservation, protection, enhancement and utilization.

A. Overview

An important part of Northfield's future vision is the preservation and enhancement of the community's environmental resources. Three of the land use principles in Chapter 4, developed during the Comprehensive Plan public meetings, reinforce the City's commitment to environmental stewardship:

- The natural environment will be protected, enhanced and better integrated in the community.
- Environmentally-sensitive and sustainable practices will be integrated into new developments and redeveloped areas.
- Rural character of certain areas of the community will be protected.

B. Goal

A goal is a policy statement that states a desired outcome in general terms. The goal for environmental resources is provided below. The goal was developed by considering key findings related to environmental resources and integrating public input generated as part of the Plan update.

The natural environment will be protected, enhanced and better integrated into the community.

C. Key Findings

Northfield's character reflects a number of unique environmental qualities. This chapter of the Comprehensive Plan will identify many of those features and establish objectives and strategies for the preservation, protection and enhancement of Northfield's natural environment. Recently, the City has completed key documents that provide direction on the identification, enhancement and protection of the area's natural resources. These documents are the Natural Resources Inventory (NRI) completed in 2005, the Greater Northfield Greenway Corridor System Action Plan completed in 2007, and the Surface Water Management Plan, also completed in 2007. These documents will be referenced throughout this chapter.

Environmentally Significant Areas

The general topography, along with the soils, bedrock, water features and other natural community resources, are a defining element of the overall community (Map 5.1). These areas are described below. Each environmentally significant area should be evaluated

to determine whether the area should be protected, restored, or allowed to be altered.

General Topography

The Cannon River Valley is the dominant topographical element in Northfield. The river forms the low point of the community, but various high points are spread alongside the length of the river and certain hillsides and tributaries of the Cannon River feature steep slopes. Numerous wetlands of various types are located within many of the stream valleys, the Cannon River Valley and elsewhere.

Bedrock

According to the Bedrock Geologic Map and Bedrock Topographic Map of Dakota County (Minnesota Geological Survey, 1990) and the Rice County Water Resource Management Plan, the geomorphology of the uppermost geologic formation is a thin layer of quaternary deposits and, in many places, exposed bedrock. The current landscape results largely from glacial activity. The bedrock formations consist mainly of St. Peter Sandstone, Prairie Du Chien Group and Jordan Sandstone.

Depth to bedrock varies from 130 feet deep to exposure at the surface. Areas where the bedrock is shallow or exposed provide an increased potential for pollutants to reach the groundwater supply. As the City looks at infiltration practices in stormwater management, care should be taken to locate storm water improvement features away from shallow bedrock areas that could increase the risk of groundwater contamination.

Soils

The US Department of Agriculture and Rice County prepared the Rice County Soil Survey in 1975. Utilizing this survey, Carleton College developed a report called Northfield Land Use Suitability, which was used during the preparation of the 1977 Northfield Comprehensive Plan. The report generally analyzed the suitability of land for urban development, rural development (which relies on septic tanks), and agricultural use within Northfield and an area that includes today's urban expansion area.

Northfield is surrounded by agricultural land. Agricultural soils maintain a generally moderate to high level of productivity except for the western and northwestern extremes where agricultural lands are found to have very high productivity levels based on corn

suitability ratings. Conservation farming practices should be encouraged in the city's growth areas as a means of reducing soil loss from agricultural fields. Also, the rate of growth should be controlled with land use principles in Chapter 4 to reduce the amount of land taken out of agricultural production.

The agricultural lands surrounding Northfield may eventually develop. Soil types found in valleys and low areas following streams and the Cannon River, as well as areas with steeper slopes (as shown on Map 5.1) have a limited building suitability. Detailed topographic surveys will be completed as part of any development plan to determine the actual location of these areas. Development will mean soils will be highly susceptible to erosion and sedimentation during construction periods. Best Management Practices (BMPs) should be used and erosion and sediment regulations enforced to control soil loss.

Water Resources

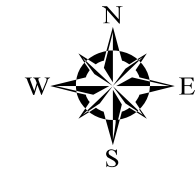
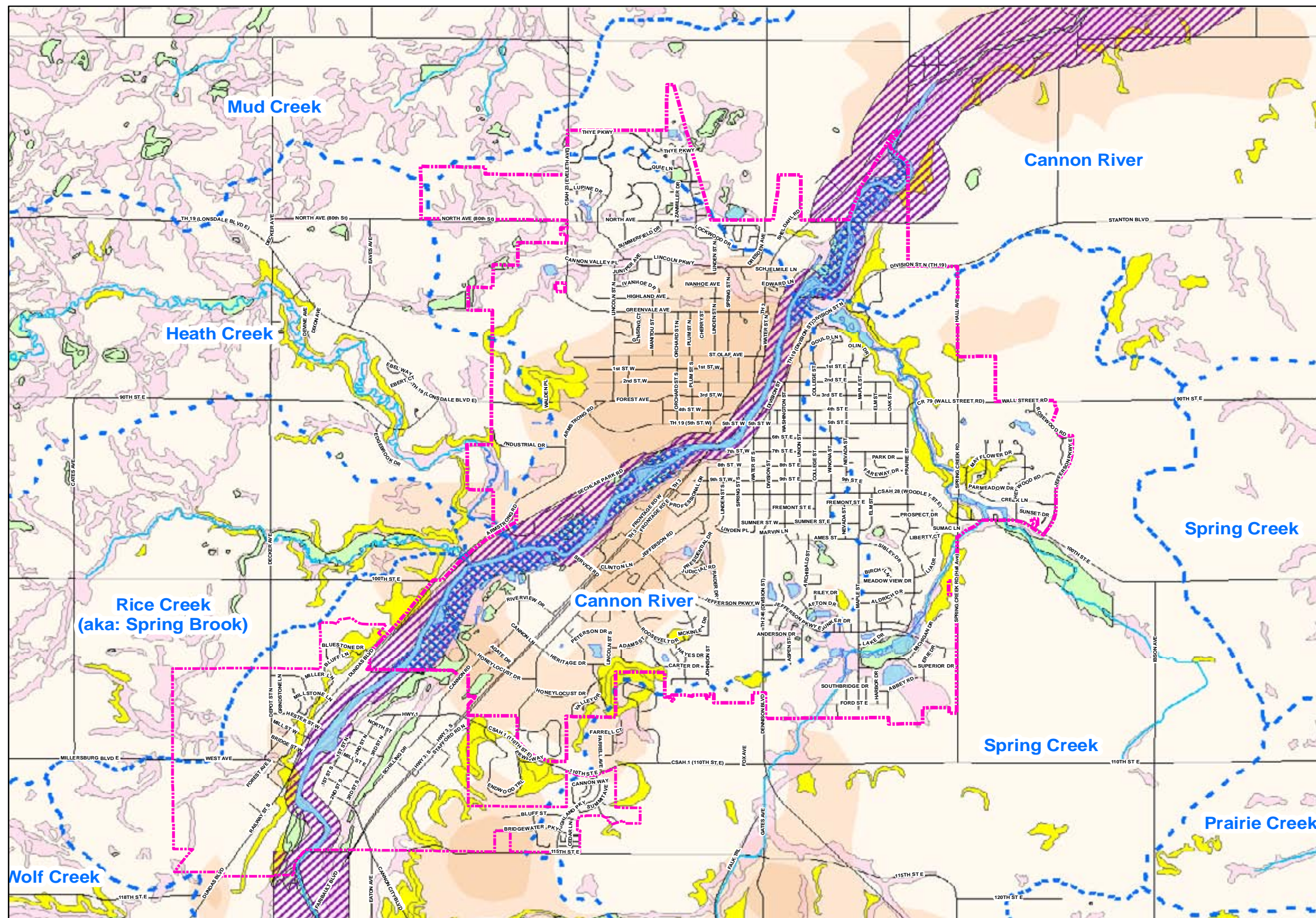
Groundwater

Aquifers provide the groundwater for the city and surrounding areas. The main aquifers within or near the city are the St. Peter Aquifer, the Prairie Du Chien-Jordan Aquifer, the St. Lawrence-Franconia Aquifer, and the Mt. Simon-Hinckley Aquifer. Within the city, five ground water wells provide the source for potable water needs. Groundwater resource data for areas within the city are available in the Rice County Water Resource Management Plan, as well as the Dakota County and Rice County Geological Atlas.

Watersheds

Northfield is part of the Cannon River Watershed. This watershed can be subdivided into four subwatersheds within the city that feed the Cannon River. These subwatersheds include Spring Creek, Rice Creek (locally known as Spring Brook), the Lincoln Waterway, and Heath Creek (Map 5.1). The City's Surface Water Management Plan describes these subwatersheds in more detail. The Cannon River and Rice Creek are waterways protected by the Minnesota Department of Natural Resources (DNR), which warrants further discussion of these waterways, below. The Lincoln Waterway and Heath Creek are discussed more in depth in the Surface Water Management Plan.

Map 5.1 Environmentally Significant Areas



Legend

- Northfield
- Dundas
- Watersheds
- Water
- Floodway
- Wild & Scenic Boundary
- Wetland
- Steep Slopes (> 8%)
- Hydric Soils

Depth to Bedrock

- 1 - 10 ft
- 11 - 20 ft
- Over 20 ft

Map Sources:

- Rice County GIS Division
- Dakota County Office of GIS
- Minnesota DNR: FEMA Q3 Floodway Data, Minnesota DNR - Division of Waters, National Wetland Inventory
- USDA Natural Resources Conservation Service
- R.S. Lively, E.J. Bauer, and V.M. Chandler Minnesota Geological Survey, January, 2006

1. Cannon River. The Cannon River, one of the most significant identity elements of Northfield, originates in Rice County at Shields Lake and flows through the heart of Northfield's downtown en route to the Mississippi River.

Many tributaries in Northfield flow into the Cannon River providing surface (rain) water drainage for much of the community as well as some of the agricultural uses in surrounding townships.

In 1980, the Cannon River was added to Minnesota's State Wild & Scenic Rivers Program. This program was established by the State in 1973 in order to protect rivers with outstanding natural, scenic, geographic, historic, cultural and recreational values. Only six rivers have had segments designated as 'wild, scenic, or recreational' under the program. Each of the six designated river segments in Minnesota has a management plan outlining the rules and goals for that waterway. These rules work with local zoning ordinances to protect the rivers from factors that undermine the wild, scenic and recreational qualities for which they were designated; factors such as pollution, erosion, over-development and degradation.

Segments of the Cannon River fall under both "scenic" and "recreational" classifications. Through Northfield, the river is designated as "recreational", a designation given to those rivers that may have undergone some impoundment or diversion in the past and may have adjacent lands that are considerably developed, but are still capable of being managed in accordance with the act. This means that bordering lands may have already been developed for a full range of agricultural or other land uses, and may also be readily accessible by pre-existing roads or railroads.

2. Rice Creek (Spring Brook). One of the more notable Cannon River tributaries is Rice Creek, located in the southwest portion of the community. Rice Creek is one of the last remaining cold water native trout streams in Minnesota and the only one in Rice County. Cool, clean, spring-fed water within this creek provides the necessary habitat for the survival and breeding of Brook Trout, the native trout species in Minnesota. In fact, the DNR has restocked Brook Trout in other streams throughout the state using fish eggs originating from Rice Creek.

Thus far, Rice Creek has been able to maintain the necessary habitat and water conditions for the survival of trout. The primary threats to this habitat come from existing agricultural practices or future development and include surface water runoff containing excessive sediment, pesticides, or fertilizers, and an increase to the speed, volume, or temperature of runoff water.

In 1997 the Cannon River Watershed Partnership began working with a committee composed of local landowners, representatives of various governmental jurisdictions, fishing enthusiasts, and the DNR to learn about Rice Creek and its watershed, and to discuss ways to preserve and protect it. The Committee created a vision for the watershed and Rice Creek entitled "Description of the Spring Brook Watershed in 2050."

The Surface Water Management Plan has identified three specific strategies for future regulations the City could adopt to protect and enhance the Rice Creek watershed. These strategies include more stringent rate and quality controls for any development project within the watershed. To achieve this, runoff from developed sites should be kept to a minimum and infiltration should be required to a greater degree than other watersheds within the city. The City will also work with Bridgewater Township and other regulatory agencies to develop a trout stream management plan.

Natural Communities

A Natural Resources Inventory (NRI) was completed in 2005. The NRI revealed that natural communities (a distinct and identifiable association of plants and animals), as well as a number of semi-natural areas that provide connectivity between the natural communities, are primarily concentrated along the river and stream corridors. Several important and unique natural features in the community were identified in an inventory in the NRI. These features are shown on Map 5.2 and listed below:

- Rich fen (a type of wetland) at Hauberg Woods
- High quality floodplain forests along the Cannon River
- Good quality maple-basswood and oak forests along the stream corridors, especially Heath Creek

- Rice Creek (this site is of regional significance as it is the only trout stream in Rice County, and is an uncommon resource type in southern Minnesota)
- Limestone cliffs along Heath Creek
- Numerous scenic overlooks along the stream corridors and in some outlying areas
- Cannon River (designated as a state Wild and Scenic River)
- Open space areas on the campuses of St. Olaf and Carleton Colleges, which have high ecological value due both to their overall size and the significant efforts the colleges are making to restore and manage existing native habitat. The Carleton College Arboretum provides areas of open space, native species and wetland restoration for both educational purposes and recreational enjoyment for students and Northfield residents. St. Olaf College also maintains a nature preserve containing open spaces, wetlands and natural habitat.

The NRI also described the quality of the various identified natural features. The “Qualitative Rank” and “Restoration Potential” described in the NRI, and the contiguity of non-developed space regardless of its quality, should be taken into account when determining whether the resource should be protected, restored, or allowed to be altered.

Additional Environmental Issues

Resource Conservation

The City makes use of many resources to enhance the quality of life, including the use of non-renewable fossil fuels. Conserving these resources to minimize the impact on the environment and provide for sustainability has become a goal of the City. Sustainable development practices are strategies and actions to achieve economic and social goals in ways that can be supported for the long term by conserving resources, protecting the environment, and ensuring human health and welfare. These practices ensure that current uses of resources and the environment do not restrict their use by future generations. Sustainable development is a process of change in which the use of resources, the direction of investments, the orientation of technological development and institutional change are made consistent with the future as well as present needs.

A task force was established in 2007 to assess opportunities for local development of energy efficiency and clean energy projects that will protect the

community from future energy price and supply instability, enhance local economic development, and provide local, regional and global environmental benefits. The task force will also assess the efficacy of creating a municipal electric utility or special energy district in achieving energy opportunities. Finally, the task force will recommend citywide target greenhouse gas emission reductions to fulfill Milestone 2 of the City’s commitment to the Cities for Climate Protection Campaign (CCPC) and develop an action plan to meet these targets. The City Council will evaluate the recommendations of the energy task force and implement new appropriate policies.

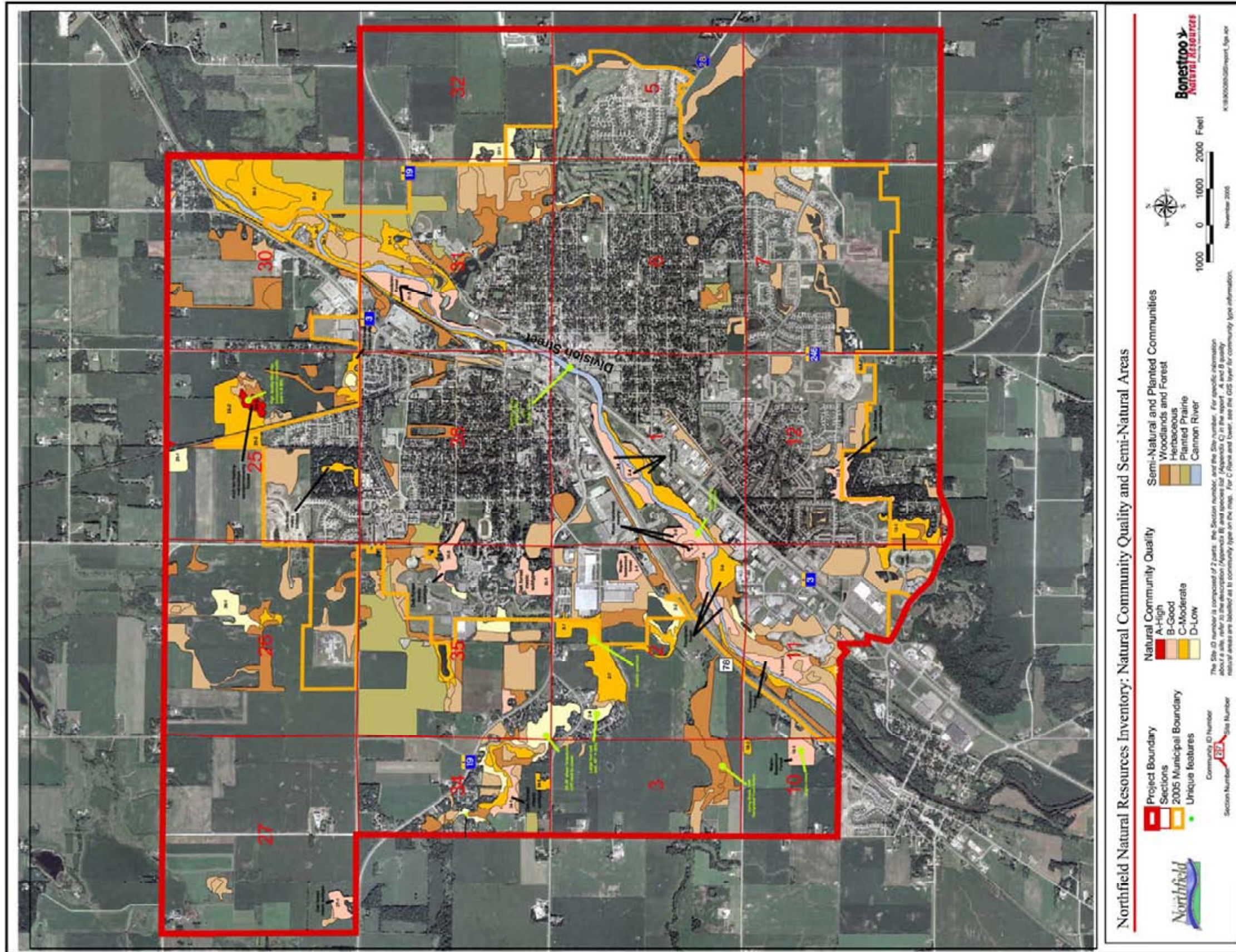
Reduction of Waste Materials

The City has a number of programs to encourage the reduction of waste materials. Normal curbside pickup of refuse is supplemented with single sort curbside recycling. The following materials can be comingled and are currently accepted for recycling curbside: aluminum cans, brown paper bags, glass bottles and jars, newspapers, small-mouth plastic bottles and jugs, tin and steel cans. Catalogs, magazines, phones books, cardboard boxes and mixed-use paper can also be comingled or dropped off at recycling containers located in the parking lots of two of Northfield’s major grocery stores. Households that produce less than 14 gallons of garbage or refuse per week may also qualify for a reduced garbage/recycling fee.

The City and the currently licensed refuse collector also sponsor Annual Clean-Up Days. Once a year, the currently licensed refuse collector provides dumpsters in Babcock Park located at Woodley Street and Hwy 3. City residents may unload debris from their households free of charge at the site. Disposal of electronic appliances are taken, but do require an additional disposal fee.

Yard waste (leaves, grass clippings and garden/flower waste) is collected curbside seasonally (spring and fall) if waste is contained in specially-marked biodegradable paper bags. Northfield residents also have the option of disposing of yard wastes, including brush, branches and shrubbery, at the City’s and Rice County’s compost sites. Finished compost is also available for pickup at the site. The City’s compost site is located between Northfield and Dundas on Armstrong Road, just south of Sechler Park. The Rice County compost site is located between Northfield and Faribault off Hwy 3 on County Road 75.

MAP 5.2 NATURAL COMMUNITY QUALITY AND SEMI-NATURAL AREAS



Source: City of Northfield

Hazardous Materials

Minimizing the contamination of the environment, whether its water, soil or air pollution, is a priority. Practices within the community can have both a local and regional affect on the environment. Locally there are a number of facilities that store and use hazardous materials that have the potential to pollute the environment. Federal and state regulations require these facilities to address storage and handling of these materials and develop a plan of action in the unlikely event that these harmful substances are released into the environment. The City, along with the other required authorities, should be notified in the event of a regulated release that could potentially be harmful.

Much of the city's solid waste products are taken to the Rice County landfill. The landfill is permitted to accept certain waste products such as household refuse, furniture, empty dried paint cans and construction materials. Hazardous waste is not allowed to be disposed of in the Rice County Landfill, as they have the potential to contaminate the landfill. Household Hazardous Waste (HHW) and qualifying Very Small Quantity Generators (VSQG) can dispose of their hazardous waste at the Rice County Hazardous Waste Facility and/or Dakota County Hazardous Waste Facility. Disposal of Household Hazardous Waste should take place in residents' respective counties. Business VSQG hazardous waste is paid for by the company and on appointment. There is also the potential that these materials are disposed of in an illegal matter such as dumping in the storm sewer system. As part of the City's NPDES MS4 permit, the City will develop an education program on the proper disposal of household hazardous materials.

Air Quality

The City values the quality of the air in and around the community. In general, the City controls and directs those activities that would subject the citizens of the community to unacceptable air pollutants, such as burning of hazardous materials and burning leaves and brush. Currently, the City does not have regulations prohibiting residential burning of wood in conventional fireplaces, wood and pellet stoves, or outdoor wood-fired boilers. The City has adopted by reference the Minnesota Pollution Control Agency's (MPCA) regulations and standards relating to air quality.

Noise Pollution

The City currently has several ordinances in place that address various noise disturbances. These disturbances include animals, parties or large assemblies, and other noise producing activities in residential or commercial areas. These ordinances should be evaluated to determine if further measures could be taken to reduce noise impacts.

Current Protection Programs

Environmental Quality Commission

The City maintains a citizen advisory board called the Environmental Quality Commission. This volunteer board advises the City Council on the creation of appropriate policies, programs, and regulations for the protection and preservation of the community's natural resources.

NPDES MS4 Permit

The MPCA implemented the National Pollutant Discharge Elimination System (NPDES) Phase II Stormwater Program in March 2003. Phase II requires (as amended in 2006) municipal separate storm sewer systems (MS4s) in urban areas with a population over 10,000 to obtain an NPDES permit. Permits for construction sites greater than one acre are also required as part of the Phase II requirements. The City submitted its Notice of Intent (NOI) and Stormwater Pollution Prevention Plan (SWPPP) in conformance with the MPCA guidelines in the spring of 2007. More information about the permit can be found in the City's Surface Water Management Plan.

Organic Pest Management Policy

The City acknowledges the potential health risks associated with exposure to pesticides and is committed to phasing out the use of pesticides on City owned land through the implementation of an Organic Pest Management Policy for Turf & Non-Aquatic Landscape ("OPM Policy"). Organic Pest Management (OPM) is a problem-solving strategy that prioritizes a natural, organic approach to turf grass and landscape management without the use of synthetic pesticides. It mandates the use of natural, organic cultural practices that promote healthy soil and plant life as a preventative measure against the onset of turf and landscape pest problems. OPM responds to site-specific conditions by

integrating cultural, biological and mechanical practices that foster cycling of resources and promote ecological balance and conserve biodiversity. Implementation of the OPM Policy is intended to augment and guide the existing turf and landscape management practices on property under the City’s control and to set an example for residents of environmentally sustainable turf and landscape practices.

Other Protection Programs

- The City currently has a tree preservation policy, which will be updated in the revision of the Land Development Regulations.
- The City has a Well Head Protection Program that is detailed in Chapter 6, Sewer and Water Resources.
- The City will strive to use Leadership in Energy and Environmental Design (LEED) standards for environmentally sustainable construction of public facilities.
- The Greater Northfield Greenway System Action Plan preserves a corridor for trail connections and recreation, and also serves as a stream buffer to filter pollutants and preserve wildlife habitat. Further detail about the greenway corridor is found in Chapter 8.
- There are many other tools and strategies for protecting environmental resources, some of which are very aggressive and require high degrees of public involvement, and others that are less aggressive and require minimal to no public involvement. These strategies may assume a variety of forms including regulatory requirements, incentives, or a combination of both. The following is a list of strategies for environmental and open space preservation/protection that may be targeted towards significant tree stands (woodlands), stream buffers that may also serve as trail corridors, or areas with significant natural habitats/species. The zoning and subdivision revision currently underway may make some of the strategies less appropriate.
 - ❖ *Fee simple acquisition* – A municipality or land trust purchases the desired preservation area outright, guaranteeing its protection and public access.
 - ❖ *Conservation or preservation easement* – A landowner agrees to place desired preservation areas in an easement that is

- recorded on the deed and prohibits development of the land. In return, the property owner receives some property tax relief. The easement should be conveyed to an organization that will be responsible for management of the easement area.
- ❖ *Purchase of Development Rights* – A municipality or land trust purchases the development rights (PDR) to the property allowing the private landowner to retain ownership, but not the property’s development rights. The private landowner would be required to place the land area that would have been developed in a permanent conservation easement or other land protection program.
- ❖ *Overlay Zoning* - Overlay zones are a type of resource protection zoning superimposed on traditional zoning in order to protect environmentally sensitive areas while still allowing the underlying use in suitable forms. As an example, Northfield has a flood plain district in its zoning code that complies with the Federal Flood Insurance Program and regulates what can be done in the flood plain area. In the area designated as an Overlay District, the use and intensity of riparian activities are regulated by a zoning ordinance containing several riparian corridor protection standards. This strategy considers all the land uses that are within the federally designated flood plain areas and gives Northfield legal control of the area without having to own the property.
- ❖ *Transfer of Development Rights* – A transfer of development rights (TDR) program allows municipalities to preserve unique and environmentally sensitive areas through a form of overlay zoning that targets specific segments of a community for preservation. Landowner property values are protected because they are permitted to transfer their right to develop, based on the underlying zoning district, to a portion of the municipality designated for more intensive development (i.e., sell development rights to other developers within the community). This allows the environmental corridors to be permanently preserved while still

providing a return on investment to the developer and retaining additional development capacity in the community. The community would have to identify areas where the transfer of density is desired (sending areas) and areas where the density would be received (receiving areas) within its zoning code. This approach relies on a market that is accepting of higher density development patterns.

- ❖ *Bonus/Incentive Zoning* – Bonus zoning is similar to transferable development rights except that the additional development rights are generated and used by the developer rather than purchased from another landowner. Incentive zones may establish a required set of conditions and an optional set of incentives that the developer may choose to meet in exchange for greater flexibility. For example, an incentive zoning law may allow a developer to build in a zone at a higher density than is normally allowed if the developer agrees to set aside more open space or adopt certain energy-saving or transportation measures.
- ❖ *Clustering* – This strategy, sometimes called open space zoning, allows municipalities to offer incentives or use regulation to ensure that new subdivisions cluster homes on smaller lots, allowing the environmentally sensitive area to be set aside and protected as a common area for the enjoyment of those who live in the community.
- ❖ *Performance-based Zoning* – This type of subdivision expands on the overlay concept. The municipality identifies the performance criteria that must be met by any development in the zone, but gives the developer flexibility in planning and developing the subdivision, as long as the criteria are met.
- ❖ *Streambank Setback or Resource Protection Zones* – The municipality can protect environmentally sensitive areas through use of an established buffer strip. The buffer is similar to a utility right-of-way. The width of the setback is determined before construction of the subdivision begins. Zoning ordinances use two approaches – a

fixed buffer or a floating buffer. A fixed buffer may prohibit development within 200 feet of the high water line of a perennial stream, but a floating buffer may vary in width depending on site, soil and runoff characteristics.

- ❖ *Urban Growth Boundaries* – This is a zoning district established to encourage development within the district and discourage development outside the district boundaries.

Collaboration Opportunities

Many organizations have an interest in preserving the environment and maintaining an abundance of open space. The opportunity to work with many special interest groups, private philanthropists, the development community and other regulatory agencies should be explored when seeking solutions to environmental protection. There are a number of state and local agencies that regulate many of the environmental features within Northfield. The Surface Water Management Plan has a list of these agencies. The University of Minnesota Extension Service and the Cannon River Watershed Partnership are good sources for technical and educational materials. The Department of Natural Resources (DNR) and other governmental agencies such as the Minnesota Pollution Control Agency (MPCA) and the Rice County Soil and Water Conservation District also offer good technical and/or financial resources.

D. Objectives and Strategies

Outlined below are ten objectives and 32 strategies. The objectives indicate a specific policy direction and help organize strategies. Strategies are detailed actions necessary to initiate or complete an objective such as a program, policy or a project.

Objective 1: Develop and approve a city-wide sustainability plan.

ER 1.1 Promote education about energy and resource conservation in the community.

ER 1.2 Incentives should be developed to promote energy efficiency in the design, construction and

operation of residential, commercial and industrial buildings.

ER 1.3 Natural resource conservation will be incorporated into the design and construction of residential, commercial and industrial development.

ER 1.4 New development will enhance conservation of surface water resources, including management of storm water runoff.

Objective 2: Protect and enhance environmentally significant areas.

ER 2.1 Maintain standards and regulations to control development on steep slopes (generally those over 12%) to control soil erosion and sedimentation and to minimize the removal of natural vegetation.

ER 2.2 Preserve sufficient natural open space, and greenway corridors, as identified in the 2008 Park System Plan and the Natural Resources Inventory (NRI), in order to provide habitat for wildlife and provide scenic and recreational qualities for the community.

ER 2.3 Encourage planting of native vegetation and development of habitat (such as native species, trees and grasses with deep root structures) within buffer areas and along streams and waterways as identified in the Greater Northfield Greenway System Action Plan and the NRI, and educate residents about the benefits of using native plant species in residential landscaping.

ER 2.4 The NRI should be consulted when development is proposed to verify the presence of any significant natural resources. Also, land use decisions in natural areas should consider the connectivity of a given natural area to other nearby areas. The loss of lower-quality natural areas can affect the ecological function of other nearby natural areas, including higher-quality areas. For this reason, the criteria for protecting or restoring a natural area should not be limited to the quality rank or restoration potential, but should also consider the location of a natural area in the local landscape and the potential utilization of the area by local wildlife.

Objective 3: Protect and enhance water quality.

ER 3.1 As the City looks at infiltration practices in stormwater management, care will be taken to locate these features away from shallow bedrock areas that could increase the risk of groundwater contamination.

ER 3.2 Protect and enhance the quality of groundwater to minimize the potential of contamination to the drinking water supply.

ER 3.3 Protect and enhance the quality of surface waters including the Cannon River and its creek tributaries. The Surface Water Management Plan identifies current strategies that should be updated periodically to remain current with regulations and acceptable practices. The City may consult with other educational and technical agencies and/or organizations to achieve this strategy.

ER 3.4 The City will cooperate with Bridgewater Township, the City of Dundas, the Minnesota DNR and any other regulatory agency to manage the regional creeks, especially Rice Creek, which is a trout stream.

Objective 4: Conserve energy in public and private sector development efforts.

ER 4.1 Encourage the use of energy conservation technologies and techniques, and promote the exploration and innovation of new methods to conserve energy.

ER 4.2 Strive to build or renovate city-owned buildings to meet LEED standards.

ER 4.3 Building design standards will allow for and accommodate changing solar technologies.

ER 4.4 Evaluate the recommendations of the Energy Task Force and promote implementation of the strategies as appropriate.

Objective 5: Promote the reduction of solid waste generated.

ER 5.1 Promote programs to reduce the amount of solid waste generated in the City and to increase the use of recyclable, reusable or biodegradable materials.

ER 5.2 The City will work with its contracted waste haulers to provide volume pricing that encourages the reduction of waste.

ER 5.3 The City will develop programs that promote and facilitate the reuse of building and construction materials in demolition, remodeling and new construction projects in Northfield in consultation with regional conservation groups such as the Green Institute's Re-Use Center in Minneapolis.

Objective 6: Minimize the negative consequences of hazardous materials.

ER 6.1 The City will review its use of hazardous materials and substitute safer alternatives wherever possible.

ER 6.2 Educate Northfield businesses and residents on the storage, use and disposal of hazardous materials.

ER 6.3 Promote organic pest management policies and objectives, including establishing a baseline inventory and reduction in the use of synthetic chemicals on City-owned properties.

Objective 7: Work toward the goal of maintaining or improving air quality in the community.

ER 7.1 City will evaluate its current ordinances and policies that affect air quality and adopt ordinances and policies, as applicable.

ER 7.2 Plan and implement a multi-faceted program of education and regulation regarding the use of indoor fireplaces and wood and pellet burning stoves, and outdoor wood-fired boilers, to protect residents from pollutants and unhealthy emissions from airborne toxins and fine particulate matter.

ER 7.3 Explore the possibility of incentives to encourage the use of high-efficiency carbon neutral stoves.

ER 7.4 Educate the businesses and residents on alternatives that can provide better air quality, such as encouraging the planting of perennials and groundcover, reducing lawn size, which leads to less frequency of use of gasoline-powered lawn mowers.

Objective 8: Minimize negative noise impacts within the community.

ER 8.1 City will review ordinances and policies related to noise to see if improvements can be made.

Objective 9: Increase the density of the community's urban forest.

ER 9.1 The City will develop an urban forest management policy that addresses protection or replacement of significant trees on developed property and all land scheduled for development. This management policy will also establish standards for tree species and location within and near public right-of-way and easements.

Objective 10: The City will remain responsive to issues of climate change and will act to reduce Northfield's contribution to climate change.

ER 10.1 Continue to act on its commitment to the Cities for Climate Protection campaign begun in 2005.

ER 10.2 Develop land use policies to manage and reduce urban heat island effects, including promoting shading of streets and parking lots with more trees.

ER 10.3 Promote the reduction of green house gas emissions at residential, industrial and commercial scales.

ER 10.4 Encourage conservation standards at residential, industrial and commercial scales.

6. Sewer and Water Resources

Organization

- A. Overview
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Purpose

The purpose of the Sewer and Water Resources Chapter is to identify the existing potable water and sanitary sewer systems and surface water management controls and provide guidance for development of these systems.

A. Overview

Principle 3 in Chapter 4, Land Use, states that: When new growth occurs on the edge of the community through annexations, it will be done with a planned growth pattern which minimizes infrastructure and community services. How the community uses the natural resources to meet its current needs without compromising the environment for future generations is an important question that planning for sewer and water infrastructure seeks to answer. Achieving a sustainable development pattern will require good planning for sewer and water infrastructure systems including sanitary sewer, storm sewer and public water supply.

Northfield completed a Comprehensive Sanitary Sewer Plan in 2007, a Comprehensive Water Plan in 2006, and a Surface Water Management Plan in 2007. These documents address the technical aspects of each system and will continue to be updated on a regular basis to stay ahead of development. This chapter of the Comprehensive Plan inventories the current infrastructure system and identifies areas that require further detailed planning for infrastructure needed to accommodate existing and projected growth to 2027. This chapter will establish key objectives and strategies for the timely, fiscally responsible, and environmentally conscious extension and management of the potable water, sanitary sewer and surface water infrastructure systems. In the event there is a conflict between this Comprehensive Plan and the technical infrastructure plans, the more specific document will guide.

B. Goal

A goal is a policy statement that states a desired outcome in general terms. The goal for potable water, sanitary sewer, and surface water infrastructure was developed by considering key findings related to these systems and integrating public input generated as part of the Comprehensive Plan update.

Provide potable water, wastewater collection and treatment, and surface water control to the community in an environmentally sensitive, financially equitable and fiscally-responsible manner.

C. Key Findings

Public Water Supply and Distribution System

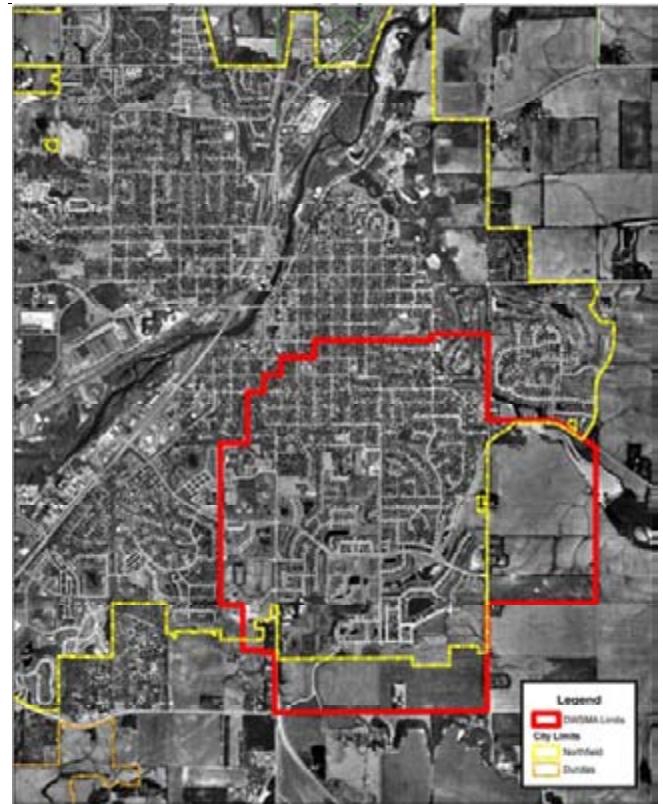
The current public water supply system includes water source, storage and distribution that serve an approximate population of 19,000, which includes college students. The system consists of five deep wells (four active and one inactive), two ground storage reservoirs, one elevated storage tank, a booster station and almost 93 miles of distribution piping. The existing water distribution system is shown on Map 6.1.

Supply and Treatment

The city gets its water supply from four deep wells. Three wells are normally in operation, being controlled by the water level in the ground storage tanks. As the water level in the tanks decreases, the wells successively turn on until they catch up with system water demands and the tanks refill. One of the wells draws from the Jordan and Prairie-du-Chien aquifers. The other three withdraw water from the Jordan Aquifer. The total supply capacity of the Northfield system is approximately 7.6 million gallons per day (MGD). The firm capacity is 5.6 MGD. Firm capacity is that which can be supplied reliably, even during maintenance activity or an emergency situation where the largest well pump might be out of service. Raw water pumped by these wells is treated with chlorine (for disinfection), fluoride (for dental health), and polyphosphate (for red water inhibition). These water treatment chemicals are added at the well pumping stations on the distribution system.

Land use around all of the well locations is regulated under the Well Head Protection Program. This program is intended to prevent contamination of public drinking water supplies by identifying water supply recharge areas and implementing management practices for potential pollution sources within those areas. The program also regulates certain land uses such as service stations, industry and farming, and outlines procedures for clean up should contamination occur. Under this program, the Drinking Water Supply Management Area (DWSMA) is mapped to indicate where surface water may reach the wellhead within ten years (See Figure 6.1).

FIGURE 6.1 DRINKING WATER SUPPLY MANAGEMENT AREA (DWSMA)

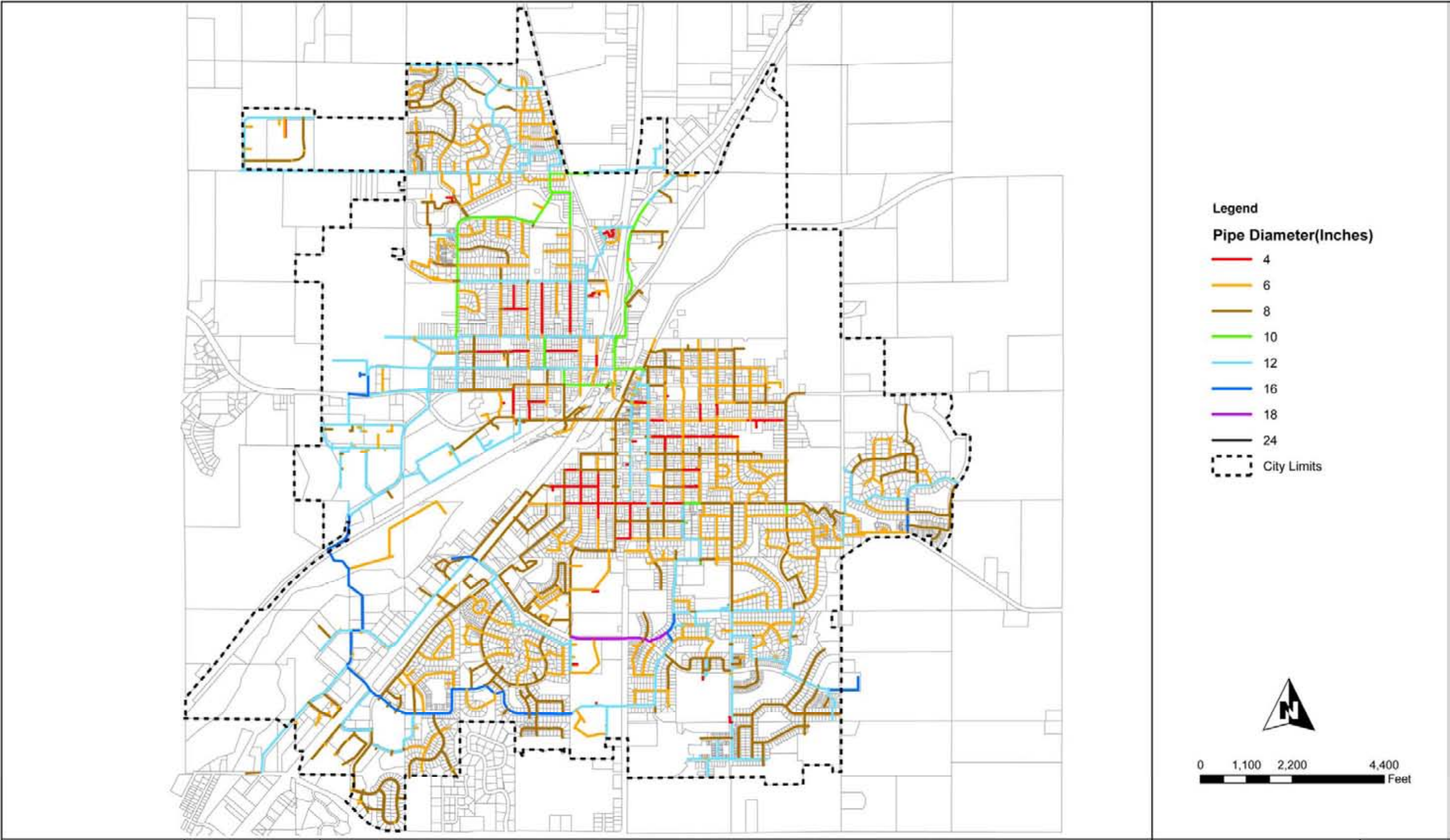


Source: City of Northfield

Storage

Storage facilities on a water system allow a more constant supply during variable demand conditions. During high demands, when water customers are using a greater volume of water, part of that demand can be met by storage reserves in addition to direct pumping from wells. During low demand conditions, the well pumps can continue to operate, with excess supply going to fill storage for later withdrawal. In addition to this operational function, storage tanks can serve as an emergency water source in the case of a supply failure (i.e. power outage, well maintenance, etc.). They also increase the amount of water available during a fire. Northfield currently has two gravity-operated ground storage tanks, each with a capacity of 1,000,000 gallons, and one elevated storage tower with a capacity of 1,000,000 gallons. The level of these tanks controls the pressure of the system.

MAP 6.1 – EXISTING WATER SYSTEM



Source: City of Northfield – March 2006

Distribution System

The Northfield water system is comprised of water mains ranging in size from 4" to 24" in diameter. The system serves an elevation range of approximately 890' to 1,050' with pressures in the system ranging from 30-100 pounds per square inch (psi) during average day demands. Pressures drop in the system to 20-90 psi during peak water usage.

Northfield maintains a connection to the City of Dundas' water system and there is an agreement between both cities for the water usage. The connection consists of a 6" valved line that provides water to Dundas in the event that pressures in their system drop to a certain level. This connection also has the ability to provide flow to Northfield in the event that pressure in the Northfield system drops below a set level.

There is a secondary 12" valved connection that can provide additional capacity to the City of Dundas in the event of an emergency. St. Olaf and Carleton Colleges maintain their own distribution systems. However, both colleges are connected to the city's water system. St. Olaf College abandoned its private well in 2001 and is now supplied water from the city and operates on a separate pressure zone. Carleton College still uses their private well to supply water to the campus. Both colleges maintain secondary connections to provide additional fire protection if needed.

Level of Service

The "Recommended Standards for Water Works, 2003 Edition," commonly referred to as the 10-States Standards, recommends normal working pressures in a distribution system be approximately 60-80 pounds per square inch (psi) and not less than 35 psi. During emergency conditions, such as a fire flow demand, pressures in the system should not drop below 20 psi. According to the American Water Works Association (AWWA), the minimum fire flow available at any given point in a system should not be less than 500 gallons per minute (gpm) while maintaining a pressure of 20 psi in the system. These standards form the lowest level of service that the City should provide. The Insurance Services Office (ISO) also has additional standards for required fire flow to properties based on building types, materials and spacing, for example. The City should strive to meet these standards as well.

The 2006 Comprehensive Water Plan evaluated the existing and future system against these standards and identified areas of concern. Four areas lying in the Urban

Expansion Area were identified as having low pressures. Since this time the City has completed the construction of a booster station to serve the northwest portion of the Urban Expansion Area. The remaining areas will require a method of boosting the pressures in order to adequately serve them. The City will have to consider the method and whether it is financially equitable and fiscally responsible to serve these areas. These areas are noted on the Framework Map (Map 4.4) in Chapter 4, Land Use.

Future Needs

The 1991 Comprehensive Water Plan was amended in 1994 to consider additional wells and additional storage capacity and also in 1995 and 1999 in order to site a new water tower and analyze the need for an additional well. The 1995 amendment projected water supply and distribution needs for a projected population of 20,000 by 2005. The 1999 amendment planned for a projected population of 26,746 by 2020. The 2006 Water Plan looked at the Urban Expansion Area as identified in the 2001 Comprehensive Plan. Using anticipated densities for the various land uses, the Water Plan estimated that Northfield would have a population of 41,207 if the Urban Expansion Area were fully developed. The Water Plan also estimated that this development might not occur for as many as 50 years. Using these population estimates, the 2006 Water Plan identified several projects to meet regulations and maintain the level of service. These include additional supply, treatment, storage, and distribution lines as development and population increases dictate. Map 6.2 shows the future water distribution system.

Sanitary Sewer System

The current sanitary waste system includes a treatment plant, a lift station, and collection system that serve Northfield and Dundas along with St. Olaf and Carleton Colleges. The system consists of the Wastewater Treatment Plant (WWTP) located in the northern area of Northfield along Hwy 3, a lift station located near the existing ice arena, and over 78 miles of collection lines. The existing sanitary waste system is shown on Map 6.3. Dundas and the colleges own and operate their own collection systems that discharge waste into the Northfield system that is in turn treated at the WWTP.

Wastewater Treatment

The Wastewater Treatment Plant (WWTP) was built in 1958 and has been upgraded over the years to treat wastewater before it is discharged into the Cannon River.

It is designed to serve an estimated population of 27,123 (Average Wet Weather Flow of 5.2 million gallons per day of effluent), which should adequately serve Northfield and its projected growth to 2027. Innovative space saving design will allow for another expansion to the WWTP estimated to double the plant capacity. The 2007 Comprehensive Sanitary Sewer Plan (CSSP) recommends that a study of the treatment capacity of the plant be completed at least seven years prior to needing the additional capacity. This time allows for evaluation of the plant, design of the new components, permitting and construction. Based on this recommendation, a study of the plant capacity should be completed in the next four to eight years, or before 2015.

The Cannon River, the effluent receiving water, is designated as an “Outstanding Resource Value Waters” as defined by the Minnesota Pollution Control Agency (MPCA). A key goal of the Outstanding Resource Value Waters program is “non-degradation”, which means that no additional pollutants should be added to the water resource. Carefully evaluating the value and benefits of industry, and heavy users of the wastewater treatment system, is one way to plan for adequate treatment capacity in the future.

Lift Stations

There is currently one lift station operated by the City, located south of the ice arena. This lift station currently serves the southern portions of Northfield and all of Dundas. It is anticipated that an interceptor will be constructed in 2009 that will eliminate this lift station.

Collection System

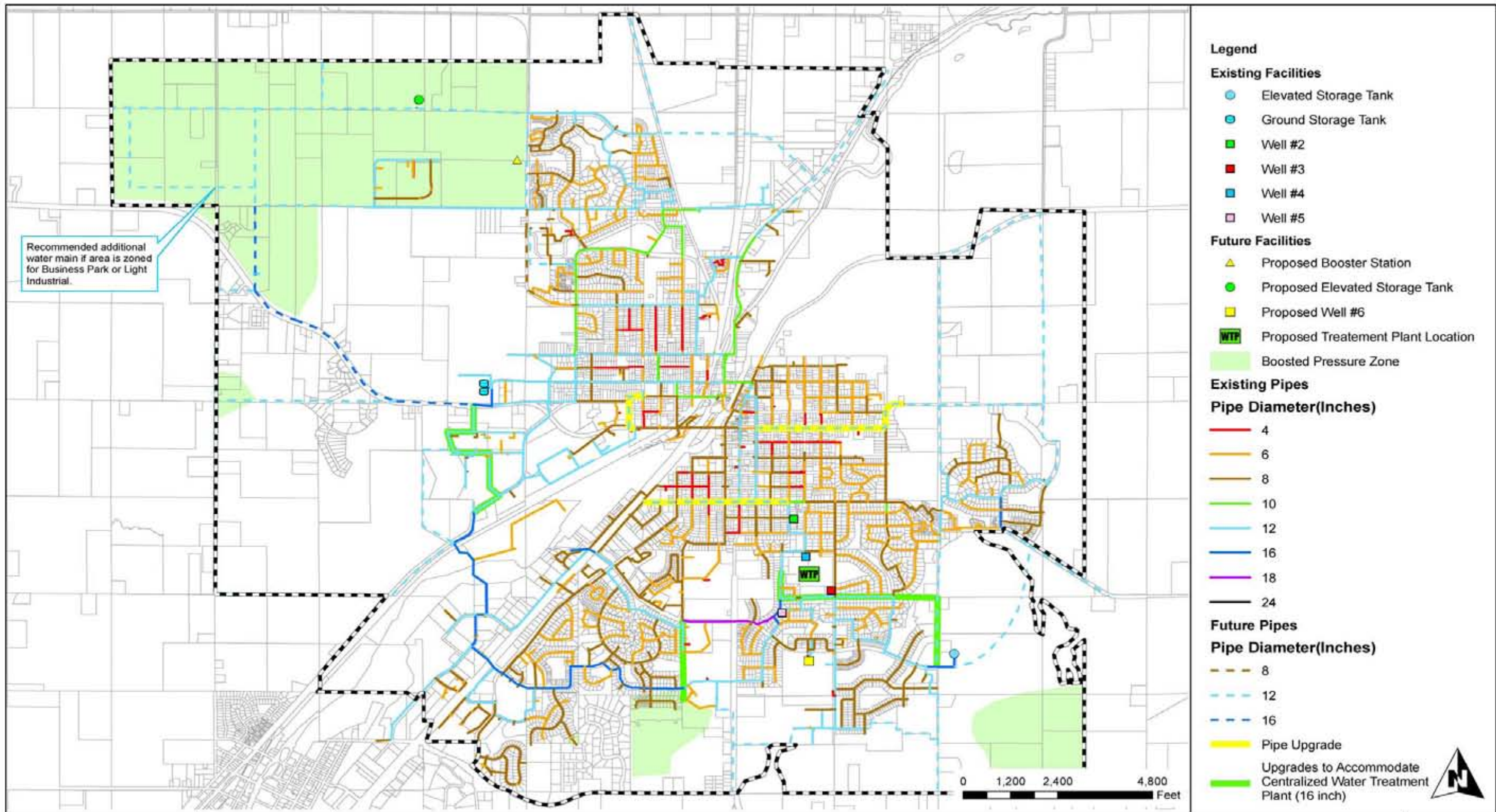
The City maintains approximately 78 miles of sanitary sewer pipes ranging in size from 6” to 42” in diameter. The smaller pipes are referred to as “laterals” and the larger pipes are called “interceptors” or “trunks.” The larger interceptors are generally located in low elevation areas of the community (such as along drainage ways) in order to utilize gravity to move the waste stream. Future extension of the sanitary sewer collection system and upgrades to the existing system will need to occur in order to serve projected growth in

Northfield. The 2007 Comprehensive Sanitary Sewer Plan, which indicated there are 12 sewersheds and 121 sub-sewersheds, evaluated a revised Urban Expansion Area for future waste collection. Recommendations were made for sizing of interceptor lines serving the areas to be developed and noted pipes in the existing system that should be upgraded to handle the development. Map 6.4 shows the recommended interceptors and sizes. Exact locations of the interceptors will have to be evaluated and determined prior to development approvals.

Level of Service

In general, sanitary sewer collection systems are designed to make use of gravity flow as is practical, financially equitable and fiscally responsible. As elevations dictate, gravity flow may not serve all areas, and pump or “lift” stations are used to provide collection from these areas. Capital, operation and maintenance costs can be prohibitive; therefore, the use of lift stations is generally limited in a system. Based on this general standard, the City can provide a higher level of service to those areas not requiring the use of lift stations.

The 2007 Comprehensive Sanitary Sewer Plan evaluated the existing and future system based on the premise of a gravity system. This plan identified the large “sewersheds” in and around Northfield that could be served by gravity. The City will provide a minimum level of service to all areas based on a gravity system. A portion of the revised Urban Expansion Area lies outside of the defined sewersheds, requiring the use of lift stations in order for the waste stream to get to the WWTP. These areas are noted on Map 4.4, Framework Map, in Chapter 4.



- Legend**
- Existing Facilities**
- Elevated Storage Tank
 - Ground Storage Tank
 - Well #2
 - Well #3
 - Well #4
 - Well #5
- Future Facilities**
- ▲ Proposed Booster Station
 - Proposed Elevated Storage Tank
 - Proposed Well #6
 - Proposed Treatment Plant Location
 - Boosted Pressure Zone
- Existing Pipes**
- Pipe Diameter(Inches)**
- 4
 - 6
 - 8
 - 10
 - 12
 - 16
 - 18
 - 24
- Future Pipes**
- Pipe Diameter(Inches)**
- - - 8
 - - - 12
 - - - 16
 - Pipe Upgrade
 - Upgrades to Accommodate Centralized Water Treatment Plant (16 inch)

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December 9, 2005

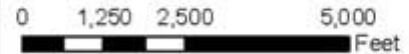
COMPREHENSIVE WATER PLAN Northfield, Minnesota

**Ultimate
Distribution
System**

**Figure
11**

MAP 6.3 EXISTING SANITARY WASTE SYSTEM

- Legend**
- Lift Station
 - ▲ Meter Station
 - Waste Water Treatment Plant
- Sanitary Mains**
- 4 or 6"
 - 8"
 - 9 or 10"
 - 12"
 - 15 or 18"
 - 21 or 24"
 - 36 or 42"
- Township Boundary
 - Existing Service Areas
 - Parcels



Source: DSU, SEH



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Existing Sanitary Sewer System

Figure 7

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NORTHFIELD/DUNDAS CSSP
Northfield, Minnesota

Sanitary Sewer System Partners

The City accepts waste from various partners including Dundas, St. Olaf and Carleton Colleges, and larger industrial users such as Malt-O-Meal and Multek (formerly known as Sheldahl). Each of these entities maintains their own sanitary sewer collection systems that discharge to the Northfield system and ultimate treatment at the WWTP. Currently, both Colleges have connection points that are metered and are in turn charged for the actual waste contributed to the Northfield system. The City maintains agreements with larger industrial users that address flows, pollutant loads and rates. The City also maintains an agreement with the City of Dundas for the treatment of their sanitary waste. As these system partners expand, the City should consider updating the agreements as needed.

Future Needs

The 2007 Sanitary Sewer Comprehensive Plan was completed using the same assumptions as the water plan completed in 2006 (See Map 6.4). The Urban Expansion Area was revised to include additional service areas expected to serve 50 years of expansion if completely developed. Based on these assumptions, this plan indicates the general location and size of interceptors to serve the study area. This plan also evaluated the ultimate growth of the defined sewersheds. Although the complete development of all of these sewersheds is highly unlikely, the evaluation shows that the City may consider preservation of a larger corridor in the event that the sewer is upsized or a parallel line needs to be installed in the future.

The 2007 plan only addressed the collection system including lift stations. This plan did recommend considering evaluation of the capacity of the WWTP at least seven years prior to the need for additional capacity. Based on this recommendation and the projected growth, the City should undertake a study sometime between 2011 and 2015.

Storm Sewer System (Surface Water Management)

The City's drainage system is a complex network of stormwater detention/water quality treatment ponds, creeks, drainage ways, roadway gutters, overflow and yard drainage swales, catch basins, storm sewer lateral and storm sewer trunk main facilities. The existing drainage basins and watershed districts are shown on Map 6.5. The

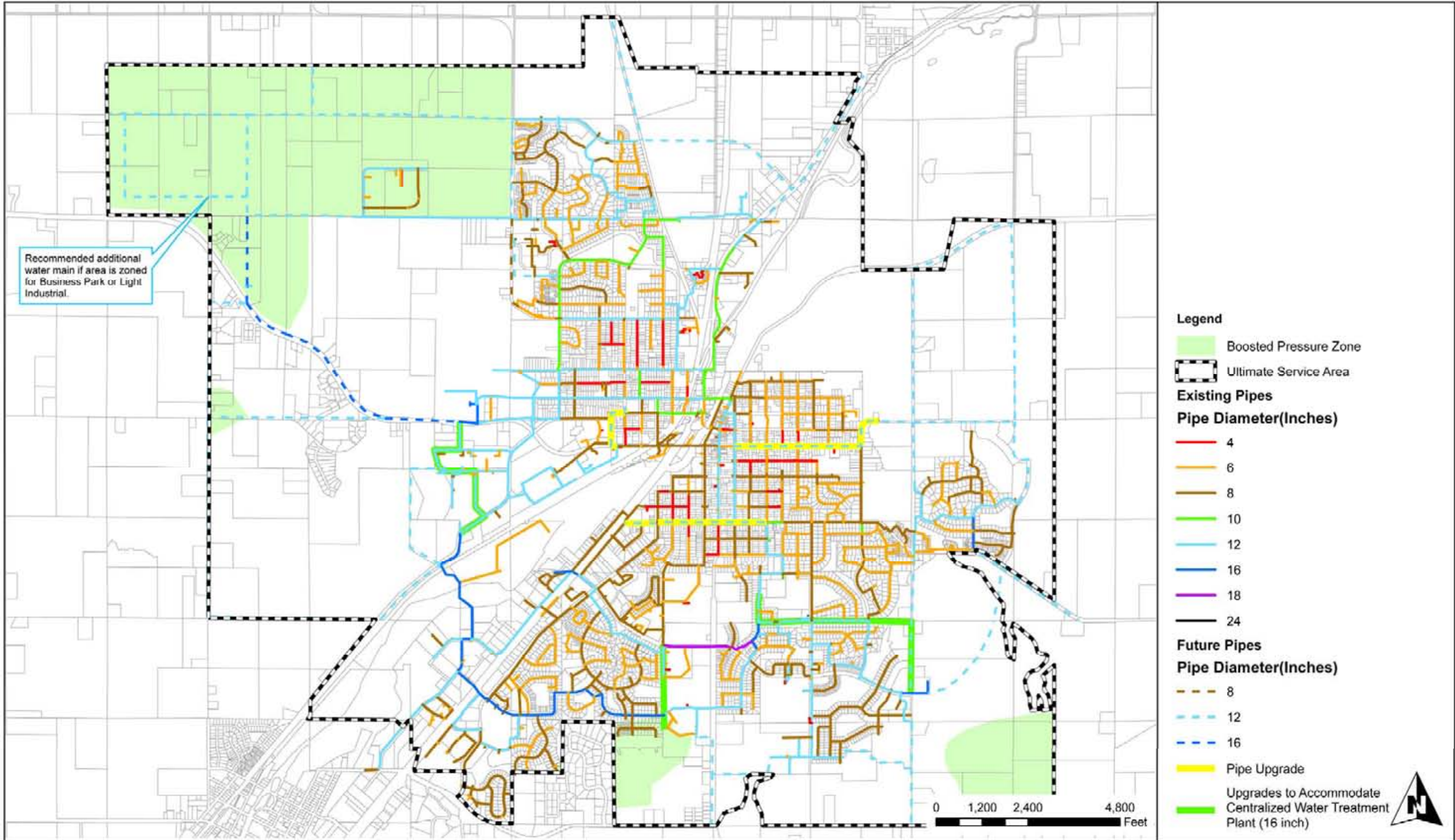
City is committed to managing its water resources so the benefits of wetlands, ponds, and streams will remain available to the existing and future community. Such uses may include aesthetic appreciation, wildlife habitat protection, nature observation and boating. The City recognizes a public need for water quality protection and improvement within its jurisdiction, and accepts water quality management as one of its highest priorities. Some areas in the community require special attention to surface water management controls. Rice Creek (also known as Spring Brook), for example, is home to a native trout species whose survival relies upon a constant volume of cool, clear water. In order to retain this unique wildlife habitat, management of surface water runoff into Spring Brook from the Rice Creek Watershed merits special attention.

The US Environmental Protection Agency (EPA) developed a surface water permitting program to address pollution issues known as the National Pollution Discharge Elimination System (NPDES). In 1999 Phase II of the stormwater program was passed requiring states to evaluate and designate Municipal Separate Storm Sewer Systems (MS4s) based on a set of minimum criteria to be subject to the program. Northfield has been designated as a NPDES Phase II city and has submitted a permit application to the Minnesota Pollution Control Agency (MPCA). The City addressed the six minimum control measures as required by the program. These include:

- public education and outreach,
- public participation,
- illicit discharge connection,
- construction site runoff control,
- post-construction site runoff control,
- good housekeeping/pollution prevention from municipal operations.

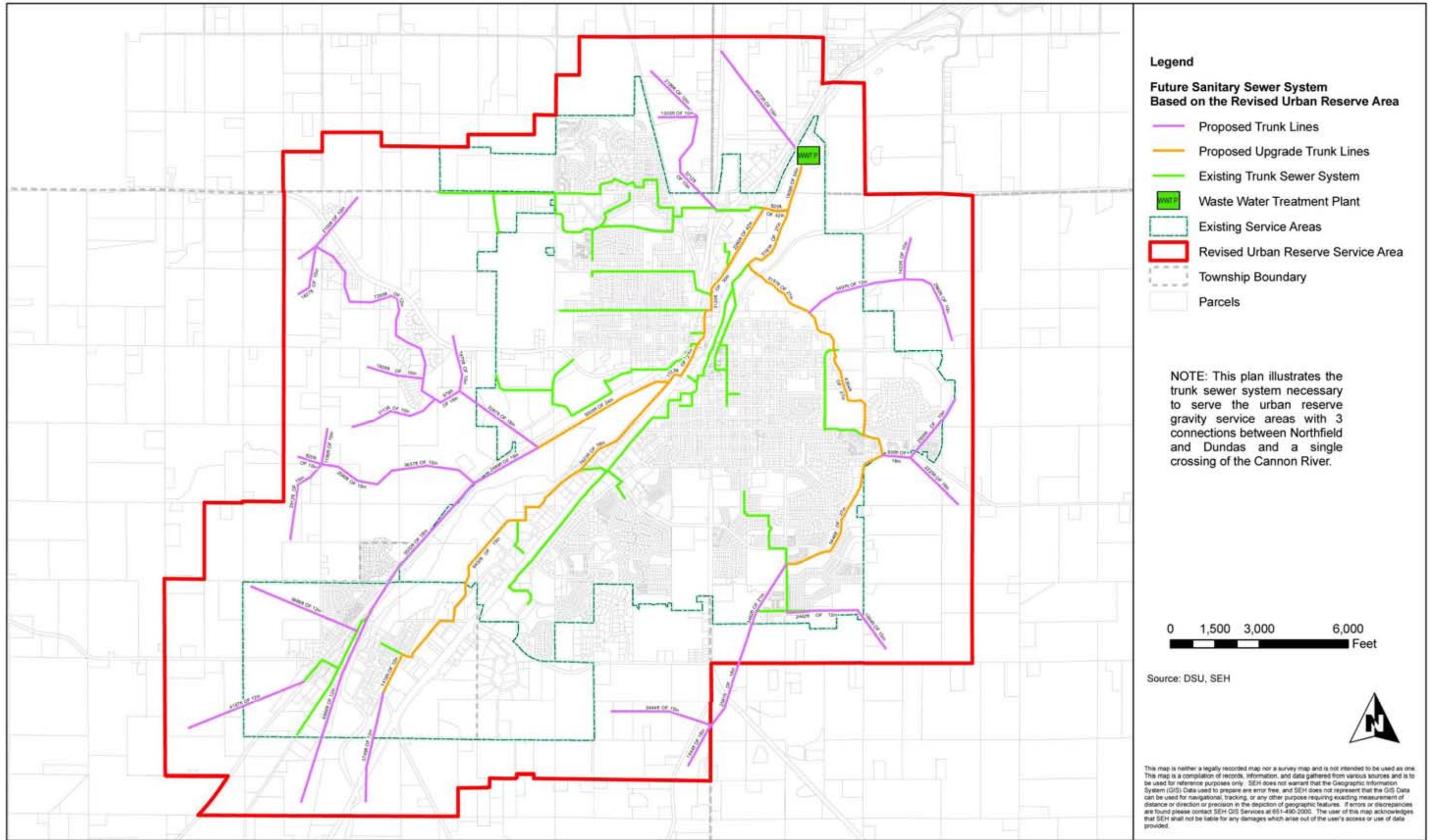
Northfield completed a Surface Water Management Plan in 2007. This plan provides a significant amount of information on Northfield's drainage patterns, watersheds, wetlands, floodplains and floodway areas and how surface water management technologies can be applied to improve water quality and environmental awareness. This plan also provides policy direction for surface water management in Northfield. Due to the complexity and technical nature of the document, the key policy categories are highlighted below. In general, this plan sets minimum standards for surface water management that allows flexibility for the use of current Best Management Practices (BMPs) where they are best suited.

MAP 6.4 FUTURE SANITARY SEWER SYSTEM



Source: City of Northfield – October 2007

MAP 6.5 EXISTING DRAINAGEWAYS AND WATERSHEDS



Source: City of Northfield

Rate Control

The Surface Water Management Plan sets a policy for control of the rate of surface water flow from a developing site. In general, development increases the amount of impervious surfaces that in turn increases the volume and rate of flow from a property. The policy requires that all new development, redevelopment and expansion projects provide rate control. The policy does set different standards for the different types of development along with setting more restrictive requirements for areas within the Rice Creek subwatershed, a protected trout stream.

Performance Standards

The Surface Water Management Plan also sets performance-based standards for total suspended solids and phosphorous removal. The standards allow for development, redevelopment and expansion projects to use the standard pond method for treatment or use new surface water management practices to accomplish the goal.

Volume Control

The Surface Water Management Plan sets a policy for controlling the volume of runoff from a developed site. Any new development, redevelopment or expansion project must consider infiltration practices to reduce the volume of runoff generated from the improvements. Various factors must be taken into consideration when determining the level of control required for each site. Parent soils, depth to bedrock and depth to groundwater can all determine the effectiveness of these types of facilities.

Other Policies

The Surface Water Management Plan identifies other policies to be implemented by the City. These policies address stormwater education, flood control, erosion and sediment control, greenway corridor and shoreland management, the use of low impact development strategies and internal operations. Details of these policies are located in Section V of the 2007 Surface Water Management Plan.

Future Needs

Section VI of the 2007 Surface Water Management Plan identifies several studies, capital improvement projects, and programs that the City should undertake or consider including to address the requirements of the

NPDES Phase II MS4 permit. The Surface Water Management Plan also estimates the cost of the study, project, or program along with identifying the possible funding source. Based on this list, the Surface Water Management Plan recommends that the City update the storm sewer charges that currently only consist of a utility fee. Evaluation of the storm sewer fees may include updating and simplifying the stormwater utility rates and consideration of other funding mechanisms such as a trunk sewer fee, pond fee, and/or sewer availability charge.

D. Objectives and Strategies

Outlined below are three objectives and 17 strategies. The objectives indicate a specific policy direction and help organize strategies. Strategies are detailed actions necessary to initiate or complete an objective such as a program, policy or project.

Objective 1: Provide potable water, sanitary waste collection and treatment, and surface water management to existing and future development areas in the city in an environmentally sensitive, financially equitable and fiscally responsible manner.

SW I.1 Provide a Level of Service to existing and future areas as defined in the Public Water and Sanitary Sewer sections above.

SW I.2 Maintain an infrastructure replacement program for the city, as detailed in the Capital Improvement Plan.

SW I.3 For orderly expansion of public services, new developments will be located in areas contiguous to existing development within the city limits.

SW I.4 Address legal limitations, fairness, property benefits, and responsible use of public funds when financing public utility extensions that reinforce the City's growth and redevelopment objectives. Priority will be given to infill and redevelopment of the existing urbanized area to maximize efficiency of the existing water and sewer infrastructure systems.

SW I.5 Provide the full range of public services to subdivisions at the time of development, including storm sewer, sanitary sewer, public water, sidewalks, parks and streets.

SW 1.6 Continue to implement and update, where necessary, the City's Well Head Protection program.

SW 1.7 Carefully evaluate and limit development in areas that require private sewer and water systems.

SW 1.8 Undertake a sewer capacity study for the Wastewater Treatment Plant sometime between 2011 and 2015.

SW 1.9 Carefully evaluate development that requires high levels of water and sewer services.

SW 1.10 Periodically review agreements with sewer system partners for any needed updating.

Objective 2: Manage water resources so that the beneficial uses of wetlands, ponds and streams remain available to the existing and future community (sustainability).

SW 2.1 Require Stormwater Management and Erosion Control Plans, as described in the 2007 Surface Water Management Plan, for projects that may have an impact on local surface water.

SW 2.2 Work with the counties, townships, watershed organizations, citizens and upstream landowners (outside the city's jurisdiction) to encourage upstream pollutant reduction similar to those being used within city limits.

SW 2.3 In new developments, redevelopments, and expansion projects encourage creative stormwater management solutions that make use of the most current stormwater management strategies including the use of Best Management Practices and Low Impact Development techniques.

SW 2.4 Give special attention to surface water management runoff controls in projects that might affect Rice Creek and the Rice Creek Watersheds.

SW 2.5 Evaluate and update current storm water fees and consider other funding mechanisms such as a trunk sewer fee, pond fee, and/or a sewer availability charge.

Objective 3: Heighten community awareness of sustainability issues through education and training.

SW 3.1 Educate the public and business community on the use of potable water conservation practices (such as water saver faucets, yard watering bans, and strategic landscaping).

SW 3.2 Develop and implement a public education and outreach program for all ages for stormwater in accordance to the requirements of Phase II of the National Pollution Discharge Elimination System (NPDES).