



**CITY OF AFTON
Draft 2040 COMPREHENSIVE PLAN**

Approved by City Council 9-18-2018

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PREAMBLE

We, the residents of the City of Afton, Minnesota, in order to:
preserve our rural sanctuary amidst suburban sprawl;
preserve our agricultural heritage and land use;
preserve the character of our Old Village;
protect our groundwater and surface water from contamination;
protect our rolling hills from erosion;
provide for open spaces to be enjoyed by future generations; and
ensure a sound tax base and a sense of community
Do ordain and establish this 2018 Comprehensive Plan.

Philosophy

From the time this community was named with a river in mind and now a City on the Scenic St. Croix River, water has been *the* foremost concern of its residents. That concern has never been greater than today.

Some see urban development as excellent proof of a growing economy; we see urban development as a threat to the water we drink, the crops we grow, and the vistas we gaze upon. This preservation attitude is consistent with the long-term desires of our residents and promotes a healthy respect for the environment. As such, our ordinances do not forbid change; they require that change not harm the environment. As stewards of this land and all that is in it or on it, we can do no less. This City is different from other communities in the Metropolitan Area *and wants to stay that way.*

This City borders on another city that has a diametrically opposed philosophy about land use and urban expansion. This is one of the most significant challenges this City has ever faced. The adage in the real estate industry is that the three most important points in real estate are “location, location, and location.” The three most important points in the City of Afton are “groundwater, surface water, and groundwater recharge.” We drink this water, we fish these streams, we protect the environment for the flora and fauna with which we share the land.

In many respects, we regard agricultural and open space as the “highest and best use” of the land. We regard our position as a community trust to preserve, protect, and defend our lands and lifestyle from irreversible change. That is our right and the actions of other jurisdictions, including the Legislature and the Metropolitan Council, ***should respect that vision of Afton to remain rural by choice.***

Introduction

*Flow gently, sweet Afton, among thy green braes,
Flow gently, I'll sing thee a song in thy praise;
My Mary's asleep by thy murmuring stream,
Flow gently, sweet Afton, disturb not her dream.*

When Robert Burns penned these words, he was describing his own idyllic rural sanctuary in southern Scotland. Half a century later, settlers of the St. Croix Valley would recognize the same spirit in the locale of the township and city they would name Afton.

Afton strives to remain true to the vision of a rural environment, a place neither purely agricultural, nor purely residential, but a blend of both. Located only fifteen miles from downtown St. Paul and bordering rapidly growing suburbs, Afton's unique status as a rural sanctuary is worth preserving.

This plan is divided into Sections as recommended by the Metropolitan Council: Inventory, Goals and Policies, and Implementation. The message of this plan and the story of Afton should be abundantly clear. This city is unique among communities in the Metropolitan Area and wants to stay that way. Afton's leaders are to look to the principles espoused within this plan for governing guidance as they define the ordinances that will preserve this place for current citizens and those to come. For definitions see Appendix A.

Vision Statement

The City of Afton began as a country village. The city's Old Village provides a business center and a rural village atmosphere typically only found far away from the conveniences of a metropolitan area. The Old Village is the cultural heart of the community, providing a town square and access to the river.

Afton is also a city of water. The St. Croix River and the creeks that flow through Afton shape the landscape and are a critical resource for the community. The quality of groundwater and surface water is essential to maintaining Afton's character. Wells and septic systems, rather than city water and sewers, govern every home's relationship to the land.

Afton is also a city of open fields. The farm fields of southwestern Afton represent the city's historical roots in agriculture and continue to be farmed in the face of development pressures on Afton's borders. Methods of preserving Afton's agrarian roots must be found if the city is to remain a rural sanctuary.

Afton is also a city of rolling hills. Water has carved these hills over thousands of years, but it is the impact of development which the city must protect against. Erosion and deforestation in these hills strip Afton of forests and vistas that are also an essential part of life in Afton.

Most importantly, Afton is a city of people. The community within this rural sanctuary gives meaning to the city's character. A sound tax base provides the community with the means to maintain roads, provide police and fire protection, and provide public facilities for the community.

*How lofty, sweet Afton, thy neighbouring hills,
Far mark'd with the courses of clear, winding rills
There daily I wander as noon rises high,
My flocks and my Mary's sweet cot in my eye.*

The rural sanctuary in southern Scotland that Robert Burns wrote of has long passed into history. But on the shores of the St. Croix River, the citizens of Afton established this plan to maintain the city's deep-seated historical vision. We are stewards of this land and all that is in it or on it, and our government has been granted a trust to preserve and protect our lands.

Public Involvement

In the past the City of Afton involved the general public in the assembling of plan updates. Since the revisions to this plan in 2018 are more limited, public involvement has not been as extensive. City committees were asked to review sections of the plan that pertained to their areas of expertise and to pass their review comments on to the Afton Planning Commission. Public hearings held in early 2018 provided the opportunity for citizens to comment on the revised plan.

Purpose

Afton's location within a major metropolitan area belies the rural atmosphere that greets commuters at its borders. Residents and visitors to Afton know they have arrived somewhere special. When Afton residents were asked what they like best about living in Afton, the three most prevalent responses all related to Afton's natural, rural character; each of them is crucial to making Afton a unique community:

1. Rural location and low population density;
2. Open space and dispersed pattern of development; and
3. Presence of active farms and agriculture.

Afton residents value rural location, low development density, open space, working farms, abundant wildlife, and historic "Old Village". Afton residents enjoy Afton's proximity to the St. Croix River, Belwin Conservancy, state and regional parks, the convenient location of the City to commercial centers, reasonable taxes, good schools, and our community identity (Community Survey: General Priorities – Appendix H).

The purpose of the Afton Comprehensive Plan is to perpetuate this character. It is to identify and capture those things that make Afton a unique and special place and protect them for current and future residents.

Citizens of Afton obtain their drinking water from the ground. It is essential, therefore, that thoughtful development planning be followed in order to protect this vital resource. Because groundwater and surface water are connected, it is just as essential to protect our streams and lakes.

The primary purposes of this plan are the following:

1. Promote the health, safety and welfare of the City of Afton and its residents.
2. Provide for the preservation of our water resources through careful planning.
3. Preserve agriculture and open space.
4. Protect groundwater and natural resources.
5. Maintain historical character of the Old Village.
6. Ensure a safe and pleasant environment for residential, commercial, agricultural, industrial and public activities.
7. Ensure a sound tax base, which will provide the resources needed to maintain our quality of life.

Historical Background

The early human inhabitants of the St. Croix Valley were Native Americans. In the early 1800's, Afton was settled by New Englanders who probably felt at home among Afton's tree covered hills and bluffs. The city retains that New England flavor with its natural beauty accented by narrow, winding roads and small, clapboard sided houses. Joseph Haskell, in 1839, planted three acres of corn and potatoes, built a farmhouse, and thus began the first farm in Minnesota. While communities north of Afton were building sawmills, the first flour mill in the state was built in Afton in 1843. A further indication of the importance of agriculture in Afton was the use of a steam-powered threshing machine in 1861.

The village of Afton was platted in 1855. The majority of the city's historical structures are located within the boundaries of the original village. The 1974 Afton Comprehensive Plan established the Village Historic Site District in recognition of the village's historical significance. The following sites are found within the boundaries of the Village Historic Site District: the Afton Theological Academy, the area's first educational academy built in 1867; the Village Hall (housing the Afton Historical Society), built in 1895 as the Congregational Church; the "Little Red House," built in 1859; the Afton House, built in 1867; and the Little Brick Schoolhouse, built in 1857.

The township of Afton, established in 1859 and named after the village, also has important historical structures and sites. Included among these are: the Bolles Mill Site, the first flour mill in Minnesota; the Bolles House, built in 1856 and the oldest frame house in the area; and Haskell's Farm.

In 1971, the village and township incorporated to form the City of Afton. Afton is a large city geographically, approximately 25 square miles, but is sparsely populated. The eastern portion of the city contains the bluffs and tree covered hillsides that attracted the original settlers, while the western portion has rolling hills, and open farmland.

BACKGROUND INFORMATION

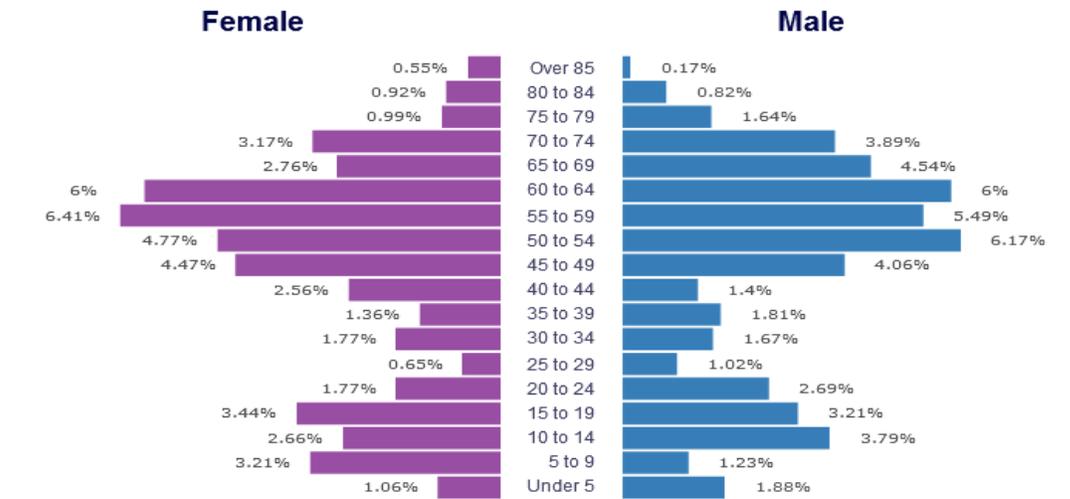
Afton has long been a desirable place to live. While being only minutes from St. Paul, Afton is a unique and special place due to the combination of its rural character, its scenic bluffs, and its location on a major wild and scenic river. The City has always approached land use management as a crucial component of its goal of protecting groundwater, the St. Croix River, and lakes and streams from the negative environmental impacts associated with urban development, which has set it apart.

Afton is and will remain a highly sought-after location. As surrounding areas have developed at typical suburban densities, Afton has remained steadfast in its low-density approach to development, in order to protect its environment and maintain its rural character. This contrast in development philosophy is visibly apparent as one enters Afton from the west. As these divergent development trends continue, Afton’s rural character will become even more in demand.

Migration & Turnover of Population

The population of Afton, as in all of the U.S., is aging. The median age in 1990 was 35.8, in 2000 42.2, and in 2010 a median age of 48.6. Since 1990, the number of people ages 20 to 34 declined from 432 in 1990 to 288 in 2010, 26 more than in 2000.

Population by Age & Gender in Afton
American Community Survey 2011 - 2015



The Aging of Afton’s population will continue in the coming decades. One of the results will be continuing turnover in residential property. As current residents decide to downsize their houses or adopt a lower maintenance lifestyle, many new homeowners will arrive from other cities. New residents will come for the same reasons current residents chose Afton: clean water, rural vistas, open spaces, and the St. Croix River. It is the responsibility of Afton’s residents and leaders to ensure that

new property owners come to share the values associated with Afton’s character. Preserving the rural character, beauty, and natural resources of Afton will be paramount for the future of the City.

This is an opportunity to be proactive in telling Afton’s story in a way that creates and manages the expectations of those who are considering developing or living in Afton, so that those who choose to develop or live in Afton are drawn here by the promise of the unique natural, open, rural character of the City vs. the urban development and services available in countless locations throughout the metro area.

Housing Values

The median housing value in Afton is significantly higher than both the median housing values of homes in Washington County and the State of Minnesota. This reflects the fact that Afton is a desirable place to live and that the demand for housing in the city is high.

Table 1 - Housing Values

	Afton	Washington County	Minnesota
Median value (2009 dollars)	397,100	243,600	186,200
Median monthly household costs with a mortgage payment	2,242	1,730	1,490
Median monthly rent	1,500	1,144	848

It is not clear what the future will bring in terms of housing values in Afton. Current trends statewide and nationwide suggest that housing values are rising and that demand is high. The desirability of housing in Afton is directly tied to the rural lifestyle and the connection to the natural environment that living in Afton provides. People value the low-density development pattern and willingly pay to secure that.

Conclusion

Afton has established a development pattern that residents value and is in high demand throughout the region. The challenge for Afton will be to continue to contain infrastructure costs, maintain a low demand for services, and incorporate new residents and their ideas in a way that focuses on the interests of all Afton residents and will maintain the current development pattern.

Demographic trends will significantly increase pressures to develop Afton. These trends in Afton are important to understand because they have evolved and increased in the years since the last update of the Comprehensive Plan. This Comprehensive Plan acknowledges these pressures and seeks to address them by reinforcing the diversified rural development pattern in the City of Afton through its housing and land use goals, policies, and strategies.

For additional demographic information and sources, see Appendix B.

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ENVIRONMENTAL RESOURCES PLAN

Intent

Afton's environment is a fragile one. The citizens of Afton have a high regard for their environment and have made major efforts to preserve and protect it. Preservation of Afton's natural features has not been an easy task considering the fragile soils, steep slopes, drainage ways, vegetation, and lakes and streams that make up the city. These delicate features need protection through careful planning.

Afton will only permit low density development which is designed to preserve and protect the soils, wildlife, slopes, drainage ways, vegetation, lakes, streams and river that make up Afton's natural features. Preserving the health and safety of residents requires protecting Afton's environmentally sensitive areas, which preserves the aesthetic qualities of the landscape and protects the purity of the air and water.

The citizens of Afton have a high regard for their environment. Low density development based on the use of private wells and individual and cluster septic systems have provided Afton with unique and sustainable neighborhoods that are not only self-sufficient, but collectively have a relatively low environmental impact. While the city is only fifteen miles east of downtown St. Paul, there is a world of difference between Afton and the surrounding urban and suburban development. Citizens desire to keep the city open and rural, while still enjoying the benefits of being located close to a major metropolitan area.

Afton's natural features exist in gently rolling uplands cut by deep ravines, drainage ways, and streams that flow into the St. Croix River. This topography, while uniquely defining, presents distinct challenges, particularly with stormwater and agricultural runoff. Interspersed with environmentally sensitive areas including trout streams, a lake, bluffs, ravines, wetlands, steep slopes, floodplains and a river, low density development is an essential part of the lifestyle in Afton. The commitment to preservation is strong (Appendix H-2007 Community Survey: Groundwater, Farmland and Rural Character).

Afton plans to accommodate future development without compromising the assets that make the city an environmentally friendly area. In addition to those mentioned above, natural resources in need of preservation include viewsheds, soils, wildlife habitat, wildlife corridors, groundwater resources such as springs and aquifers, geologically significant topographic features, vegetation, and drainage areas.

Soils

In the soil survey issued by Washington County Soil Conservation District in April 1980, the soils in Afton have been reviewed and different soil types categorized as to their suitability to accommodate on-site sewage treatment systems and to support a rural atmosphere, farming, groundwater protection, wildlife habitat, and a biological diversity for its citizens, flora, and fauna (see Appendix I). It is an inventory of the soils found in the city and indicates, among other things, the type of soil, the slope

gradient, the suitability of the soils to support certain uses and the degree and kind of limitation of each soil type for certain uses.

The maps that accompany the soil survey are useful as a planning tool since one is able to determine those areas that present problems for development. While the soil map is reasonably accurate, it is still recognized that unmapped pockets of different soil types can exist within a designated soil boundary line. Therefore, the soil map does not eliminate the need for soil sampling and testing on each building site. The soil map indicates the areas of prime agricultural soils and additional farmland of statewide importance.

The different types of soil in Afton are directly attributed to glacial till. (Tester, J.R., Minnesota's natural Heritage, University of Minnesota press, 1995; chapter 1) and weathered limestone. Most of the Afton area includes soils overlaying bedrock having slow percolation rates, steep slopes, periodic flooding and seasonal high water tables, although there are some karst areas with rapid infiltration rates. In addition, there are some areas in Afton that have been mined. These geologic features have created deep ravines and drainage ways. Soil types associated with these features are generally unsuitable for development due to their instability, high erosion potential and low absorption rates. Development in these areas needs to be monitored to prevent further soil degradation.

While soils are a major factor in determining the importance of land for agricultural purposes, (Appendix I – Map 3), there are many other factors that influence whether a land is most suitable for agricultural uses. In Afton, the prime agricultural lands tend to be those areas most easily developed, having few topographic or environmental constraints. Yet, these areas provide some of the broadest expanses of non-fragmented open space in the city and are thus critical preservation areas.

Topography

Afton's steep slopes (Appendix I–Map 5) are a result of erosion by flowing water. It is vital to the community that these drainage ways be protected and maintained. It is essential that every attempt be made to limit the amount of additional stormwater and agricultural runoff that flows through these drainage ways. Afton currently protects all slopes with a grade over 18 percent and slopes with a grade over 12 percent are protected if the soils on such slopes are deemed fragile. Continued care must be taken when allowing development in the upland areas of the City.

Vegetation

The vegetative cover is an essential part of Afton's natural environment and should be protected. (Appendix I–Map 4). In an area where there is such dramatic topography, damage to the vegetative cover can result in such things as increased erosion and stormwater runoff, and danger of flooding and siltation, lessening of water quality, loss of landscape diversity, decreased land values, detriments to surrounding wildlife and ecosystem, and degradation of soil and air quality. The tree cover is predominant where there are steep slopes, areas not being farmed and along watercourses and drainage ways. The vegetative cover consists mainly of deciduous trees, with several areas of planted conifers.

Riparian Systems

The St. Croix River, a National Wild and Scenic River, is one of the most pristine large river ecosystems in the upper Midwest. In 2009, it was named one of the Ten Most Endangered Rivers in the United States by the organization American Rivers. It is shared and highly valued by two states, Minnesota and Wisconsin. Land use along the river is governed by the Departments of Natural Resources of both states, as well as the U.S. Park Service and local municipalities. In addition to local zoning regulations, all development must conform to the provisions of the Lower St. Croix Bluffland, Shoreland, and Floodplain Management Ordinances.

Parts of the City of Afton are included in three major drainage ways (Appendix I-Map 6): the Valley Branch Watershed District, the Middle St. Croix Water Management Organization and the South Washington Watershed District. Valley Creek, South Fork Valley Creek, Trout Brook and other major ravines and drainage ways are tributaries to the St. Croix River. Much of the surface water that flows from Afton into the St. Croix River goes through or near the Old Village. It is vitally important to the safety of the Old Village, and to the health and vitality of the St. Croix River, that these drainage ways be protected and stabilized and the amount of stormwater runoff through these drainage ways be kept to a minimum.

According to the 1996 National Water Quality Inventory, stormwater runoff is a leading source of water pollution. Stormwater runoff can harm surface waters such as rivers, lakes, and streams which in turn cause or contribute to non-compliance with water quality standards. Stormwater runoff can change natural hydrologic patterns, accelerate stream flows, destroy aquatic habitats, and elevate pollutant concentrations and loadings. Development substantially increases impervious surfaces thereby increasing runoff from city streets, driveways, parking lots, and sidewalks, on which pollutants from human activities settle.

Nutrients (phosphorus and nitrogen) and sediment enter the St. Croix and its tributaries from many different sources: wastewater treatment plants, urban stormwater, residential lawns, crop land, pastures, animal feeding operations, construction sites and natural sources. Common pollutants in runoff include pesticides, fertilizers, oils, metals, pathogens, salt, sediment, litter and other debris.

Groundwater

Afton must keep the groundwater in its natural condition, free from any degradation caused by human activities. All homes in Afton are currently served by private wells and septic systems Afton is currently outside of the metropolitan urban services area (MUSA) and has no intention of utilizing the Metropolitan Council's sewer and water services even if they become available. However, a large subsurface treatment system and gravity sanitary sewer collection system has been constructed to serve the existing residential and commercial properties for the Historic Village Sewage Treatment Service Area. It is of the utmost importance in order to maintain our rural residential and agricultural character, that we have ample supplies of clean drinking water throughout the city. In areas that have rapid infiltration or that have been mined, it is essential to monitor groundwater to prevent unfiltered septic effluent from damaging the aquifer.

Aggregate Resources

Afton contains limited mineral deposits, primarily sand and gravel. Minnesota Geological Survey indicates that much of Afton falls within area designated as “Afton Valley Fill”, which is described as:

Colluvial material which fills in lower-lying areas within the bedrock uplands in southeastern Washington County. We interpret most of these deposits to be thin and gravel-poor. 1
(Minnesota Geological Survey Information Circular 46.)

The circular also indicates that, “*In all likelihood, the majority of these deposits will not continue to be available for mining because of competing land-use pressures.*”

Of the areas in Afton that could potentially be utilized for aggregate extraction, most are either within existing, residential neighborhoods or encumbered by a permanent conservation easement. (For instance, lands within the Belwin Conservancy are unavailable for aggregate extraction.) The remaining areas are zoned primarily Industrial, which allows for extraction through a permitting process outlined in Chapter 12, Article X, of the Afton City Code.

Although not significant in size, there are several areas in the city that have been mined that are unsuitable for building unless it is established that they can meet all building requirements. Mining removes the topsoil and sub-soils that filter runoff and sewage system effluent. Systems installed in soils in areas previously mined may result in the effluent moving quickly and untreated through the coarse soils to the water table resulting in pollution of water wells. This is of even greater concern if the area is one of groundwater recharge. Areas of groundwater recharge are critical areas that have soil characteristics that are conducive to rapid percolation of water from the surface into the substrate and ultimately into the local water table and connected hydrologic systems (wetlands, lakes, aquifers, and rivers). Pollution of the groundwater supply would have a devastating financial and environmental effect on the community and its residents.

Energy

As a sparsely populated rural community, the City will encourage feasible methods of energy storage and conservation, and renewable forms of energy that are environmentally friendly, including wind, photovoltaic and geothermal.

The Metropolitan Land Planning Act (Minnesota Statutes 473.859, Subd. 2) requires that local comprehensive plans include an element for the protection and development of access to direct sunlight for solar energy systems. The City of Afton protects such access by requiring minimum lot sizes, abundant open space, yard setbacks, and maximum height of buildings for urban residents. Land uses should not preclude the possible use of solar energy systems. The City will review and revise, as necessary, the Zoning and Subdivision Ordinances to ensure the protection of solar access.

New subdivisions are required to be designed to accommodate extensive use of passive and active solar energy systems. New and modified structures are prohibited from blocking reasonable capture of Solar Resource within the buildable area of other parcels, including vacant lots.

Environmental Resources Goals, and Policies

The City of Afton establishes the following environmental resource goals:

1. Preserve a rural landscape and natural ecosystem.
2. Maintain the city's overall one housing unit per ten acres, which is Afton's definition of low density, to limit development's footprint upon the land by maintaining the following minimum acreage requirements per housing unit.
 - a. Agriculture Preserve zone – 1 housing unit per quarter-quarter section
 - b. Agricultural zone – 3 units per quarter-quarter section, and in the case of Preservation and Land Conservation Developments, a maximum of one housing unit per ten acres with one half of the total acreage protected by a conservation easement.
 - c. Rural Residential zone – one housing unit per five acres.
3. Reduce nutrient loading to the St Croix River.
4. Improve and protect water quality in Kelle's Creek, Valley Creek, Lake Edith and the St. Croix River.
5. Protect supply of surface and groundwater.
 - a. Maintain springs, Lake Edith and Valley Creek at current surface elevation.
 - b. Maintain aquifers at levels supporting existing area wells.
6. Protect groundwater recharge areas from pollutants.
 - a. Prevent untreated wastewater and unfiltered stormwater runoff from entering the groundwater.
 - b. Develop a plan to reduce nutrients.
7. Protect groundwater aquifers from contamination.
 - a. Provide for safe drinking water.
 - b. Prohibit mining and prevent contamination from previously mined areas.
 - c. Continue a well monitoring program.
 - d. Encourage organic farming and gardening practices.
8. Maintain and enhance fish and wildlife habitats so as to retain or expand the current diversity of species.
 - a. Ensure the long term ecological stability of the riparian system.
 - b. Restore the riparian forests that line the banks of Valley Creek.
 - c. Provide for natural corridors throughout the City.
 - d. Explore creating effective wildlife corridors with neighboring communities.
9. Preserve existing forests, woodlands and prairies and control invasive species.
 - a. Plant diverse species of native trees.
 - b. Control and eradicate noxious species.
 - c. Control and eradicate invasive species to facilitate agricultural operations.
 - d. Prohibit clear cutting, except where necessary to remove invasive species.

- e. Encourage planting of native shrubs, forbs, grasses and trees as appropriate for erosion control, carbon sinks, water infiltration, and energy conservation.
10. Protect and preserve steep slopes and the land atop them from development.
 - a. Preserve viewsheds by screening new home visibility from roads and other homes and increasing setback requirements.
 - b. Prevent erosion.
 11. Protect soils from erosion, contamination and loss.
 - a. Utilize best management practices in all development.
 - b. Provide natural buffers to stabilize soils and contain run-off where possible.
 - c. Encourage use of native grasses, forbs, shrubs and trees.
 12. Protect and preserve natural features unique to the City of Afton.
 - a. Promote conservation easements and scenic easements.
 13. Reduce the use of fossil fuels for energy production by encouraging alternative options such as solar, wind and geothermal where doing so will not impair rural viewsheds, wildlife corridors or in other ways adversely affect Afton's rural environment.
 - a. Reduce community wide use of non-renewable energy sources attempting to meet state-wide standards of 80% renewable by 2050.
 14. Protect the night sky from light pollution.
 15. Anticipate changing climate demands on our environment.
 16. Promote wise land stewardship.
 17. Update Afton's natural resources inventory.

The City of Afton establishes the following environmental resources policies:

1. Maintain the city's overall development density of no more than one dwelling unit per ten acres of surface area, excluding in the calculation road surfaces, area covered year-round by water or marsh and lots that at the time of calculation have sizes that are under then current zoning requirements.
2. Use water quality protection practices such as reducing the use of phosphorus fertilizers and support protection efforts by state, county and federal agencies, as well as the Valley Creek Protection Initiative.
3. Work with various agencies to develop a strategy for reasonable and achievable reduction of nutrient and sediment loading from wastewater treatment plants, Subsurface Sewage Treatment Systems (SSTS), stormwater, crop land, pastures, animal-based agricultural operations, construction sites and natural sources.
4. Strive for the highest standard possible for Individual or Communal, or Large Subsurface Sewage Treatment System technology and advanced treatment of wastewater where that technology has been tested, proven reliable and approved by regulatory agencies.
5. Work with the Wisconsin Department of Natural Resources (WDNR)), the Minnesota Department of Natural Resources(DNR), and the Minnesota Pollution Control Agency (MPCA) with support from the St. Croix River Water Resources Planning Team (an interagency planning team consisting of federal, state and local members) to develop Total Maximum Daily Load requirements which will enhance the water resources in the St. Croix River Basin.

6. Prohibit clear cutting.
7. Monitor and control land uses which contribute to erosion, pollution, and well contamination by enforcement of ordinances.
8. Work with the various agencies involved with groundwater monitoring in regard to the east well-field area in the City of Woodbury.
9. Continue to provide funding for a volunteer well-monitoring program.
10. Study and consider ordinances to allow for economically sustainable, locally renewable and environmentally friendly means of energy production.
 - a. The city will seek opportunities to install renewable energy technology on city property.
 - b. Establish ordinances and building codes requiring energy efficiency and encourage use of renewable energy sources.
11. Actively enforce all land use ordinances, including the various special overlay districts.
12. Protect steep slopes, tree cover, wetlands and other fragile lands through conservation easements, scenic easements, and other available means.
13. Require setbacks from the crest of all slopes of 18% or greater, except in the Lower St. Croix Bluffland District where the slope is greater than 12%.
14. Utilize data from the Natural Resources Inventory when considering all land use applications.
15. Develop an Environmental Score Card for the City of Afton.
16. Discourage use of chemical pesticides.
17. Encourage use of organic landscape applications.
18. Encourage integrative pest management techniques such as biological control, habitat manipulation, modification of cultural practices, and use of resistant varieties.
19. Protect trout streams from temperature increases by actively enforcing Afton's restrictions on vegetative and topographic alterations in its shoreland district.

HOUSING AND LAND USE PLAN

The City's land use philosophy is an outgrowth of its focus on environmental protection and the resulting natural rural character of the City. The protection of groundwater is both essential to, and the result of, the City's low density development approach based on private wells and septic. The City's managed development philosophy is also based on limiting and managing stormwater run-off to protect the quality of the area's main natural and recreational resource, the St. Croix River.

In the Metropolitan Council's Thrive MSP 2040, Afton is designated as "Diversified Rural." The residents of the City of Afton have consistently supported the concept that Afton remain rural.

The residents of the City of Afton value the agricultural economy and rural character that an agricultural environment provides. This Plan intends to preserve agricultural land for permanent agricultural use, and does not accept the belief held by some that agricultural use is merely a temporary use or that agricultural lands are merely a holding area for future residential or other development. Moreover, the community values agricultural land as open space in an increasingly urban environment, a sanctuary for a rural lifestyle that Afton residents have consistently desired to maintain.

Agricultural

After several years of work, and in conformance with the Metropolitan Council's prior Development Framework Plan, in the Comprehensive Plan of 1982, the City of Afton established an Agricultural Zone with a density of 3 dwelling units per quarter-quarter section (40 acres) of land and passed ordinances to enforce that policy. At that time, and continuously to the present, the residents of the City of Afton have valued the agricultural economy and rural character that an agricultural environment provides.

Agriculture plays an important role in preserving the balance of economic conditions in the Twin Cities Metropolitan area, but productive agricultural land is being lost to nonagricultural development. Once agricultural land is developed for nonagricultural residential, commercial or industrial use, it is forever lost to agricultural production.

In April 1980, the State of Minnesota enacted the Metropolitan Agricultural Preserves Act. This act provides a package of benefits designed to give farmers in the seven-county metropolitan area the assurance that they can continue their farm operations on an equal footing with other farmers in the state, without the pressures of urbanization. These benefits include:

1. Agricultural use valuation.
2. A limit on total tax rates so that they cannot exceed 105% of the statewide average in townships for all purposes.
3. Prohibition of special assessments for sewer and water.
4. Protection for normal farm practices -- a local government would be prohibited from enacting ordinances which inhibit normal farm practices unless they bear a direct relationship to the public health and safety.

5. Protection from eminent domain -- before Ag Preserve land can be acquired by eminent domain, it must be shown that there are no reasonable, cost-effective alternatives which would have less of a negative impact on Ag Preserves. The process of review is conducted by the Environmental Quality Board. A suspension of up to one year is possible, but it cannot permanently stop eminent domain (Minn. Stat. . 473H.01 – 473H.17).

In order to take advantage of these benefits, a farmer's land must be designated "agricultural" on the city's land use map and zoned at a density of no more than one dwelling unit per quarter-quarter section for residential development. In addition, the farmer must apply for and receive certification from the city stating that the property is eligible for "preserve" status. Once a farmer's land is designated a preserve, the land must remain in agricultural use indefinitely or for eight years after the landowner applies for an expiration of the preserve designation.

Agricultural Zoning District and Agricultural Preserves Overlay District

To address environmental concerns detailed within this plan and to maintain our overall one dwelling per 10 acres (1 per10) density, this plan creates an Agricultural Preserves Overlay District. With the Agricultural Preserves Overlay District, the Agricultural District is envisioned to allow for three development scenarios:

1. Agricultural Preserves Overlay District 1 dwelling unit per quarter-quarter section (approximately 40 acres)
2. Agricultural Zoning: 3 dwelling units per quarter-quarter section (approximately 40 acres)
3. Agricultural Zoning using a Preservation and Land Conservation Development on a minimum of 80 acres: 4 dwelling units per quarter-quarter section. Land developed under this option would be subject to conservation easements, and subdividers would be required to set aside an extensive part of their property for continued farming or conservation. The City intends to provide more conservation-minded land use planning throughout this zone so as to coordinate and link the preservation areas for maximum benefit and minimal impact to the character of the community.

Note that, pursuant to the Agricultural Preserves Act, lands in the Agricultural Preserves Program would only be allowed a density of 1 unit per 40 acres on a specific, designated parcel. (Agricultural Preserves Overlay District).

Residential

According to the 2010 census estimates, there were a total of 1,143 residential housing units in Afton.

Table 2 – Residential Housing Units, 2010 Estimates

	Afton	Afton %	Washington County	Washington County %	MN	Minnesota %
Single-Family Detached	1,139	99.7%	66,590	68.1%	1,619,319	67.2%
Townhomes (single-family attached)	0		13,713	14.0%	175,908	7.3%
Duplex, triplex and quad	4	0.3%	2,841	2.9%	98,798	4.1%
Multifamily (5 units or more)	0		13,213	13.5%	433,746	18.0%
Manufactured Home	0		1,333	1.4%	79,520	3.3%
Other (Boat, RV, etc.)	0		59	0.1%	0	0.0%
Total Housing units	1,143		97,749		2,409,701	

The majority of the housing stock (99.7%) that existed in Afton in 2010 was single-unit detached, which is a higher proportion than either Washington County (68.1%) or the State of Minnesota as a whole (67.2%).

The predominance of older housing is a unique feature of Afton. Nearly a quarter of Afton’s current housing was built in the 1960’s and 15% of the housing stock was built prior to World War II. Homes in Afton hold their value and have appreciated much more quickly than homes across the county and state

The high land values in Afton have been an obstacle for those looking to locate affordable housing in the City. This is not likely to change in the near future.

The Rural Residential Zoning District provides for residential development on private wells and on-site sewage treatment systems, with the exception of the rural residential properties within the Historic Village Sewage Treatment Service Area as shown in Figure 5.. Each Rural Residential lot requiring a minimum of five acres, including 2.5 acres of contiguous buildable area. With the steep topography of a majority of the land in the rural residential zone, the average density attainable in this zone is expected to be about one unit per ten acres.

Old Village

The village of Afton is within the Village Historical Site zoning district, hereinafter referred to as the “Old Village,” located in sections 22 and 23 of Afton along the St. Croix River. The eastern boundary of the Old Village is established by the St. Croix River. It is bounded on the southern and western sides by steep slopes and river bluffs. The northern boundary is the intersection of St. Croix Trail South and Stagecoach Trail South. The Village Historical Site zoning district has two sub-districts, the Village Historical Site-Residential District and the Village Historical Site-Commercial District.

The only commercial zone of the city is located within the Old Village (VHS Zone) which has been certified as a Historic District. This area has been the traditional commercial focus for the city and for area visitors. The existing village atmosphere needs to be preserved while allowing a balanced and

complementary mix of residential, recreational, locally attractive commercial and tourist uses. Infrastructure improvements should be designed to eliminate environmental hazards and to sustain the long term viability of the commercial area.

Commercial uses in that portion of the Old Village zoned commercial are within the Lower St. Croix Bluffland and Shoreland Management District and thus allowed by Conditional Use Permit only.

The quaint character and charm of this rural village stands in stark contrast to the commercial development happening in neighboring communities. The mix of small businesses and residential properties provides a unique destination experience.

The Old Village has a special place in the history of Afton. The Old Village was platted in 1855 by R. Haskell, Joseph Haskell, H.L. Thomas, and C.S. Getchell. The plat is typical of land divisions of that time: 50 x 150-foot lots and 80-foot wide street rights-of-way designed in a grid pattern overlaying the natural topography and other physical limitations of the site.

Afton's Old Village offers unique opportunities to business owners and professionals. The Old Village has attracted a number of successful small businesses as well as professionals drawn both to the lifestyle and the natural environment. This mix of businesses fits with the residential development of the Village and, together, they reinforce the context that makes the Old Village such an important feature of the City of Afton. Because of the location and the natural constraints on development, most successful businesses in the Old Village have a focused market. The Old Village is not the place for a big box store but rather an ideal location for specialty shops, services, and as a destination place for tourists.

The Old Village was established on river flats subject to flooding from the St. Croix River. A significant portion of the Old Village lies within the 100-year floodplain and, over the years, there has been periodic flooding. The City of Afton has made substantial improvements to the levee that protects the Old Village to enable the levee to be certified by the Corps of Engineers.; continued maintenance of the levee to standards necessary for certification will be necessary to protect against future flooding and encourage reinvestment in existing properties. The physical features noted above, bluffs to the west and south, the St. Croix River to the east, naturally constrain expansion of the Old Village beyond its present limits.

St. Croix Trail is the main thoroughfare running through the Old Village. It is maintained by Washington County at county standards. The other improved streets in the Old Village are typical of a rural village. The driving surfaces are relatively narrow, causing slower traffic speeds, a safe pedestrian environment and the aesthetic of the Old Village. In 2017 the City of Afton and Washington County upgraded the stormwater management and improved all streets and sidewalks in the old village.

Old Village residences and businesses have been utilizing private wells and on-site sewage treatment systems. Small lot sizes leave limited room on each property for sewage treatment. The overall density

has created concerns over the total amount of sewage effluent being discharged into the ground in a limited area. This concern was heightened by the existing, high groundwater table, which leaves limited vertical space for soil treatment before effluent reaches the groundwater. Adding these concerns to the intermittent flooding and geography, the Old Village has a small margin for error when it comes to properly treating sewage and therefore must carefully control remodeling and new construction. To mitigate these concerns, the City of Afton has installed a large subsurface treatment system (LSTS) and a sanitary sewer collection system to serve the Historic Village Sewage Treatment Service Area.

Many of the structures in the Old Village are of historical interest, which is a tremendous asset for the area. Unfortunately, some of these buildings are vacant or in disrepair. Where the historical value is not realized and the properties become blighted, it negatively impacts the entire community. A map showing structures and sites of historical value in the City of Afton is included in this plan (Appendix I-Map 8). The city intends to support renewal and reuse of these vacant buildings in order to continue to promote unique opportunities and the revival and survival of small businesses and professionals. Doing this will enhance the Old Village as a destination that attracts local residents and tourists.

Industrial

Approximately 239 acres of the City are zoned for light industrial use. The light industrial area is bounded by I-94 to the north, State Highway 95 to the west, and includes one 70 acre parcel directly abutting the south side of the Interstate Frontage Road and the east side of State Highway 95, as well as all property north of the Interstate Frontage Road between State Highway 95 to the city limits to the east. Light industry and storage related activities will continue to be allowed in the light industrial area under current zoning ordinances. Afton intends to maintain this area as a relatively low intensity transitional use between the interstate highway and the nearby residential zone. The light industrial area provides a location within the city for those uses that would be incompatible with the residential and agricultural districts.

Marine Services

The City has created a separate marine services zoning district to complement the river accesses and marinas and to permit storage and repair of boats and boat trailers by Conditional Use Permit. This District is generally confined to the area just north of the Old Village that was designated General Business and Light Industry in the Township of Afton before the Lower St. Croix River Bluffland and Shoreland Management Ordinance was adopted, and also includes a boat storage facility located on Manning Avenue just north of 8th Street.

State Park

Afton State Park is owned by the State of Minnesota, and is operated as part of the State Park System. The Park provides substantial open space and natural features, as well as recreational opportunities for Afton residents and the general public. It is anticipated that the land will continue to be used in this way far into the future. The State Park consists of 793 acres.

Belwin Conservancy

The Belwin Conservancy - a non-profit conservation organization dedicated to the preservation, restoration, and appreciation of the natural world - owns 1,239 acres of preserved land in Afton. Belwin's acreage is substantial and preserves and protects open space in the form of high value native habitats to include oak savanna and woodlands, tall grass prairie, wetland and fens. It is anticipated that this land will also continue to be conserved in this manner far into the future.

Table 3 - Acreages by Zoning District, City of Afton

Zoning District	Acres
Agricultural	7180
Rural Residential	7702
State Park	793
Industrial	289
VHS	176
Marine Service:	25

Housing and Land Use Goals, Policies and Strategies

The City of Afton establishes the following housing and land use goals:

1. Maintain the city's overall low density.
2. Preserve the rural character of Afton.
3. Encourage agricultural uses.
4. Maintain natural open spaces.
5. Promote wise land stewardship.
6. Maintain a low demand for public expenditures.
7. Avoid the need for extension of the metropolitan wastewater system into the City of Afton
8. Resist development pressures and land speculation, which tend to create urban sprawl.
9. Ensure that development within the Old Village is sensitive to the natural environment that surrounds it.
10. Preserve and revive the rural village character of the Old Village and promote its use as an entry point for recreational activities in the area.
11. Maintain a mix of single-family residential structures and commercial structures containing niche businesses in the Old Village.
12. Provide for adequate parking in the Old Village
13. Encourage pedestrian-friendly sidewalks and lighting in the Old Village.
14. Promote relatively narrow driving surfaces and slower traffic speeds in the Old Village.
15. Improve access to and residents usage of the city docks and access to the St. Croix River as it relates to Main Street.

16. Ensure that untreated wastewater and stormwater do not flow into the St. Croix River.

The City of Afton establishes the following housing and land use policies:

1. The overall development density of the City shall not exceed one unit per ten acres
2. The City shall not approve any requests to permit property then within the municipal boundaries of Afton to be annexed to any other municipality.
3. The City shall maintain the current densities for the following land use classifications:
 - a. Agricultural– 3 dwelling units per quarter-quarter section.
 - b. Preserve Agricultural Preserves - 0 or 1 dwelling unit per quarter-quarter section.
 - c. Agricultural with a Preservation and Land Conservation Development and a minimum of 80 acres– 4 dwelling units per quarter-quarter section
 - d. Rural Residential - 1 dwelling unit per 5 acres, with a minimum of 2.5 contiguous buildable acres
 - e. Old Village – 1 unit per 22,500 square feet (1 unit is considered one structure and may include one commercial unit, one residential unit or a combination commercial unit on the main floor with residential unit above.)
4. The City shall maintain the current minimum lot sizes for newly created lots in each of the following land use classifications:
 - a. Agricultural – 5 acres with a minimum of 2.5 contiguous buildable acres.
 - b. Rural Residential – 5 acres with a minimum of 2.5 contiguous buildable acres.
 - c. Old Village – 22,500 square feet.
5. Provide for a mixture of land uses which maintains a rural environment and lifestyle and prevents the extension of the Metropolitan Council’s sewer systems, municipal water, and other urban services in the Agricultural and Rural Residential Zoning Districts.
6. Prohibit land uses which are inconsistent with the rural character of the Rural Residential Zoning District and which might place excessive demand on city services.
7. Prohibit rezoning of a parcel from Agricultural to Rural Residential unless, in addition to meeting other criteria, the parcel is more than 50% contiguous to a rural residential zoning district and such a rezoning would not result in development which is inconsistent with the generally rural character of the surrounding area.
8. Discourage residential development on lands suitable for agricultural use and adhere to planning practices that will allow farms to operate without external pressures.
9. Require a minimum of 300 feet of frontage on a public street for all newly created residential lots in the Agricultural, Rural Residential and Industrial Zoning Districts.
10. Prohibit long and narrow lots and irregularly shaped lots except when deemed advisable in the Rural Residential Zoning District.
11. Restrict industrial uses to those which do not pose a threat to air or groundwater
12. Prohibit hazardous waste facilities within the city limits of Afton.
13. Restrict industrial development to those uses that do not generate large amounts of traffic or sewage, and can operate efficiently on an onsite standard drainfield approved by City ordinances.
14. Restrict industrial uses to those which would not create the need for metropolitan sewer, municipal water or sewer, or additional urban services.

15. Retail, restaurants and other commercial uses are allowed as principle uses only in the VHS Zoning District. Multi-unit dwellings within the Old Village are prohibited as they are not in keeping with the context of the community. Accessory commercial uses may be allowed by ordinance in other zones.
16. Monitor and support municipal wastewater collection and treatment serving properties within the Old Village.
17. Encourage economic revitalization of the commercial portions of the Old Village.
18. Continue to allow mixed use structures in the Old Village as they are consistent with the current character of that area.
19. To ensure the preservation of the character of the historic district, current non-conforming uses that are rendered unusable may be restored to their prior use in accordance with state law.

The City of Afton will seek to implement the following land use strategies:

1. Prepare a plan establishing priority conservation areas within the Agricultural Preservation Overlay District. The plan should identify areas that are best-suited for continued agricultural production as well as linkages/wildlife corridors that should be established throughout the district.
2. Partner with the Minnesota Land Trust and other independent, non-profit organizations that serve as holding entities for conservation easements.
3. Study parking needs in the Old Village.
4. Develop and enforce requirements for construction and maintenance of sidewalks and lighting in the Old Village.
5. Develop a management plan for unimproved right-of-ways in the Old Village.
6. Incorporate design review standards created by the Design Review/Heritage Preservation Commission for future village construction.
7. Encourage the use of conservation or open space design subdivisions where the subdivision permanently preserves open space or agricultural land uses or creates transition zones with adjoining zones or jurisdictions.
8. Develop signage and pedestrian-friendly connections to the St Croix River.
9. Protect Steamboat Park as a nature preserve and passive use area.

TRANSPORTATION PLAN

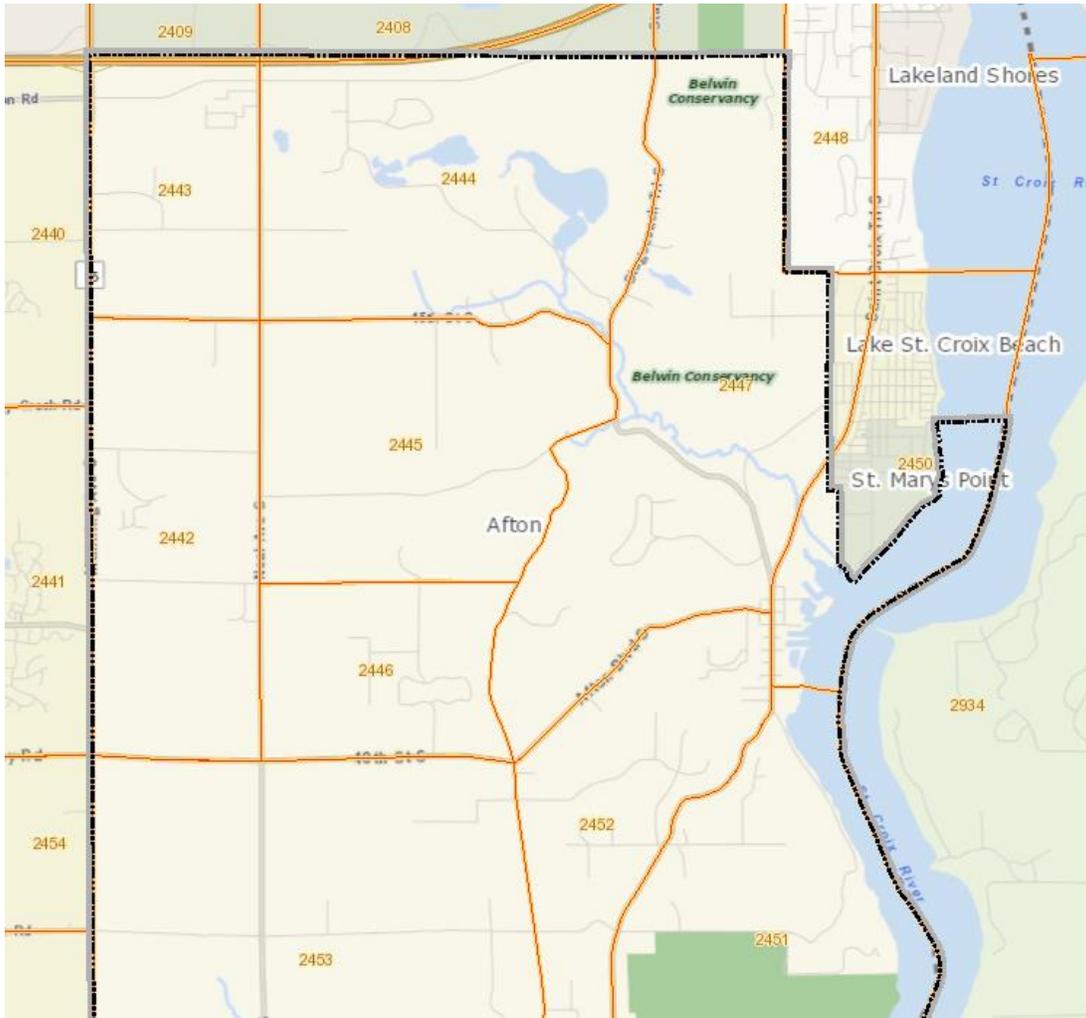
In 1855 the City of Afton consisted of a main street through the center of the village going north and south with short side streets extending up the sides of the bluffs. Today, Afton is served by an extensive network of federal, state, county and local roads.

The continued emphasis on low density, rural development pattern will not result in significantly more roads being added to the City of Afton. The projected household growth is estimated to be 12% over the next 20 years. There is a higher growth forecast for cities and towns adjacent to Afton. This higher adjacent growth forecast may bring more traffic to roads within the City.

Development of the road system over the past few decades has focused on the construction of new roads in cooperation with the developers of subdivisions. The developer has been responsible for the construction of paved roadways and appropriate drainage to city standards and the city has assumed maintenance and ownership of these roadways one year after completion. Due to the low development density of the Agricultural Zoning District, road development has been deemed unnecessary and is prohibited within this zone, except as permitted through a Preservation and Land Conservation Development that conserves large areas of open space through conservation easements.

Traffic Analysis Zones

Metropolitan Council Traffic Analysis Zones (TAZ) for Afton which were used to create the 2040 forecasted traffic volumes are detailed below. The projected growth for 2040 is 150 new homes and an increase in employment by 180.



Traffic Analysis Zones for Afton (TAZs)

Met Council TAZ	Population	Households	2010	
			Retail Employment	Non-Retail Employment
2442	201	72	3	9
2443	271	89	20	57
2444	338	118	2	62
2445	200	79	0	1
2446	200	75	1	12
2447	512	201	5	36

2450	42	15	33	69
2451	260	102	0	2
2452	549	210	3	81
2453	313	120	0	16
TOTALS	2886	1081	67	345

2020				
Met Council TAZ	Population	Households	Retail Employment	Non-Retail Employment
2442	205	80	0	11
2443	252	100	18	100
2444	338	134	10	66
2445	226	90	0	1
2446	213	83	0	12
2447	566	221	28	14
2450	43	17	20	76
2451	286	112	0	5
2452	588	230	20	83
2453	351	134	5	41
TOTALS	3068	1201	101	409

2030				
Met Council TAZ	Population	Households	Retail Employment	Non-Retail Employment
2442	208	57	0	11
2443	252	103	8	110
2444	346	142	7	70
2445	231	95	0	1
2446	216	86	0	13
2447	577	234	5	40
2450	45	18	15	85
2451	290	117	5	1
2452	594	240	20	88
2453	361	140	5	43
TOTALS	3120	1232	65	462

2040				
Met Council TAZ	Population	Households	Retail Employment	Non-Retail Employment
2442	208	86	0	12
2443	249	105	10	111
2444	351	148	9	70

2445	234	99	0	1
2446	216	87	0	14
2447	582	243	5	42
2450	47	20	15	89
2451	290	121	0	6
2452	592	246	10	104
2453	369	146	5	45
TOTALS	3138	1301	54	494

Roads and Highways

A combination of Federal, State, County, and local roads serve Afton as shown in the Existing Transportation System (Figure 3). Ideally, roads are designed to perform a designated function and are located to best serve the type of travel needed. The four functional classifications assigned by the Metropolitan Council that describe roads in Afton are

1. Principal arterial;
2. Minor arterial (“A” Minor/”B” Minor);
3. Collector; and
4. Local.

Principal arterial routes are roadways intended to connect metropolitan areas, major industrial centers, etc. that are the highest traffic volume roadways such as interstate highways. Minor arterials connect urban service areas to cities and towns inside and outside the region. The emphasis of minor arterials is on mobility as opposed to access in the urban area. Collector roadways provide connections between neighborhoods and regional business centers. Local roads provide land access by connecting blocks and land parcels.

Interstate I-94 is a principal arterial along the northern border of the City. “A” minor arterial connectors within the City are Trunk Highway (TH) 95, Washington County Road (CR) 18, and CR 21 (from the village to Denmark Township). “B” minor arterial routes are CR 71 and CR 21 (from the village to the north). Collector routes include 15th Street South (from TH 95 east to Oakgreen Avenue South). All other roads in Afton are considered local.

The remaining unpaved roads in Afton were paved in 2005. In 2017, Afton adopted a long term road improvement and funding plan, and improved 17 miles of city roads with funding provided by a 10-year bond issue. The road improvement and funding plan will provide sufficient funding to pay the debt service on the bonds and to ensure that by the year 2028, the City can fund its on-going road improvement needs on a pay-as-you-go basis, without the need for bonding.

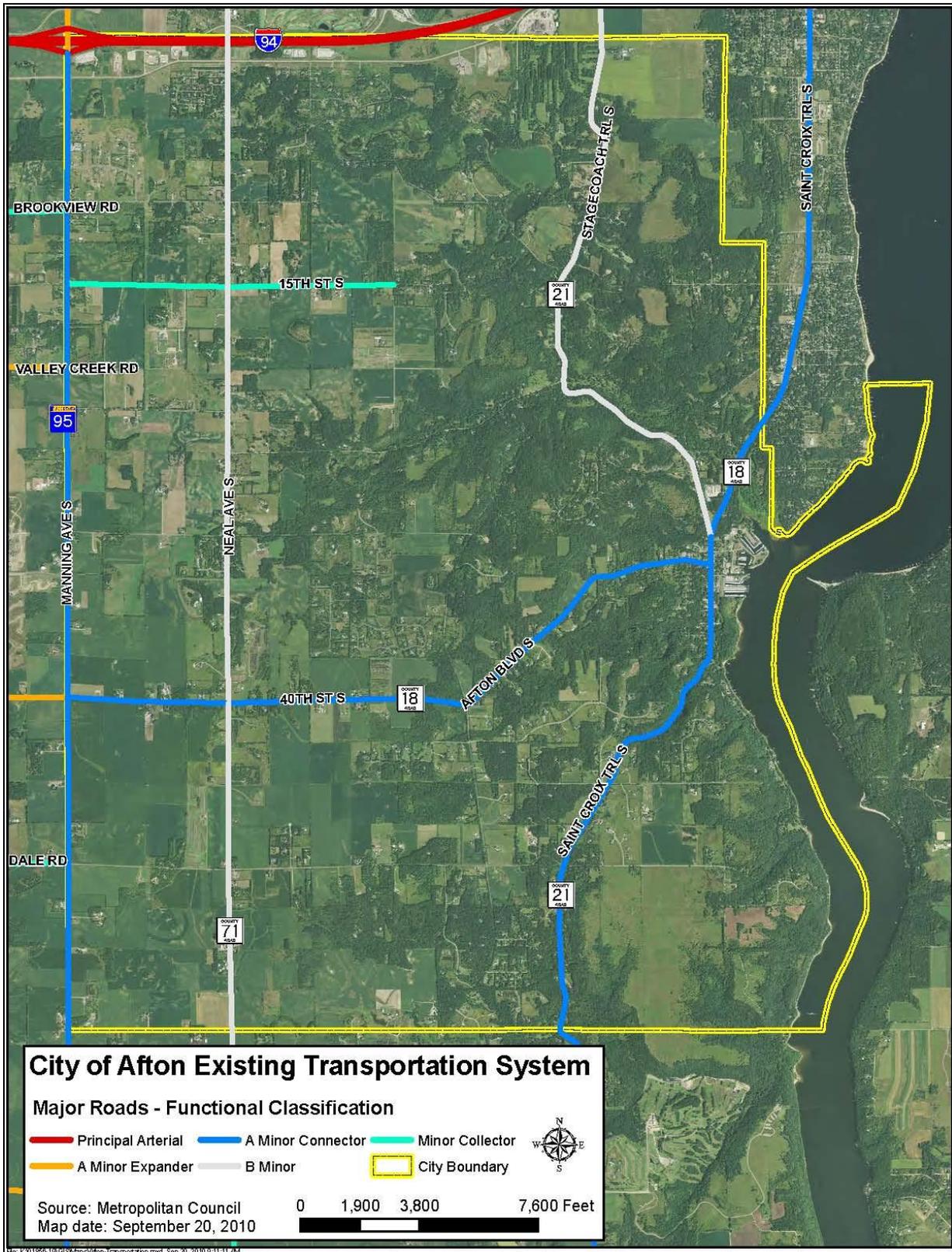


Figure 3 – City of Afton Existing Transportation System, Metropolitan Council

Safety

The City will construct new roadways and reconstruct roadways to meet City standards and increase safety and mobility.

Access Management

The City encourages the alignment of new access points with other existing access points, the provision of adequate spacing to separate and reduce conflicts, and the consideration of sight distance limitations. The City will use Washington County's access management requirements as a guide for design standards on local roadways.

Aviation

Afton does not have an airport or landing strip and will not allow any, public or private, due to the lack of central services, suitable land space, fragile soils, and noise pollution. Heliports are likewise prohibited. The City of Afton promotes the protection of airspace navigations and electronic communication. Current City ordinances prohibit any structures, including antennas and wind turbines, over 150 feet in height. Proposed new structure construction will require a Conditional Use Permit where the applicant will be required to submit a "Notice of Proposed Construction or Alteration" to the Federal Aviation Administration (CFR – Part 77, Form 7460-1).

Transit

Afton is outside of the Metropolitan Transit Taxing District; there is no regular route transit service existing or planned in the City. There is a Park and Ride lot located at I-94 and St. Croix Trail. Washington County provides limited transit service for the elderly and disabled. The City is located in Market Area IV; service options for transit in Market Area IV include Transit Link, formerly called "dial-a-ride", volunteer driver programs, and ridesharing. The City, in conjunction with its neighboring St. Croix Valley communities and Washington County, may be an advocate for a light rail corridor along I-94 to the St. Croix River. As our population ages, our City may choose to explore the expansion of bus service into our community.

Non-motorized Transportation

While the City of Afton encourages non-motorized transportation, it is not practical as a primary mode of transport outside of the Old Village. However, with the paving of most of Afton's streets, the City has become a destination for the recreational bicyclist who enjoys the rolling hills, open spaces, and low traffic volumes within much of the community.

Transportation Goals, Policies, and Strategies

The City of Afton establishes the following transportation goals:

1. Ensure safe routes for motor vehicles, bicycles, and pedestrians.
2. Ensure that roadways are adequate for use by emergency vehicles.
3. Provide appropriate roadways for area businesses depending on their location in an industrial zone or within the historic Old Village.
4. Provide reliable access to roadways outside of the City of Afton.
5. Provide and maintain roadways and intersections by the most cost effective means possible.
6. Avoid disruption to the natural environment.
7. Promote safe, contemporaneous use of the roads by motorized and non-motorized traffic, as well as oversized and slow moving farm vehicles and implements.
8. Utilize appropriate design and construction techniques to avoid premature degradation of roads adjacent to waterways.
9. Encourage “Park and Ride” lots for commuters in areas adjoining major thoroughfares.
10. Provide for the possible extension of local streets in new subdivisions to avoid the need for cul de sacs, except where doing so would have greater environmental impacts, such as significantly increasing the total amount of impervious surface.
11. Require right-of-way dedication for existing easement roads and existing streets whenever land is subject to City Council approval.

The City of Afton establishes the following transportation policies:

1. Prohibit the construction of new streets in the agricultural district except where deemed necessary to allow a property owner to use the property in keeping with the agricultural zoning and to promote land conservation to the maximum extent.
2. Control the upgrading of existing roads and construction of new roads which would serve to encourage non-farm development in the agricultural zone.
3. Require a 150 foot setback along designated collector streets.
4. Prohibit airports, landing strips and heliports within Afton.
5. Update and implement a capital improvement program.

The City of Afton will seek to implement the following strategies:

1. Post speed limits, weight and parking restrictions on City streets, where appropriate.
2. Post share-the-road signs for bicyclists, equestrians and other uses, where appropriate.

GROUNDWATER AND SURFACE WATER PLAN

A copy of the City's Surface Water Management Plan is attached, as Appendix E.

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WASTEWATER AND SANITARY SEWER PLAN

Properly treating wastewater is a critical concern of the residents of Afton. There is a strong desire to ensure that wastewater is properly treated so as to limit the impact that development in Afton has on the natural environment. There is an equally strong desire to avoid the land use patterns that come with centralized collection and treatment of wastewater. Continued use of highly efficient and well maintained individual sewage treatment systems throughout the rest of the City will avoid public expenditures for central sewer and will prevent development at urban densities.

In 2013, the City completed a Facility Plan to evaluate various wastewater collection and treatment alternatives to replace current individual subsurface treatment systems (ISTS) within the Historical Village Sewage Treatment Service Area (HVSTSA). Included in the study were four alternatives: 1. Leave the system as is; 2. Conduct widespread ISTS replacement; 3. Implement a large subsurface treatment system (LSTS); or 4. Undergo regionalization. The Facility Plan concluded, after consideration of environmental, financial, and technical factors, that the preferred alternative for the city is the implementation of an LSTS system.

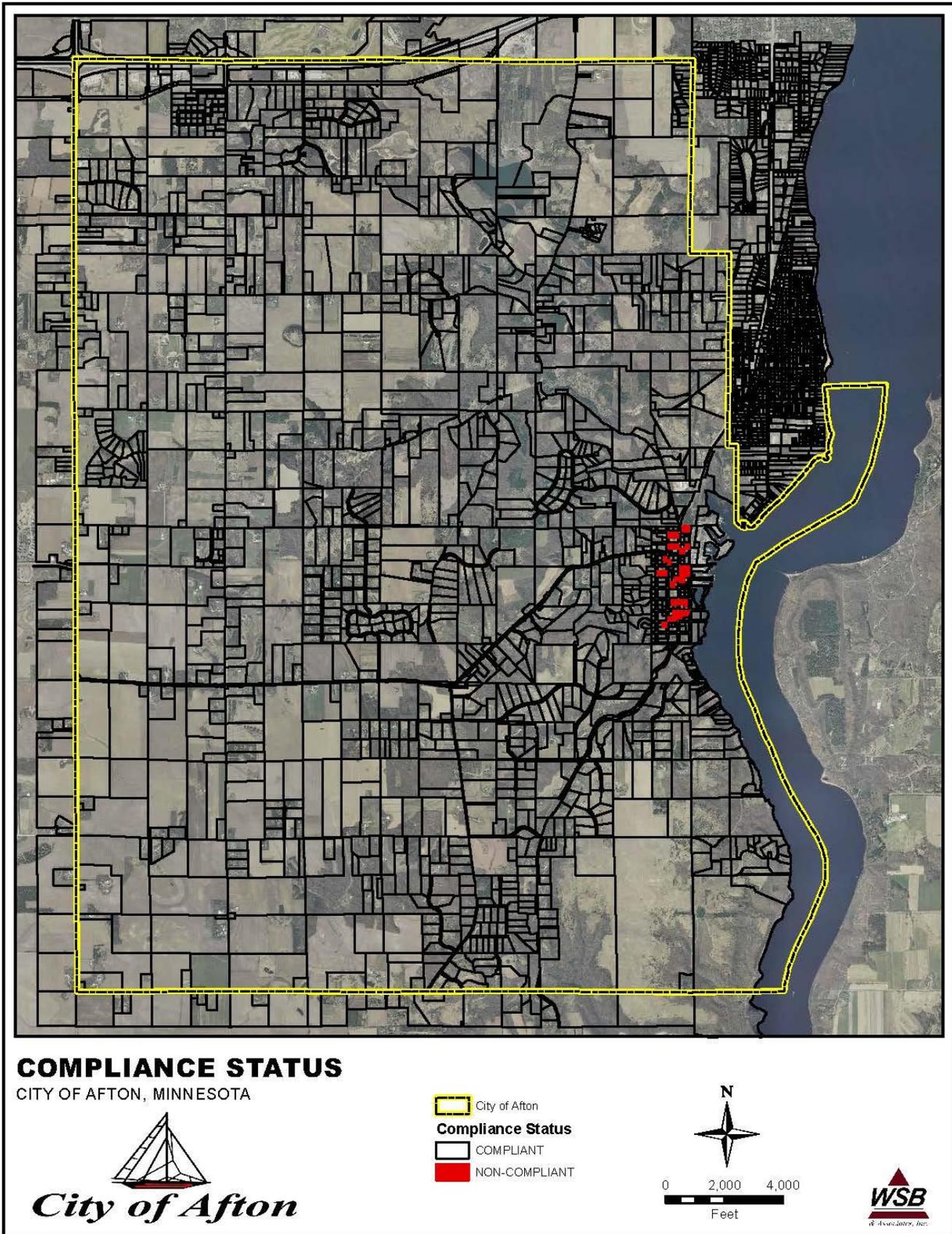
The Facility Plan has been reviewed and approved by the MPCA and the following information summarizes that plan in accordance with comprehensive planning requirements. The entire Facility Plan is included in Appendix M of this Comprehensive Plan.

Existing System

As of 2008, there were 1,119 individual, subsurface sewage treatment systems within the city limits. In addition, there is one community cluster system that serves eleven homes. A survey of the HVSTSA was completed, and the location of surveyed, non-compliant systems are shown in Figure 4. It was estimated that 52% of the existing systems were compliant and meeting setback requirements, with another 18% compliant but not meeting setback requirements.

The current reliance on ISTSs will require the City of Afton to be diligent in protecting residents' health, safety, and welfare. Development restrictions in place limit development in areas with unsuitable soils. Compared with other communities in Washington County, Afton has few soils with a slow percolation rate. Slow percolation rates usually indicate a heavy or tight clay soil which does not allow sewage effluent percolation. A significant area of these soils is in the southeast corner of Afton along the St. Croix River. Other small pockets of these soils occur along the many drainage ways within the City.

Figure 4. Parcels known to have non-compliant sewage treatment systems in the HVSTSA.



Steep slopes are predominant in Afton along the eastern half of the city. These steep slopes follow the major drainage ways. Currently, installation of an on-site sewage treatment system is prohibited on any slope exceeding 12%. Installation of septic systems on slopes over 12% may result in erosion, lateral seepage, and down-slope flow of effluent. The soils with a seasonal high water table or that are wet or subject to periodic flooding are also located along Afton's drainage ways. These soils are not suitable for septic systems since the effluent will either be dispersed into groundwater or will back up into the residence.

To further ensure the health and safety of Afton's residents, the City performs a thorough review of all ISTS designs and provides expert inspection for all installations.

The installation, maintenance and inspection of all ISTSs and LSTSs are regulated by both the City of Afton and Washington County in accordance with Minnesota Rules Chapter 7080. An agreement is in place whereby Washington County provides individual sewage treatment system inspection services within the City (Appendix J – ISTS Inspection Services Agreement). As part of this agreement, the City of Afton has adopted Washington County's ordinance #179 by reference as Afton Ordinance 08-2010. The City has agreed to be consistent with, or more restrictive than, the county.

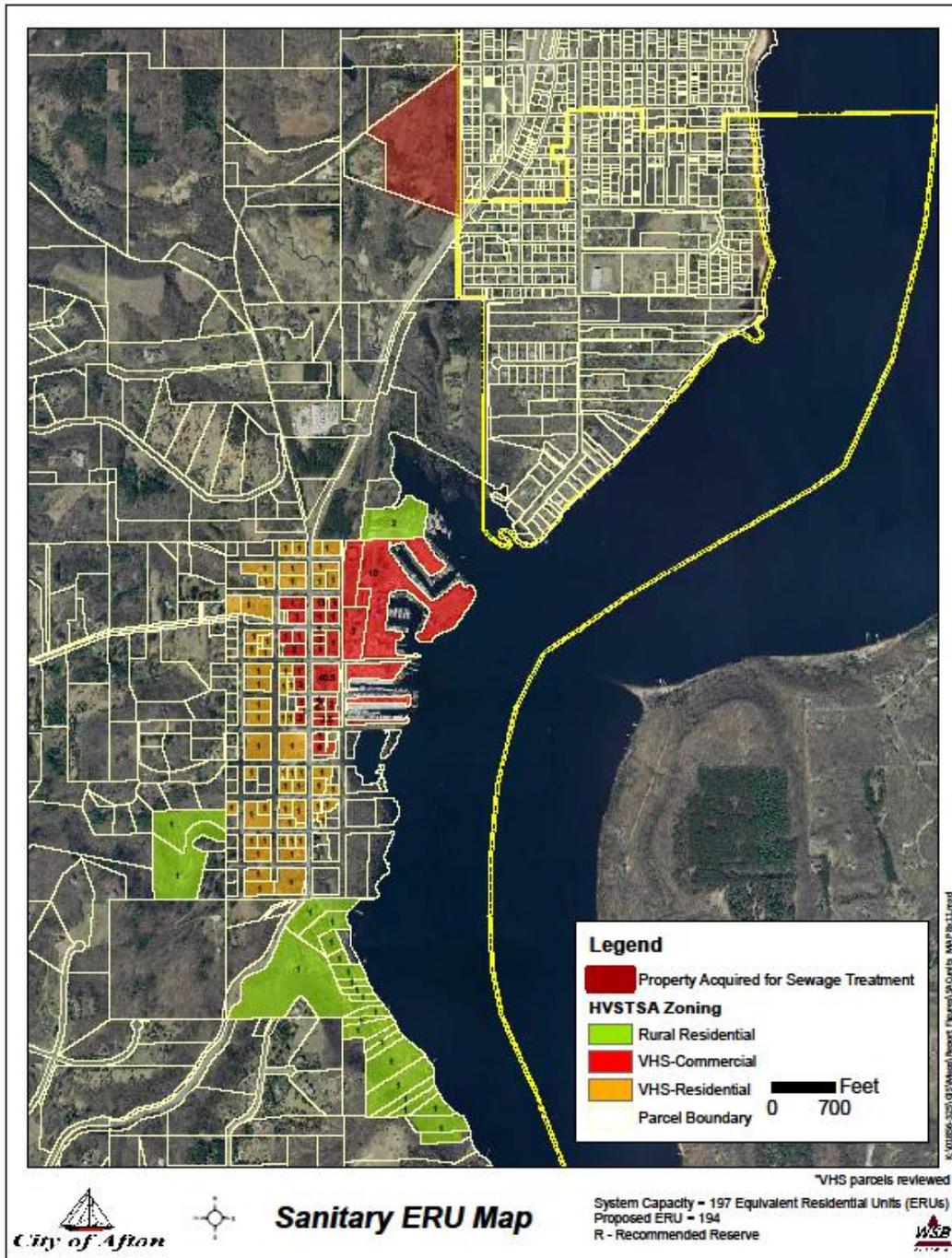
Existing ISTSs in the Historic Village Sewage Treatment Service Area will continue to provide wastewater treatment until the properties are connected to the new system. Properties with non-compliant systems are required to connect to the new system immediately. Properties with compliant systems are required to connect to the new system by 2024 or at the time of sale, whichever comes first.

Planned System Improvements and Projected Wastewater Flows

Due to the high flooding risk in Afton, as well as the non-compliant ISTSs serving residential dwellings and commercial establishments within the Historic Village Sewage Treatment Service Area, the need for sanitary sewer system improvements was identified. The implementation of a LSTS will improve water quality and reduce noncompliant systems. The completed improvements will greatly reduce health and sanitation impacts to the City, residents, businesses, and general public, and will benefit the water quality of the St. Croix River.

There is a desire from the City of Afton, however, to prevent large-scale treatment systems that would allow for widespread commercial and industrial development. For this reason, the City implemented a LSTS with a capacity allowing a modest growth in residential and commercial flows only. The system estimates a population growth of 30 people (17%) in the Old Village over the next 20 years. In 2030, the system will serve an estimated 77 households and 22 commercial establishments. The following figure details the Historic Village Sewage Treatment Service Area to be served by the LSTS.

Figure 5. Current Zoning for parcels in the Historic Village Sewage Treatment Service Area.



The following table presents the sanitary sewer flows that will be generated within the Historic Village Sewage Treatment Service Area based on the land use designations as detailed in the city’s Facility Plan. The 2020 and 2030 flows are in accordance with the proposed system staging that is described in the following sections. As the LSTS will only accommodate modest growth, it is assumed that the design capacities will be reached by the year 2030.

Land-Use	2013 Flow (gpd)	2020 Flow (gpd)	2030 Flow (gpd)
Residential	0	9,272	18,544
Commercial	0	14,175	28,349
Inflow/Infiltration Allowance	0	2,000	4,000
Total Peak Flow	0	25,447	50,893

Table 5. Estimated sanitary sewer flows.

Collection System Improvements

The improvements include the construction of a gravity sanitary sewer system, lift stations, and forcemain to convey the residential and commercial wastewater flows generated within the Historic Village Sewage Treatment Service Area to the LSTS. Individual sewer services will be connected to the sewer lines which will extend the sewer service to the homes and businesses to be served.

The trunk lines within Saint Croix Trail extend to a main lift station located adjacent to the Steam Boat Park parking area east of the intersection of Saint Croix Trail and Upper 34th Street. The main lift station will convey the wastewater to the LSTS north of the Historic Village Sewage Treatment Service Area. Two additional lift stations located along River Road have been reconstructed to convey wastewater to the collection system and ultimately the LSTS. The following figure details the sanitary sewer collections system improvements within the Historic Village Sewage Treatment Service Area (Figure 6).

Figure 6. Planned sewer system in the Historic Village Sewage Treatment Service Area.



Treatment System

The treatment system consists of communal septic tanks, an anoxic denitrification component, recirculation tank, recirculating gravel filter, and a dose tank sized to store and meter flows throughout the day to a seepage cell soil dispersal drainfield. A control building houses various valves and controls. It also serves as a location to store miscellaneous items pertinent to system operation and maintenance.

The treatment system is located north of town at an elevation of 720 to 730 feet above mean sea level. The treatment system is above the 500 year, 100 year, 50 year, and 10 year floodplain elevations of 695 ft, 691.5 ft, 690 ft, and 686.5 ft, respectively, and will be operable during the 25-year flood and protected during a 100-year flood event.

Inflow and Infiltration

Due to Afton's proximity to the St. Croix River, extra precautions were put in place to ensure the system can withstand flooding. These precautions limit inflow and infiltration in the system. Flood-tight castings are used along the collection system in the floodplain. The collection sanitary sewer will be made from PVC plastic with water-tight gaskets and HDPE including fused joints to keep water from entering the system. In addition, the collection system was pressure tested after construction, and the manholes include joints, rings, and castings that are wrapped to exclude water. The combination of these technologies will greatly reduce the potential for inflow and infiltration. Nonetheless, the system plans include an inflow and infiltration allowance of 4,000 gpd as required by the MPCA permit.

Staging

Residences and commercial establishments that have existing non-compliant septic systems will be required to connect to the system. The remaining users in the Historic Village Sewage Treatment Service Area will be required to hook up to the system within eight years of completion. The system is to be fully connected by 2024, as outlined in the updated Sanitary Sewer Code for the City of Afton (Appendix G.)

Wastewater Goals, and Policies

The City of Afton establishes the following wastewater goals:

1. Reduce the volume of wastewater that is discharged to the soils of Afton.
2. Protect ground and surface waters to the greatest extent practicable by improving the quality of wastewater effluent.
3. Protect the groundwater from chemical or hazardous waste introduced from wastewater systems.

The City of Afton establishes the following wastewater policies:

1. Encourage the use of individual, highly efficient, wastewater treatment systems for all homes and businesses within the rural area of Afton.
2. Restrict industrial uses to those which would not create the need for metropolitan sewer or additional urban services.
3. Educate all residents on the proper maintenance of a septic system.
4. Monitor and manage the upgrading of all substandard wastewater treatment systems and require the immediate upgrading or replacement of failing systems.

PARKS AND OPEN SPACES PLAN

Residents value the rural atmosphere of Afton. Five-acre minimum lot sizes outside of the Old Village with houses that do not dominate the views of the countryside, large non-buildable areas of the City, and a large amount of farmland create an open feel to the landscape *Open spaces, in and of themselves, are valuable to the residents of the City as preserves of nature and sanctuaries for flora and fauna.* An adequate area of properly managed parks and open spaces helps to protect and recharge surface and groundwater which is used by every resident of the city.

The preservation of open spaces, including land with steep slopes, woodlands, wetlands, scenic or environmentally sensitive areas, and agricultural land provides many benefits, including the protection of natural resources, the provision of wildlife habitat, and the preservation of the natural, rural countryside character of Afton. The preservation of these open spaces is of key importance to the City. The City will seek to accomplish this preservation through a number of means, including:

1. Parkland dedication;
2. Parkland acquisition;
3. Open space dedication incentives in land development regulations; and
4. Encouraging and supporting the long term continuation of agricultural uses.

Existing Parks and Open Space

The City of Afton, and Afton's natural, open, rural character, greatly benefit from the substantial amount of open space that has been preserved by other public and quasi-public organizations. These open space amenities include a State Park, Regional Parks and the Belwin Conservancy. In addition, the St. Croix River is a magnificent open space amenity, providing scenic and tranquil vistas, and a major recreational resource. Another significant element of Afton's open space is its scattered rural development, including large lots and large expanses of agricultural land. Rather than developing new parks, the focus of the City has been to protect and preserve the existing natural resources and open space amenities.

The City currently has a limited amount of City-owned open space and developed parks. The City of Afton has one park for active recreation, Town Square Park, and another for passive recreation, Steamboat Park, along the St. Croix River. Both parks are located in the Old Village.

Steamboat Park lies mostly in the floodplain. and is approximately thirty (30) acres in size. It serves as a sanctuary for many birds and various kinds of wildlife. It is one of the few locations on the lower St. Croix River that is not readily accessible for large boat traffic. Recreation is limited to passive recreation, such as picnicking, walking, swimming, bird and wildlife viewing.

Town Square Park is a more active site. The park provides space for basketball, baseball, picnicking, music concerts, skating and group activities. There is playground equipment, a band shell, and a picnic shelter in the park, as well as restroom facilities. Town Square Park is the focal point of many special events.

Over the course of many years, the City has acquired a number of other parcels throughout the city of Afton with the potential to develop into local parks. These public lands were acquired in conjunction with the approval of major subdivisions over the course of several decades and remain undeveloped. In all, there are 53.44 acres of designated park land available for public use.

Community and regional parks (Afton State Park, Lucy Winton Bell Athletic Fields, Lake Elmo Regional Park Reserve, St. Croix Bluffs Regional Park, and Cottage Grove Ravine Regional Park) also provide a variety of different types of recreation to Afton residents.

Rinta Community Garden was created in 2012. The city of Afton received a grant from the Lower St. Croix Valley Community Foundation. These funds were used to remove trees and shrubs on approximately 1 acre of dedicated park land. The garden area was plowed and tilled. There are 21 garden plots on the property as well as compost bins, a garden shed with rain barrels to catch runoff from the shed's roof. Gardeners are primarily from the Lower St. Croix Valley, although a few come from Woodbury, Oakdale and St. Paul.

Two biking/hiking trails pass through the City. One trail follows St. Croix Trail South and extends from the northern edge of the Old Village to Interstate 94. The other, Afton Bluffs Regional Trail, is designated along County Road 18 running east and west, and is not separated from the roadway.

The planned St. Croix Valley Regional Trail will parallel the St. Croix River, and will connect Point Douglas County Park, Carpenter Nature Center, St. Croix Bluffs Regional Park, Afton State Park and the proposed Afton Bluffs Regional Trail. The St. Croix Valley Regional Trail will be aligned parallel and in close proximity to the St. Croix River.

The City seeks to protect a number of significant natural features within its boundaries. These include Trout Brook, Valley Creek and its North Branch, Bissell's Mounds and Kelle's Coulee. Bissell's Mounds in particular are unique to Washington County and are a recognized landmark in the City. Other natural features that are determined to be either unique or geologically sensitive will be preserved as the property around them is developed.

Afton State Park is located south of Afton and a portion of the park (787 acres) is located within the City's boundaries. The park was authorized by legislation in 1969 and was opened to the public in 1982. The terrain of the park is defined by a glacial moraine cut by deep ravines running into the St. Croix River. To Afton's residents, the state park offers many recreational amenities, including: backpack camping, swimming, hiking, fishing, cross country skiing, a prairie landscape, bird watching, and animal sighting. Some of the animals the park offers a home to include hawks, bluebirds, meadowlarks, deer, fox, badgers, turkeys, thirteen-lined ground squirrels, and gray and fox squirrels. Afton State Park is also home to an array of natural vegetation. It contains a combination of oak savannah and woodlands. Park wildflowers include woodland ephemerals in the spring, butterfly weed and puccoons in the summer, and sunflowers and blazing star in the fall.

Belwin Conservancy also holds considerable land within Afton under a conservation easement with the Minnesota Land Trust. The Belwin land provides a substantial open space amenity for adjacent land uses, and makes a major contribution to the protection of natural resources, and to the City's rural countryside character.

Parks and Open Space Goals, Policies and Strategies

The City of Afton establishes the following parks and open space goals:

1. Acquire and Preserve adequate amounts of open space to maintain a rural atmosphere (Afton's 2012 Park Plan).
2. Obtain and maintain designated open spaces to provide for wildlife habitat and migration.
3. Reconnect Afton's historical linkages to the St. Croix River.
4. Provide expanded access to the City docks to all residents.
5. Provide safe areas to ride bicycles within the City.
6. Provide safe areas to ride horses within the City.
7. Provide pedestrian friendly means of enjoying Afton's scenic views, wildlife, and connections to the St. Croix River.
8. Preserve locally important water resources, natural and scenic features.
9. Periodically identify the recreational needs of Afton citizens and evaluate ways to meet them.
10. Consider using the Afton Bluffs Regional Trail to create an east-west connection from Afton's Old Village to the City of Woodbury.
11. Manage all City owned or controlled land to maintain or restore to naturally occurring species of plants and trees plus those necessary to anticipate climate change.
12. Manage all City owned or controlled land to prevent erosion, to recharge groundwater and to increase carbon storage.

The City of Afton establishes the following parks and open space policies:

1. Preserve open spaces and natural resources for passive use and create non-motorized trails through direct purchase, subdivision, scenic and/or conservation easements and other means to include the seeking of grants and the use of matching funds when they are available, but not the use of eminent domain.
2. Maintain central community places.
3. Maintain safe environments for children to play and for the community to gather.
4. Maintain designated open spaces to provide for wildlife habitat and migration.
5. Work cooperatively with Washington County, the Belwin Conservancy, the Science Museum of Minnesota, and other -public and private entities to preserve sensitive lands and open space.
6. Develop a forestry plan for all park and open space land to enhance water quality.
7. Develop a park plan for the five small parcels obtained by the City through park dedication.

The City of Afton establishes the following parks and open space strategies:

1. Develop signage and pedestrian friendly connections to the St. Croix River.
2. Protect Steamboat Park as a nature preserve and passive use area.
3. Develop a long term plan to obtain additional city owned land in areas identified as having unique environmental value, ecological significance or fragile geological attributes. Significant weight should be given to highly ranked areas identified on Afton's Natural Resources Inventory.
4. Develop a forestry plan to identify plant and tree species native to Afton and hardy in projected climate conditions.
5. Develop a long term plan to pay for acquisition and development of Afton's parks and open spaces.

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SOLID WASTE PLAN

Solid Waste Goals and Policy

The City of Afton establishes the following solid waste goals:

1. Manage waste in a manner that will protect the environment and public health.
2. Manage waste to minimize land filling and incineration.
 - a. Emphasize less waste generation.
 - b. Increase waste reuse (composting) and source separating of recyclable materials.
3. Routinely report to residents results of recycling and waste reduction with total volumes and associated cost benefits.
4. Educate residents and businesses by sending consistent messages about the importance and value of waste management both economically and environmentally.
5. Evaluate the value and relative success of mandatory or voluntary participation.

The City of Afton establishes the following solid waste policy:

1. Waste reduction and reuse of resources.
2. Waste separation and recycling.
3. Promote resource conservation and recovery.
4. Promote composting of yard waste and food waste.
5. Provide for trash hauling and recycling.
6. Enforcement of illegal burning or dumping of trash.
7. Routinely report to residents results of recycling and waste reduction efforts with total volumes and associated cost benefits.
8. Explore avenues to encourage residents and businesses to reduce solid waste by providing educational material for best present and future practices.

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CITY GOVERNANCE PLAN

The City provides services consistent with those provided in small rural communities, including general street maintenance, parks and recreation facilities, police service, fire protection, building inspection services and general assistance at City Hall. These services have typically been managed from City Hall by a city administrator and small staff.

The City of Afton owns five public buildings located on three parcels of property. The Afton Village Hall, leased to the Afton Historical Society and City Garage are located on Lots 1, 2, and 3 of Block 8 in the Old Village. The Town Hall (leased) and Garage are located in the NW quarter of the SW quarter of Section 10, on Stagecoach Trail South. The City Hall and a new city garage located next to city hall is located on Lots 2, 3, 4, 5, and 6 of Block 11 of the Old Village. The City also owns docks that are leased to a private operator.

Police protection is provided through a contract with the Washington County Sheriff's Department. As the city grows the cost of police protection may increase, and the provision of these services should be a consideration as new developments are proposed. Fire, ambulance, and rescue services are provided by way of a joint powers agreement among the five Lower St. Croix Fire Protection District cities with a fire station located in Lake St. Croix Beach. There are no current plans to add additional public facilities.

City Governance Goals, Policies and Strategies

The City of Afton establishes the following public facilities goals:

1. Maintain a small and efficient government.
2. Properly maintain public facilities.
3. Encourage a “pay-as-you-go” approach to maintaining public facilities and infrastructure.
4. Public subsidy for development, in the form of tax breaks such as Tax Increment Financing, shall be discouraged by the City of Afton.

The City of Afton established the following public facilities policies:

1. The City of Afton will comply with all FAA and Met Council Aeronautic Safety Standards regarding the height of structures and any regulations that pertain to airspace safety and electronic interference over the City of Afton.
2. Comply with all state and federal mandates.
3. City property is to be leased at market value.
4. The City Code shall be properly maintained so that current version is annually provided to all elected and appointed officials.
5. Continue utilizing and updating the Capital Improvements Plan and long-range planning process for maintenance and improvement of roads and other municipal infrastructure.

The City of Afton will seek to implement the following strategies:

1. Institute a budgeting process that annually takes a long-term examination of the City's finances.

SYSTEM STATEMENT COMPATIBILITY

The Metropolitan Council has issued a system statement for the City of Afton, which indicates specific issues that must be addressed by the Comprehensive Plan before the Plan is considered complete by the Metropolitan Council. The City of Afton seeks to comply with all aspects of the system statement and has done so as per the following:

1. **Population, Housing, and Employment Forecasts:** The Metropolitan Council (Met Council) provides population, housing and employment forecasts for the City of Afton until the year 2040. These are required to be part of the plan update and are cited in Appendix B - Demographics Information of the Comprehensive Plan.
2. **Density and Land Use Classification:** The Met Council classifies the geographic area that the city of Afton is located in as "diversified rural" and partially "agricultural". Diversified rural areas include a mix of large-lot residential and clustered housing with agricultural and other uses. Density in diversified rural areas must be no greater than 1 housing unit per 10 acres. Agricultural areas are planned and zoned by local communities to maintain agriculture as the primary long-term land use. In Afton the density of areas zoned agricultural may not exceed three units per quarter-quarter section, except in the case of Preservation and Land Conservation Developments, in which case the density may be increased up to four units per quarter-quarter section.

This plan identifies policies, in the Housing and Land Use Action Plan, that will maintain an overall development density within the parameters required in the system statement.

3. **Aviation Plan and Facilities:** The system statement requires that the City of Afton must include airspace protection in its comprehensive plan. The protection is for potential hazards to air navigation including electronic interference. Airspace protection should be included in local codes/ordinances to control height of structures, especially when conditional use permits would apply. The comprehensive plan should include policy/text on notification to the FAA as defined under code of federal regulations CFR-Part 77, using the FAA Form 7460-1 "notice of proposed construction or alteration."

There are no public or private airfield facilities within the City of Afton. Furthermore, public and private airfields and heliports are not allowed within the City of Afton. Language has been added to the Public Facilities Action Plan to reflect Afton's desire to follow all FAA and Met Council Aeronautics Safety Standards in regards to airspace safety in the City of Afton.

4. **Sewage Treatment:** The system statement requires that the City of Afton incorporate current MPCA regulations as part of a program for managing individual cluster, and large sewer systems in the local comprehensive plan and implement the standards in issuing permits. An overview of Afton’s management program must be included in the community’s local comprehensive plan update.

Afton should include in the sewer element of its comprehensive plan the conditions under which private treatment plants would be allowed. The use of private wastewater treatment plants must be consistent and compatible with the long-term regional wastewater system plan.

Subsurface and cluster septic treatment systems are regulated by Afton City Code which adopted Washington County’s septic ordinance by reference and by contract with Washington County to perform permitting and inspections (Appendix J).

5. **Watershed Management:** The system statement requires that a local surface water management plan should be prepared once a watershed plan for the area has been approved. The local surface water management plan must be submitted to both the water management organization(s) within whose watershed the community is located and to the Metropolitan Council for its review.

Afton is required to complete a local surface water management plan. The plan will be submitted to the Met Council for its review concurrent with the review by the watershed management organizations.

6. **Trail Connections:** The system statement indicates that a proposed regional trail following the St. Croix River (St. Croix River Regional Trail) and a planned trail (Afton Bluffs Trail) will be located within or traverse across the City of Afton. These trail alignments are acknowledged in the Parks and Recreation Action Plan.

IMPLEMENTATION PLAN

The City has adopted and does enforce the following ordinances, among others. The ordinances and official controls listed in this section will continue to be enforced in order to implement this Plan.

1. The Zoning Ordinance, as amended from time to time and incorporated by reference herein, implements the primary elements of this Plan by establishing the type, location, and intensity of uses throughout the city as prescribed by this Plan.
2. The Shoreland Management Ordinance, as amended from time to time and incorporated by reference herein, protects wetlands, water bodies and water courses throughout the City as prescribed by this Plan.
3. The Floodplain Ordinance, as amended from time to time and incorporated by reference herein, protects man-made development from floodwaters and the floodplain areas that carry and discharge regional floods by limiting development in those floodplains and floodways in the City as prescribed by this Plan.
4. The Sanitary Sewer Disposal Ordinance, as amended from time to time and incorporated by reference herein, governs the installation, inspection, and maintenance of septic systems as prescribed by this Plan. Further, the City issues septic system permits, inspects installation of all septic systems, reviews soil tests for subdivisions, issues building permits after the City has issued any required zoning use permit, and provides consultant planning services. The City is currently undergoing a Sanitary Sewer code revision to address changes in the Historic Village Sewage Treatment Service Area
5. The Subdivision Ordinance, as amended from time to time and incorporated by reference herein, regulates the division of all property as prescribed by this Plan.
6. The Mining Ordinance, as amended from time to time and incorporated by reference herein, establishes uniform performance standards for sand and gravel extraction and for land reclamation as prescribed by this Plan.
7. The Lower St. Croix River Bluffland and Shoreland Management Ordinance, as amended from time to time and incorporated by reference herein, protects the natural environment and aesthetics of this wild and scenic river as prescribed by this Plan.
8. The International Building Code, as amended from time to time and incorporated by reference herein, protects the safety, health and welfare of residents through regulating standards of construction.

In addition to these ordinances, the city utilizes and depends on the following agencies for reviews of proposed developments and advice on ordinance revisions:

1. Watershed and Water Management Organizations review all proposals within the watershed and recommend permit conditions for building within four different watershed districts within City limits.
2. Minnesota Department of Natural Resources reviews all developments along the St. Croix River, other public water bodies and floodplains.
3. U.S. Army Corps of Engineers reviews and approves alterations of public water bodies.

4. Minnesota Pollution Control Agency reviews pollution problems.
5. Metropolitan Council reviews and approves the comprehensive development plan.
6. Lower St. Croix Valley Volunteer Fire Department recommends ordinances necessary to protect the health and safety of Afton residents, and comments on development proposals.
7. Washington County Soil and Water Conservation District reviews proposed projects and offers recommendations on slope, wetland, and fragile lands protection.
8. Minnesota Department of Transportation and Washington County Highway Department maintain and develop state and county roads.

In 1997, the City amended and recodified its ordinances to eliminate any inconsistencies and to assure conformance with the Comprehensive Plan. In addition to enforcing the existing ordinances that will implement this Plan, the city will update and revise pertinent ordinances in order to implement all of the policies contained in this Plan. As a general overview, it is the City's intent to amend the ordinances and policies in conformance with this plan within required timeframes.

While this plan contains much of the language, intent and purpose of the previous version of the City's Comprehensive Plan, it has been formatted quite differently. The plan is now organized into sections of background followed by topic specific goals. It is the intention of the City of Afton to work, over time, on developing policies and strategies for implementing these goals. When adopted, these would require an amendment to the plan, which would need to follow required procedures for making plan amendments.

CAPITAL IMPROVEMENTS PROGRAM

The City has limited funding for capital improvements and seeks to minimize debt. As such, the City needs to correlate the tax base with the long-term capital needs of the community, including:

1. Re-pave, reconstruct and sealcoat streets.
2. Repair bridges, streets and culverts as required.
3. Use Park Dedication Funds to upgrade existing park and trail facilities and to purchase land and/or easements to add to future park and trail infrastructure.
4. Resolve surface water erosion and flooding issues.

The City has in-place a pay-as-you-go funding plan for the long term maintenance and improvement of the City Streets. The pay-as-you-go funding plan required substantial tax levy increases over several years, and continues to require an on-going tax levy for street improvements. The goal of the funding plan is to provide a sufficient level of funding to address current and future street improvement needs without the need for bonding, special assessments, or extraordinary tax increases. A detailed Capital Improvement Program (CIP outlining cost estimates, income sources, and payment schedules will be attached to this plan at a future date.) The CIP will be reviewed and revised annually. Sound financial planning will be utilized so as not to significantly increase the tax burden on individual property owners in fulfilling the capital improvement plan.

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List of Appendices

Appendix A: Terms and Definitions

Appendix B: Resource References

Appendix C: Soils Information

Appendix D: Parks and Open Spaces

Appendix E: Surface Water Management Plan

Appendix F: 2007 Community Survey

Appendix G: Maps

Appendix H: Individual Sewage Treatment System Inspection Services Agreement & Ordinances

Appendix I: Afton Flora and Fauna

Appendix J: Public Involvement in Comprehensive Plan Process

**CITY OF AFTON
DRAFT 2018-2040 COMPREHENSIVE PLAN
APPENDICES**

Appendix A- Terms and Definitions

The following terms are used in the Afton Comprehensive Plan and are defined by the City of Afton as follows:

Baby Boomer- A person born in the United States between 1946 and 1965.

Collector Street – A street that functions to collect traffic from local streets and move it to minor arterials and other collectors. Collector systems provide access to commercial, industrial and high-density residential development. Equal emphasis is given to mobility and land access.

Empty Nester- A parent whose child or children have reached adulthood and moved away from home.

Local Street – A street that functions to provide access to land within neighborhoods (95 percent or more) rather than carry through traffic (5 percent or less).

Minor Arterials – A street or highway that connects adjacent sub-regions and activity centers within sub-regions. Minor arterials are primarily oriented toward the provision of sub-metropolitan mobility (70 percent or more) and any land access (30 percent or less) should be oriented to public streets and major traffic generators rather than closely spaced driveways onto the street.

Principle Arterial – A street highway or interstate freeway which provides for ninety- to ninety-five percent high speed travel and five- to ten-percent direct land accesses. Such highways should be designed as fully controlled access facilities. The emphasis on these roads is on mobility as opposed to land access. They are used to connect the sub-regions of the metropolitan center. They also connect the Metropolitan Area to outside centers.

Appendix B- Resource References

Best Management Practices Resources

- USDA natural Resources Conservation Service, Technical Guide Minnesota;
- Construction Site Erosion and Sediment Control Planning Handbook;
- Protecting Water Quality in Urban Areas, Best Management practice for Minnesota;
- Agriculture and Water Quality, Best Management for Minnesota.

Appendix C- Soils Information

Washington County Soil Conservation District issued a soil survey in April 1980 and the different soil types have been categorized as to their suitability to accommodate on-site sewage treatment systems and to support a rural atmosphere, farming, groundwater protection, wildlife habitat, and biological diversity. It is an inventory of the soils found in the City and indicates the type of soil, slope gradient, suitability of the soils to support certain uses and the degree and kind of limitation of each soil type for certain uses.

Soils suitable for the installation of on-site sewage treatment systems:

- Ostrander
- Hubbard
- Sparta
- Emmert
- Antigo
- Hayden
- Burkhardt
- Santiago
- Chetek
- Zimmerman
- Anoka
- Braham
- Gotham
- Grays
- Richwood
- Lindstrom
- Rosholt
- Dickman
- Campia
- Waukegan
- Mahtomedi
- Baytown

Some of the city consists of prime agricultural soils (Class I and II soils) and soils of statewide importance. Agricultural land is determined by many factors, not only by soil type. Therefore, the following criteria were used to categorize agricultural lands:

Prime agricultural soils (Class I and II soils) and soils of statewide importance:

Class I:

- Ostrander
- Nessel
- Richwood
- Crystal Lake

Class II:

- Ostrander
- Antigo
- Webster
- Brill
- Hayden
- Santiago
- Ronneby
- Grays
- Freeon
- Baytown
- Otter
- Duluth
- Paskin
- Ripon
- Freer
- Richwood
- Whalan
- Kingsley
- Campia
- Waukegan
- Comstock
- Barronette
- Waukegan Variant
- Barronette

Soils of Statewide Importance:

- Ostrander
- Antigo
- Bluffton
- Copaston
- Dundas
- Hayden
- Burkhardt
- Chetek
- Anoka
- Braham
- Blomford
- Gale
- Rosholt
- Dickman
- Whalan
- Kingsley
- DeMontreville
- Baytown

- Channahon
- Duluth
- Ripon
- Algansee

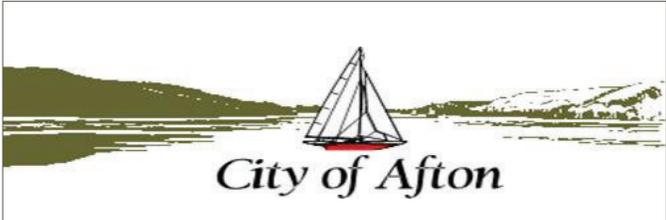
When the soils map is overlaid with the existing land use map it appears that many of the homes in Afton are located in areas where there is a predominance of soils which are not most suitable for installation of septic systems. The general soils circumstances depicted by the map cannot be relied upon alone in determining whether a building site has suitable locations for the installation of a septic system. An area shown on the map as containing generally suitable soils must be tested for a septic location, and vice versa, any area shown as unacceptable may by testing be proven to have an appropriate site for a septic system.

Appendix D - Table of Afton Parks and Open Spaces

PARKS AND OPEN SPACES				
NAME	SIZE	OWNERSHIP	TYPE	FACILITY
Aftonwood	7.74 acres	City	Open Space	Conservancy with Trail
Collin Green	2.8 acres	City	Open Space	Conservancy with Trail
Meadow Ridge	10.4 acres	City	Neighborhood	Currently Open Space
Remus	5 acres	City	Neighborhood	Passive Uses until 2026 with Trail
Rinta	3.25 acres	City	Neighborhood	Currently Open Space
Steamboat Park	27 acres	City	Community	Minimum development: Trails, picnic, fishing, swimming, non-motorized small craft
Town Square Park	2 acres	City	Neighborhood	Picnic, Basketball, Tennis, Baseball, Volleyball, Playground
CITY SUBTOTAL	53.39 acres	(2 acres developed for active recreation and the remainder undeveloped)		
Afton State Park	787 acres	State	Regional	Trails, Picnics, Swimming
Bowles Mill Monument	.5 acres	State	Historical Site	Monument with small parking lot
STATE SUBTOTAL	787.5 acres	(plus 715 acres of Afton State Park located in Denmark Township to the south, surrounding Afton Alps and Golf Course, a very active recreation area)		
Afton Creek Preserve**	110 acres	Private	Quasi-Public Open Space	Conservancy with trail
Belwin Conservancy*	1400 acres	Non-Profit	Quasi-Public	Outdoor Educational Center and Land Trust, Private, and trails open to the public

Cedar Bluff**	70 acres	Private	Quasi-Public Open Space	Conservancy with trail
PRIVATE & NON-PROFIT SUBTOTAL	1,580 acres	*600 acres are protected by MN Land Trust. ** Protected by conservation easement held by the MN Land Trust.		
TOTAL	2,420.89 acres	Located within Afton City Limits and about 13% of the total acreage of the City of Afton (2240/16896), with an increase of 28% in acreage since 1990 (predominately quasi-public Land Trust Acquisitions)		

Appendix E: Surface Water Management Plan



SURFACE WATER MANAGEMENT PLAN

MAY 2019

Prepared for:
City of Afton
3033 St Croix Trail S
PO Box 219
Afton, MN 55001

WSB PROJECT NO.011680-000



Surface Water Management Plan

City of Afton

January 2019

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I. PURPOSE AND EXECUTIVE SUMMARY

Minnesota Statutes 103B.235 requires that the City of Afton prepare a local water management plan consistent with the requirements of Minnesota Statutes 103B, the Metropolitan Land Planning Act and Minnesota Rules Chapter 8410.

The City of Afton's local water management plan is to meet statutory and state rule requirements, to guide the City in conserving, protecting, and managing its surface water resources, and to detail how these goals will be accomplished.

This plan is to be consistent with the adopted plans of the three watershed management organizations having jurisdiction within the City (Figure 1). These include:

- The Valley Branch Watershed District (VBWD)
- The Middle St. Croix Watershed Management Organization (MSCWMO)
- The South Washington Watershed District (SWWD)

A majority of the City, 21 square miles (13,696 acres), is within the VBWD. With the redistribution of the LSCWMO, Kelle's Creek watershed is now part of VBWD.

The next largest section of City is within the SWWD. A 5-square mile portion (3,096 acres) of the western boundary of the City, adjacent to the City of Woodbury, lies within the SWWD. This represents a small percentage of the land area of the SWWD which was recently expanded within Afton to include the Trout Brook watershed.

A 0.2 square mile portion (115 acres) of the northeastern corner of the City, adjacent to the City of Lakeland, lies within the MSCWMO. This represents about one (1) percent of the land area of the MSCWMO and is located in the area of Croixview Drive.

II. WATER RESOURCE MANAGEMENT RELATED AGREEMENTS

The Valley Branch Watershed District (VBWD) adopted their [Watershed Management Plan](#) in 2015 and the Middle St. Croix Watershed Management Organization (MSCWMO) adopted their [Watershed Management Plan Standards](#) in 2015. These documents include rules/policies and regulations to ensure that development and other activities protect surface water resources. The VBWD currently implements a project review and permit program. Projects in the City meeting specific criteria established in the VBWD Rules must obtain a permit issued by the VBWD. The MSCWMO does not have a permitting program. As a joint powers board and WMO, they receive and review development proposals and issue comments to the City of Afton. These comments would then be included in the City's permitting process and enforced by the City of Afton.

The South Washington Watershed District (SWWD) adopted a [Watershed Management Plan](#) in 2016. They use a Standards Manual (located on their web site) to guide and regulate activity within the District. The District adopted a set of [District Rules](#) in 2011 after LSCWMO dissolved, and [updated](#) them in 2015 in accordance with Atlas 14 rainfall rates. The SWWD has an established permitting program in place for the City Afton to use. They can issue permits and enforce District standards through this process.

The City supports the regulatory efforts of all three watershed districts and will continue to work with the VBWD, SWWD, and MSCWMO in achieving the goals stated in their respective plans. With the adoption of this plan, the City adopts the plans, rules, and standards of the three watershed districts within the City by reference as the Surface Water Management rules and standards for the City. The City of Afton will continue to rely on the Watershed Districts to enforce surface water management regulations within the community under this Comprehensive Plan. The City's Engineer will review development proposals and provide comments on the proposals for consideration of the Districts in their reviews. The City will require the applicants for development to obtain permits from the appropriate Watershed District and include recommendations from the Districts as provided for development reviews.

The City enforces and administers zoning and subdivision regulations which, when implemented in cooperation with the watershed districts, are part of the overall effort to protect and manage surface waters within the City. The City will work with the Districts to identify the process that will govern development reviews.

III. LAND AND WATER RESOURCES INVENTORY

Surface Water System

The City is primarily low density residential and a majority of the surface water infiltrates and drains to wetlands, ponds, and creeks. In the Old Village area of Afton there are smaller lots, businesses, and marinas. There is storm sewer in this area on County Roads (21 and 18). The water from these systems outlets into an infiltration swale and eventually into the St. Croix River. Beginning in Summer of 2017, improvements were made to roadways and utilities along St. Croix Trail and surrounding streets in the Old Village Area. Additional storm sewer and stormwater management BMPs were constructed to capture and treat stormwater before it flows into the St. Croix River.

The City streets generally have a rural profile with ditches or swales that carry storm water. The City has started to map their culverts and has worked with the County to include their storm sewer systems within the City (Figure 2). This map is included in **Appendix A**. The City is continuing to maintain culverts and outfalls and has a maintenance program for its stormwater facilities.

Washington County and the City completed a stormwater management plan (SWMP) for the watershed tributary to CR 21 and the Old Village area of Afton in 2011. The study includes improvement options using NPDES, VBWD rules and phosphorus reduction requirements as laid out in the [Lake St. Croix TMDL](#).

In the CR 21 study, drainage areas in Downtown Afton, near County Road 21 were delineated to establish subwatershed boundaries. Subwatershed delineation was accomplished by utilizing contour mapping, aerial photography, existing drainage as-builts, and field visits. A HydroCAD model of the study area was developed to estimate peak runoff flows and volumes along with 2, 10, and 100-year high water levels from the subwatersheds discharging to County Road 21. The HydroCAD model was also used to size stormwater features to meet the drainage needs of the study area. P8 water quality modeling of the stormwater BMPs was completed to estimate TP and TSS removals.

Improvements were constructed in the Afton Downton Village in 2016 to 2018. The Afton Downton Village Improvements Project consisted of reconstruction of various roadways (County Road 21 and local roads) within the city of Afton, replacement or installation of utilities (e.g., stormwater and sanitary sewer), construction of a Wastewater Treatment Plant, and the reconstruction of the levee adjacent to the St. Croix River. The project included the construction of a storm sewer system to collect and convey stormwater to two new stormwater ponds to treat the water before it enters the St. Croix River. The project also contains three rain gardens at the foot of the river bluff west of County Road 21 to capture and treat stormwater drainage from the bluff, and a two-celled bio-filtration basin in the park area on the east side of St. Croix Trail and south of 36th Street to capture and infiltrate stormwater before it reaches the St. Croix River.

Surface Water Resources

1. Valley Branch Watershed District

The Valley Branch Watershed District (VBWD) drains to the St. Croix River, and therefore is within the St. Croix watershed. Water south of Interstate 94 in the VBWD generally flows to Valley Creek, and then into the St. Croix River.

A majority of the City of Afton's land area lies within the Valley Branch Watershed District which is broken down into numerous Major Subwatersheds. The major subwatersheds drain primarily into Valley Creek as well as landlocked basins which include lakes or wetlands. The major subwatershed districts within the VBWD that are located within the City of Afton include the Lake Edith, Fahlstrom Pond, Main Stem Valley (Branch) Creek, North Fork Valley (Branch) Creek, and South Fork Valley (Branch) Creek Subwatersheds. Figure 3 shows the surface water resources.

a. Fahlstrom Pond

The portion of land in Afton that lies in Fahlstrom Pond watershed primarily consists of rural residential and agricultural land uses. Construction of Interstate 94 diverted approximately 1,000 acres of the Fahlstrom Pond tributary area into the Interstate 94 drainage system.

The VBWD classified and will manage Fahlstrom Pond as a Low Priority water body (This is consistent with the VBWD 1995 Water Management Plan, which classified Fahlstrom Pond as a Level V (wetland) waterbody). The pond has no public access and is primarily used for passive aesthetic viewing by a small number of adjacent property owners.

b. Lake Edith

Also known as May's Lake, Lake Edith is between Indian Trail South and Stagecoach Trail South in the City of Afton. Almost half of the Lake Edith Tributary area drains to a large wetland (Metcalf Marsh) approximately $\frac{3}{4}$ mile upstream (west) of Lake Edith. Lake Edith overflows to the south to the north fork of Valley Creek, through a 24-inch diameter culvert under Indian Trail. The City of Afton's shoreland ordinance allows only non-motorized craft on the lake, with the exception of small electric motors.

The VBWD will manage Lake Edith as a High Priority water body. Lake Edith has excellent water quality and drains directly to an outstanding resource value water (Valley Creek).

c. Valley Creek

The majority of the Valley Creek watershed is located in the City of Afton. The creek is comprised of two major branches. The north branch of the creek flows 3.4 miles from Lake Edith to the main stem. The south branch flows 2.5 miles from the point where the creek becomes perennial-flowing (water flowing year around) to the main stem. The north and south branch converge to form the main stem 1.8 miles above the mouth of the creek near the intersection of Valley Creek and Stagecoach Trail.

The Minnesota Department of Natural Resources (DNR) has designated the perennial reaches of Valley Creek as a designated trout stream. The cold, relatively clean waters of Valley Creek are suitable for trout, and trout have naturally reproduced in the creek throughout recorded history. Currently, surface water quality in the Valley Creek watershed is good. This is largely due to the underdeveloped nature of the watershed. Land use is mainly agricultural and low-density residential, resulting in low levels of impervious coverage and animal waste.

VBWD has classified Valley Creek as a high-priority waterbody. In 1973, VBWD first began collecting water quality chemistry data from the creek. The VBWD's management strategy for Valley Creek and its tributary watershed is described in Section 5.20 of the VBWD 2015 Watershed Management Plan.

The DNR has recommended that the VBWD manage the tributary watershed in order to maintain its current dissolved oxygen concentration, avoid increases in water temperature, and avoid increased discharge.

d. Kelle's Creek (Kelle's Coulee)

The Creek is regarded as a high-quality spring creek with rare plants, animals, and natural communities in its lower reach. This perennial creek is within a deep ravine that runs through the City of Afton before outletting to the St. Croix. Streambank erosion is prevalent. Kelle's Creek is another very significant perennial stream in the VBWD. The Minnesota Pollution Control Agency included Kelle's Creek on the 2018 MPCA Impaired Waters List for E. coli. VBWD completed TMDL and WRAPS reports in February 2016 to identify implementation items for Kelle's Creek. The VBWD will manage Kelle's Creek as a High Priority water body.

2. Middle St. Croix Watershed

The total land area within Afton City limits that lie in the Middle St. Croix Watershed is approximately 115 acres, or 1% of the total land in the watershed. The relatively small portion of land contains two subwatersheds: I-94/West Lakeland and South Unit/Afton. The watershed is unique in that each of many

small, parallel subwatersheds flows directly into the St. Croix River, whereas other watersheds in the county generally have one major drainage basin with a headwaters and outlet.

In 2007, the City of Afton participated in a stabilization project to minimize erosion within the Afton-Lakeland Gully. Otherwise Afton does not have significant surface waters that lie in the MSCWMO.

3. South Washington Watershed District

Afton also lies within the South Washington Watershed District (SWWD). Approximately 400 acres of the City drains through SWWD's Northern Watershed and approximately 2600 acres drains through Trout Brook.

a. Trout Brook

Passing through Afton Alps and Afton State Park before discharging into the St. Croix River, Trout Brook has been classified by the DNR as a protected waterbody. The Minnesota Pollution Control Agency included Trout Brook on the 2018 MPCA Impaired Waters List for E. coli. The brook has seeps and spring discharges typical along the stream channel and its tributaries. It is one of the most significant perennial streams in the watershed.

4. St. Croix River

The St. Croix River and Lake St. Croix border the City of Afton. This portion of the River is more closely related to a lake environment than a river due to its width and slow current. The St. Croix River is currently classified as an Outstanding Resource Value Water – Restricted. The restricted classification stems from its very high recreational and aesthetic value. St. Croix River and Lake St. Croix are both included in the 2018 MPCA Impaired Waters List for excess nutrients. The Lower St. Croix River was designated as a National Wild & Scenic Riverway by Congress in 1972. The MPCA completed a [TMDL for excess nutrients in Lake St. Croix](#) in 2012.

DNR Public Waters

There are numerous valuable DNR designated public waters within the City of Afton. These waterbodies include Lake St. Croix, Edith Lake, and US Lock & Dam #3 Pool. Other public waters in the City include portions of Valley Branch Stream and Trout Brook, as well as nine wetlands. Table A lists the DNR public waters within the City.

Table A
Department of Natural Resources, Division of Waters List of Public Waters and Wetlands within the City of Afton

Number	Name
82-1 P	Lake St. Croix
82-4 P	Lake Edith
82-5	Fahlstrom Pond
82-6	Unnamed Wetland
82-7	Unnamed Wetland
82-8	Unnamed Wetland
82-464	Unnamed Wetland
82-465	Unnamed Wetland
82-466	Unnamed Wetland
82-467	Unnamed Wetland
82-468	Unnamed Wetland
	Valley Branch (Section 9-23)
	Kelle's Creek (Section 28-23)
	Trout Brook (Section 31)

Priority or Outstanding Water Resources

The VBWD has determined that it will manage Lake Edith, Kelle's Creek and Valley Creek as High Priority waterbodies. The St. Croix River is currently classified as an Outstanding Resource Value Water – Restricted by the MnDNR.

There are many other important, protected water bodies listed in Figure 3 in Appendix A of this Plan.

Upland Resources

In 2017, Washington County partnered with the Washington Conservation District to update the Minnesota Land Cover Classification System (MLCCS) for the county. The vegetative cover of the City consists mainly of deciduous forests, woodlands, grasslands, and several areas of planted conifers. Much of the pre-settlement vegetation has been converted to agricultural land; some of which has now been developed for industrial, commercial, and residential uses. Figure 4 shows natural resource features within the City.

The average quality natural areas in the City of Afton are dominated by mesic oak forests. The central portion of Afton consists of high quality oak woodlands, lowland hardwood forests, and maple-basswood forests.

The eastern portion of Afton consists mainly of floodplain forests containing silver maple, cottonwood, green ash, and American elm.

The City also contains many unique and rare natural features such as bedrock bluff prairies, sand-gravel prairies, a trout stream, rich fens, and the St. Croix River.

The *Environmental Resources* section of the [Comprehensive Plan](#) for the City of Afton contains additional information on upland resources.

Groundwater Resources and Issues

Residents of the City of Afton obtain their drinking water from groundwater through private wells. This makes it especially important to ensure that these aquifers are uncontaminated, protected from future contamination and provide adequate supplies. In 2001, the City of Afton conducted a [Water Resource Evaluation](#). In 2003, Afton worked along with the county, other communities on [the 2003 Legislative Commission on Minnesota Resources](#) (LCMR) grant for determining the long-term sustainability of groundwater in the Woodbury/Afton area. Washington County has known areas of [groundwater contamination](#) including VOC contamination, PFC contamination in four communities and elevated nitrate levels.

In 2014, Washington County published the [Washington County Groundwater Plan 2014-2024](#) to: “Manage the quality and quantity of groundwater in Washington County to protect health and ensure sufficient supplies of clean water to support human uses and natural ecosystems.” To achieve this planning effort, the county seeks support from the community in order to protect and preserve this valuable resource.

There is more information in the groundwater section in the [City of Afton Comprehensive Plan](#).

IV. POLICIES AND GOALS

Policy Statement

The City of Afton is committed to a goal of no adverse impact (nondegradation) of the water resources within and adjacent to its jurisdiction. Surface water resources within the City represent a significant asset to the City's residents and to their quality of life and protecting these resources is a high priority of the City.

The City of Afton understands and supports the need for coordination between the City, landowners, the watershed management organizations of which it is a part of, and other local, state, and federal agencies in managing its surface water resources.

Watershed Management Organizations

Surface water resource policies in Afton are managed by the City through ordinances and the three watershed management organizations within the City.

Surface Water Management Goals

Goal 1: The City of Afton is committed to a goal of no adverse impact (nondegradation) of the water resources within and adjacent to its jurisdiction.

Policy: The City will work cooperatively with the VBWD, SWWD and MSCWMO, state and federal agencies, local governments, landowners, and other interested parties to protect local surface waters and ground water for the benefit of current and future generations.

Policy: The City supports the continued enforcement of rules and regulations by the VBWD, SWWD, and MSCWMO within the boundaries of the City of Afton.

Policy: The City will refer development and land alteration projects within the City to the appropriate watershed management organization in accordance with the required procedures and notification requirements for comments and applicable rules, regulations, and permit requirements.

Policy: The City will jointly work with applicable watershed management organizations to identify existing or future flooding, water quality, and natural resource problems.

Policy: The City will continue to enforce and administer DNR shoreland and floodplain ordinances.

Policy: The City will continue to administer regulations relating to ensuring compliance and maintenance of subsurface sewage treatment systems, in cooperation with Washington County.

Policy: The City acknowledges the SWWD's Measures of Success as an annual evaluation tool.

Goal 2: The City of Afton will maintain its Zoning, Subdivision, and other land use regulations in a manner consistent with the rules and requirements of the VBWD, SWWD, and MSCWMO and state agencies.

Policy: The City will review and update, as necessary, its Zoning and Subdivision ordinances and review procedures related to development and alteration of the landscape to reflect the performance standards and requirements set forth in Section 7 of the MSCWMOs 2015 Watershed Management Plan, SWWD District Rules, and Sections 4 of the VBWDs 2015 Watershed Management Plan. These ordinance revisions will take place after the adoption and approval of the City's Comprehensive Plan by the Metropolitan Council.

Goal 3: The City will manage its wetland resources to preserve their natural functions

Policy: The City will conform to the wetland standards, rules and management plans set forth by the SWWD, VBWD, and MSCWMO.

Policy: The City will implement its Zoning and Subdivision ordinances to ensure adequate protection of wetlands and their functions during and after development.

Policy: The City will continue to recognize the VBWD as the permitting authority for the purposes of the Wetland Conservation Act within the boundaries of the VBWDs jurisdiction.

Policy: The City will continue to recognize the SWWD as the permitting authority for the purposes of the Wetland Conservation Act within the boundaries of the SWWDs jurisdiction.

Policy: The City will continue to recognize the Washington Conservation District (WCD) as the permitting authority for the purposes of the Wetland Conservation Act outside of the boundaries of the VBWD and SWWD.

Goal 4: The City will manage and protect its groundwater resources

Policy: While the City does not provide public waters supply, it will cooperate with local watershed management organizations, Washington County, and applicable state agencies in protecting and managing the quantity and quality of groundwater as well, as groundwater recharge areas.

Policy: The City will partner with Washington County and the Department of Health (MDH) to ensure that all unsealed or improperly abandoned wells within the City are properly sealed. Technical requirements for the abandonment of these wells will be in conformance with the MDH Water Well Code and will reference the County's abandoned well sealing cost share program where applicable.

Policy: The City will balance the need for infiltration with the need for protection of vulnerable wellhead protection areas and will promote recharge in areas away from known or potential groundwater contamination. Additional information on protection areas and recharge can be found in the Washington County Groundwater Plan.

Goal 5: The City will manage and protect its lakes.

Policy: The City supports the VBWD's goals and classification system for managing lakes and will work with watershed management organizations in achieving their lake management goals.

Policy: The City will implement its Comprehensive Plan and zoning and subdivision regulations to protect shoreland areas and lake water quality.

Policy: The City will adhere to the stormwater runoff treatment and detention standards and requirements of the VBWD, SWWD, and MSCWMO. Where necessary, the City will amend its zoning and subdivision ordinances to reference or explicitly state these requirements.

Incorporation of MIDS Standards

Prior to 2016, stormwater performance standards did not exist in Afton's current code. In 2016, the city updated its [existing stormwater management ordinances](#) to incorporate standards and policies from the Minimal Impact Design Standards (MIDS) Model Stormwater Ordinance. The MIDS performance standards and Model Ordinance was developed with the help of the Minnesota Pollution Control Agency to create Low Impact Development (LID) standards. LID standards use technologies and best management practices (BMP) to mimic a site's natural hydrology as the land is developed. These standards minimize stormwater runoff and pollution.

V. ASSESSMENT OF PROBLEMS AND CORRECTIVE ACTIONS

The City of Afton has identified the following items for implementation:

1. Routine maintenance of culverts, erosion control, and street sweeping.
2. The Old Village floods from three sources: the St. Croix River, Kelle's Creek, and runoff from the Bluff which damages property as it flows freely through town. The Bluff in Afton is a unique physical feature that is associated with the St. Croix River topography.

The City held a public task force to identify issues and needs within the Old Village. Through that process it was identified that water from the bluff gets into people's basements, causes damage to outdoor structures and City infrastructure. Those living along Kelle's Creek have also had damages due to flooding. These damages are amplified in years when the River floods.

The sources of flooding are integral to each other because the levee blocks the landward flow. Thus, they all need to be addressed to effectively minimize property damages and reduce those costs resulting from reoccurring flood events. The following is proposed to address each source of flooding:

- St. Croix River Flooding– Levee accreditation (pump station, seepage system, and storage basins) and associated work. The City is working on the accreditation process with FEMA now that levee reconstruction is complete. The City is coordinating with the Army Corps to coordinate annual inspections and inclusion in the Non-Federal Levee Program. Inspections and maintenance will be completed consistent with the O&M Manual for the flood protection system.
 - Kelle's Creek Flooding – Improvements along Kelle's Creek were completed with the levee reconstruction improvements to reduce flooding.
 - Bluff Runoff Flooding– Rain gardens were constructed to help reduce erosion and flooding. Ongoing inspections will be completed to determine if future improvements are necessary.
3. Kelle's Creek and Trout Brook have been added to the MPCA Impaired Waters List for E. coli. A TMDL has been complete for Kelle's Creek. The City is working with MPCA to identify solutions to treat sanitary sewage and they are also working on water quality improvements. VBWD recently completed a pilot project upstream to test existing septic systems and provide partial credit for replacement. The City has also amended their ordinance for septic systems to require inspections.

4. Lake St. Croix TMDL the City is identifying options and working on funding sources for meeting the phosphorus reduction goals. The Old Village water quality project will help to meet phosphorus reduction goals for the Lake St. Croix TMDL.
5. Development pressure and its impact on natural resources. The City would like to develop a Natural Resource Conservation Plan, which would include groundwater protection to provide a sustainable and clean drinking water supply.
6. The City incorporates the VBWD, MSCWMO, and SWWD plans by reference and concurs with water quality and quantity related problems, corrective actions to be implemented, and priorities related to these corrective actions.
7. Inspection and maintenance of stormwater ponds and other BMPs that the City is required to maintain. The City has noted the need for a maintenance plan.
8. Lack of inspection and maintenance of privately owned ponds within subdivisions.
9. The City contains numerous large ravines that are in need of maintenance to protection against erosion. The City is interested in pursuing funding opportunities and partnerships with the watershed districts for ongoing maintenance.
10. PFC's have been located in the groundwater to the north of Afton. The City will continue to implement groundwater protection strategies in the Washington County Groundwater Plan.
11. Monitoring for aquatic invasive species and implementing preventative measures in partnership with the watershed districts

A summary of the problems, corrective actions, and priorities identified by the watershed management organizations within or adjacent to the City of Afton are as follows:

Impaired Waters

The City of Afton does not contain any lakes on the current MPCA 303d Impaired Waters List within its boundaries. Kelle's Creek and Trout Brook are impaired for E. coli. The City also has land which discharges to the St. Croix River/Lake St. Croix, which is listed an impaired water for excess nutrients. Figure 5 shows the impaired waterbodies within the City.

Lake St. Croix, the lower 25 miles of the St. Croix Basin between Stillwater, MN and Prescott, WI, was designated an impaired water in 2008 for excess phosphorus. The TMDL will be jointly developed by the Wisconsin Department of Natural Resources (WDNR) and the Minnesota Pollution Control Agency (MPCA) with support from the St. Croix River Water Resources Planning Team; an interagency planning team consisting of federal, state, and local members formed to work together to protect and enhance the water resources in the St. Croix River Basin. The goal developed by the planning team is

a twenty (20%) percent reduction in total phosphorus loading to the River. The CR 21 SWMP includes options to meet these goals for that drainage area.

The City of Afton will cooperate with the relevant agencies and the St. Croix River Water Resources Planning Team once the TMDL is completed and in efforts to implement the TMDL study results.

Saint Croix River

The St. Croix River is the common resource for the watershed management organizations that have jurisdiction in the City of Afton. The river is classified as a National Wild and Scenic River, and is a resource at the national, state, and local levels. Efforts to manage the water quality of the river may impact future land use and development activities within the City of Afton as well as other communities within the St. Croix River Basin.

The St. Croix River Basin Planning Team identified water quality degradation of the St. Croix River as a significant issue. Increased urbanization and agricultural activities in the St. Croix River Watershed are predicted to lead to continued decline in the river's water quality. To prevent this degradation, the St. Croix River Basin Planning Team established a goal to reduce nutrient loading to the St. Croix River Basin by twenty (20%) percent.

The City of Afton will work with the VBWD, SWWD, and MSCWMO to enforce their policies/rules in an effort to protect the quality of the St. Croix River. The City will also work closely with all three watersheds in their efforts to protect and improve the quality of the watersheds. The City will also manage land use through its Zoning and Subdivision ordinances to help protect the St. Croix River and its associated bluffs and natural resources.

Valley Branch Watershed District

The VBWD's 2015 Plan identifies the following significant issues that affect surface waters within the City of Afton:

- Water quality degradation due to agricultural and residential land uses and management.
- Aquatic Invasive Species (AIS) control and management.
- Water quality monitoring and reporting
- Implementation and maintenance of water quality improvement projects
- Collaboration with other entities to reduce pollutant loading and improve water quality

The VBWD has also created Individual Watershed Management Plans for each of its subwatersheds. A listing of the subwatersheds within the City of Afton and a summary of the issues identified for each are as follows:

- Rest Area Pond Watershed – Rest Area Pond is located in West Lakeland Township; however, there is a section of Afton which drains to this water body. The VBWD will manage Rest Area Pond as a Stormwater Pond water body. Water quality is viewed as poor but has improved somewhat in recent years. Management efforts will include monitoring water quality, preserving its function as a stormwater pond, and studying the possible impacts of curlyleaf pondweed infestation to the St. Croix River.
- Fahlstrom Pond Watershed – The VBWD will manage Fahlstrom Pond as a Low Priority water body. Water quality is viewed as poor. Management efforts will include monitoring water quality and conducting an assessment of wetland functions.
- Lake Edith Watershed – The VBWD will manage Lake Edith as a High Priority water body. Water quality is viewed as excellent and drains to an outstanding resource value water (Valley Creek). Management efforts will include monitoring water quality, conducting an assessment of wetland functions, and management of macrophytes (lake plants) including curlyleaf pondweed infestations.
- Valley Creek Watershed – The goal for the Valley Creek watershed is to preserve its water quality and trout stream habitat. The creek is entirely within private ownership and there is no public access. The Minnesota Department of Natural Resources (DNR) has recommended management in order to maintain its current dissolved oxygen concentration, avoid increases in water temperature, and avoid increased discharge. The 2002 *Valley Creek Subwatershed Plan* identifies specific recommendations for the City of Afton, the VBWD, landowners, and others. Management efforts will include monitoring water quality, continued funding of a volunteer stream monitoring program, continued implementation of stabilization projects, incentives and technical assistance for removal of problematic flood control structures, coordination with other agencies to reduce thermal impacts of in-stream ponds, and facilitation of meetings with individuals interested in protecting the creek.
- St. Croix Watershed – VBWD has no specific water quality management plan for the St. Croix River because so many agencies have jurisdiction over the St. Croix.
- Kelle's Creek – Kelle's Creek is a groundwater supported stream that has been identified by VBWD as one of the highest priority surface water resources in the watershed. It was also identified as a key natural resource in the City of Afton's Natural Resource Inventory (EOR, 2001). Increased development within the Kelle's Creek watershed has the potential to increase the rate and volume of flow within the stream, thus leading to increased erosion of the streambed, potential flooding in the downstream reaches, and an overall loss of habitat. Water quality within Kelle's Creek may also be impacted by development within the watershed. Additional evaluation of Kelle's Creek is available in VBWD's 2015 Plan in Section 5.37.

South Washington Watershed District

The SWWD adopted its latest Watershed Plan in 2016. Within that plan, the District identified issues within each of its subwatersheds. The portion of Afton that is currently within the District's jurisdiction is located in its "Northern" subwatershed. Of the issues identified that were specific to the northern subwatershed, none are directed exclusively at land within the City of Afton.

Generally, the SWWD identifies the following as its primary goals:

- Floodplain Damage Reduction and Mitigation – Minimize existing and future potential damages to property, public safety, and water resources due to flood events.
- Central Draw Storage Facility and Overflow – Complete establishment of a controlled overflow from SWWD's Northern Watershed to the Mississippi River.
- Surface Water Degradation and Impairment – Protection and restoration of District resources to meet local resource goals and State standards.
- Erosion – Prevent resource degradation of District resources from bluff, streambank, shore land, and construction site erosion.
- Groundwater Supply – Implement conservation efforts to ensure long term viability of groundwater resources in South Washington County.
- Groundwater Protection (Pollution Prevention) – Protect groundwater resources through pollution prevention and management of surface water groundwater interactions.
- Natural Resources – Protect, restore, and reconstruct native terrestrial and aquatic habitat for the benefit of resource management.
- Climate Change – Facilitate increased resilience of District resources and public infrastructure through development of information and strategies and implementation of accepted climate adaptation practices.
- Resource Assessment – In partnership with Local, State, and Regional partners, operate a monitoring program adequate to establish baseline water quality and quantity measures and identify long-term trends. Operate a monitoring program adequate to detect changes in loading rates as a result of District implementation actions.
- District-Wide Hydrologic Modeling – Maintain updated, District-wide hydrological modeling to inform District and Municipal management of resources and infrastructure
- Research – Work with local and regional partners to advance knowledge of watershed management issues.

- Education – Heighten the awareness of key constituencies within the District, sufficient to modify behavior to improve the recognition and implementation of District policies, programs, and activities.
- Progress Evaluation – Utilize a Results Based Accountability approach in evaluating and refining implementation strategies for achieving resource goals and to evaluate and improve program performance.
- Uniform Standards – Establish and maintain District controls necessary to achieve established District resource goals, comply with mandated permits and programs, and maximize regulatory consistency with neighboring jurisdictions.
- Collaboration and Coordination of Efforts – Limit duplication of planning and implementation efforts by the District and its State and Local partners by improving collaboration and coordination of efforts. Create efficiencies in implementation through partnerships
- Trout Brook – Trout Brook has been identified by SWWD as one of the highest priority surface water resources in the watershed. This stream is groundwater supported and provides habitat and water temperatures suitable for trout. Due to urbanization, trout streams are rare in the Metro Area and their protection has been identified as a priority by the MN Department of Natural Resources (DNR). Increased development within the Trout Brook watershed has the potential to increase the rate and temperature of flow as well as nutrient concentrations within the stream, thus threatening its ability to support trout. Identification and protection of the groundwater recharge area for Trout Brook will also be important to its long-term management.
- St. Croix River – The St. Croix River forms the eastern boundary of the watershed with approximately 12 miles of shoreline. The River is not only a key resource of the City, but also a key resource regionally. The primary issues concerning the St. Croix River are bluffline/streambank erosion and watershed nutrient loading. Several erosion areas have been identified along the St. Croix and it is likely that many other eroded or erosion prone areas exist.

In addition to Kelle's Creek and Trout Brook, there are several small Creeks, ravines, and intermittent streams which outlet into the St. Croix. The St. Croix River Basin Planning Team has identified a goal of improving the water quality in the St. Croix River. (St. Croix Basin Water Resources Planning Team, 2004). Cooperation with local watershed authorities is needed to achieve this goal and protect the St. Croix River as an outstanding regional water resource.

- Erosion and Sedimentation Along Trout Brook, O'Connors Creek and Kelle's Creek – Trout Brook, O'Connors Creek, and Kelle's Creek contain areas of significant erosion and sedimentation as described in the Afton and Denmark Township Water Resource Inventories (WCD, 2002; WCD, 2001) resulting in impacts to fish habitat, degraded water quality, changes in channel morphology, and loss of property.

- Forest Fragmentation – The Kelle’s Creek watershed contains large areas of Maple Basswood forest, and the Trout Brook watershed has a very large area of Oak forest. These large tracts of forest have a critical function in defining the quantity and quality of water reaching watershed streams. Clearing or fragmentation of these areas is a likely consequence of development and may diminish this function.

Middle St. Croix Watershed Management Organization

The MSCWO has jurisdiction over only a small portion of the City of Afton, a 0.18 square mile area, in the area of Croixview Drive adjacent to the City of Lakeland. The MSCWOs 2015 Watershed Management Plan identifies a number of general issues affecting water quality within the watershed, although none are directed exclusively at land within the City of Afton.

Generally, the MSCWO identifies the following as its priority issues:

- Protect and improve water quality in the Middle St. Croix watershed through the treatment and control of stormwater runoff.
- Minimize existing and future potential damages to property, public safety, and water resources due to flood events.
- Prevent erosion and subsequent sedimentation from surface runoff within the watershed on construction sites, agricultural lands, and along stream banks, lakeshores, and roadsides.
- Collect monitoring data needed to understand the quality of major water bodies, identify problems, and determine appropriate practices and management practices.
- Manage the quantity and quality of wetlands, in conformance with the Minnesota Wetland Conservation Act (WCA) and Water Quality Standards Rules (Minnesota Rules 8420 and 7050).
- Collaborate to protect the quantity and quality of groundwater resources.
- Maintain or improve habitats by implementing protection or restoration measures that consider ecological functions as well as recreation, human health, safety, and welfare.
- Increase the knowledge and understanding of watershed residents, government officials and staff, consultants, and developers on water quality, water quantity, wetlands, and natural resource protection.
- MSCWMO is an efficient, well organized, and proactive organization that collaboratively prioritizes and manages water resources with member communities and other government jurisdictions.

VI. IMPLEMENTATION PRIORITIES AND PROGRAM

The City of Afton's Implementation Program

1. The City of Afton's Land Use Code will be routinely updated to maintain consistency with the Watershed Management Organization's plans. Chapter 12 of the Land Use Code (located on the City's web site) includes the following stormwater management sections:
 - a. Section 12-409 Stormwater Management
 - b. Section 12-1383 Drainage Minimum Design Standards
 - c. Section 12-1429 Stormwater Drainage Engineering Standards
 - d. Division 7 Lower St. Croix River Shoreland Management
 - e. Division 2 Floodplain District

These sections address erosion control consistent with NPDES stormwater permit requirements. On all projects, whether or not they require a permit, the City requires NPDES erosion control and sediment control measures are met. The City of Afton will review its permitting and subdivision approval procedures to ensure that it incorporates the MPCA's General Stormwater Permit for Construction Activity requirements for development near special waters, as specified in Appendix A part C.1-5 of the General Permit.

The City in collaboration with the watersheds ensures that best management practices meet the current standards. In addition, the City has specific BMPs for the Old Village area.

2. The City is working to develop a stormwater inspection maintenance plan as well as completing necessary inspection and maintenance activities.
3. The City of Afton supports and will cooperate with the VBWD in efforts to address the thermal pollution effects from development near the City's trout streams.
4. The City of Afton will adopt the VBWD, MSCWMO, and SWWD Plan's by reference. The City supports the regulation of developments and land-altering activities by:
 - a. Updating and enforcing its Zoning and Subdivision ordinances as determined necessary or desirable
 - b. Support the use stormwater practices that promote infiltration/filtration and decrease impervious areas where practical

- c. Support the development and use of best management practices to improve stormwater quality and quantity and the maintenance schedule for the best management practices.
5. The City will continue to inspect and maintain culverts, outfalls, and drainage systems along City roads and on City properties. The City includes maintenance of these facilities and street sweeping in its annual budget, and implements maintenance and improvements as needed to ensure that these facilities function adequately.
6. The City will assess the need to establish a local spill containment clean-up plan or any other necessary management programs.
7. The City will meet the SWWDs requirements to:
 - a. Maintain up-to-date DNR approved Floodplain and Shoreland ordinances.
 - b. Adopt a regional water quality protection strategy that is consistent with the SWWD water quality and waterbody standards. The SWWD standards can be found within their WMP Table 6.1.
 - c. Include a groundwater protection component consistent with Washington County's Groundwater Management Plan or method to adopt measures.
 - d. Develop methods to address flooding, water quality, and natural resource problems.
 - e. Establish 100-yr high water levels and peak flow rates for all waterbodies in the drainage system.
 - f. Plan for a ponding and drainage system that meets the SWWD allowable peak flow rates and regional assessment location criteria.
 - g. Establish a minimum 3-foot freeboard standard for ponding areas in the drainage system.

CITY OF AFTON STORMWATER CAPITAL IMPROVEMENT PLAN

5/13/2019

Year in CIP	Water Resources Project Description	Estimated Project Cost (2019 \$'s)	Estimated Project Cost (Inflation 6.5%)
2019			
2019	Culvert Replacement and Eroision Control and Drainage Improvements	\$100,000	\$100,000.00
2019	Street Sweeping	\$14,000	\$14,000.00
2019	Storm Sewer System Mapping	\$1,500	\$1,500.00
2019 Miscellaneous Improvements Subtotal		\$115,500	\$115,500
2020			
2020	Culvert Replacement and Eroision Control	\$100,000	\$106,500
2020	Street Sweeping	\$14,000	\$14,900
2020	Stormwater BMP Maintenance Plan	\$15,000	\$16,000
2020 Miscellaneous Improvements Subtotal		\$129,000	\$137,400
2021			
2021	Culvert Replacement and Eroision Control	\$100,000	\$113,400
2021	Street Sweeping	\$14,000	\$15,900
2021	Stormwater Pond Inspections	\$5,000	\$5,700
2021 Miscellaneous Improvements Subtotal		\$119,000	\$135,000
2022			
2022	Culvert Replacement and Eroision Control	\$100,000	\$120,800
2022	Street Sweeping	\$14,000	\$16,900
2022	Stormwater Pond Inspections	\$5,000	\$6,000
2022 Miscellaneous Improvements Subtotal		\$119,000	\$143,700

CITY OF AFTON STORMWATER CAPITAL IMPROVEMENT PLAN

5/13/2019

Year in CIP	Water Resources Project Description	Estimated Project Cost (2019 \$'s)	Estimated Project Cost (Inflation 6.5%)
2023			
2023	Culvert Replacement and Eroision Control	\$100,000	\$128,600
2023	Street Sweeping	\$14,000	\$18,000
2023	Stormwater Pond Inspections	\$5,000	\$6,400
2023	Storm Sewer System Mapping	\$1,500	\$1,900
2023 Miscellaneous Improvements Subtotal		\$120,500	\$154,900
2024-2028			
2024-2028	Culvert Replacement and Eroision Control	\$100,000	\$137,000
2024-2028	Street Sweeping	\$14,000	\$19,200
2024-2028	Stormwater Pond Inspections	\$5,000	\$6,900
2024-2028	Storm Sewer System Mapping	\$1,500	\$2,100
2024-2028 Miscellaneous Improvements Subtotal		\$120,500	\$165,200
Total Estimated Program Costs for 2019 Through 2028		\$603,000	\$851,700

VII. FINANCIAL CONSIDERATIONS

The City of Afton continues to have stormwater facility maintenance and planning in their annual operating budget. In addition, Washington County completed a 5 year [Capital Improvement Plan](#) (CIP) in 2017. The City's support of the watershed management plans and corrective actions should not directly impact the City's budget as their plans are funded through the taxing authority of the districts.

VIII. AMENDMENT PROCEDURES

Review and Adoption Process

Review and adoption of this Surface Water Management Plan will follow the procedure outlined in Minnesota Statutes 103B.235:

After consideration but before adoption by the governing body, each local government unit shall submit its water management plan to the watershed management organization[s] for review, for consistency with the watershed plan. The organization[s] shall have 60 days to complete its review.

Concurrently with its submission of its local water management plan to the watershed management organization, each local government unit shall submit its water management plan to the Metropolitan Council for review and comment. The council shall have 45 days to review and comment upon the local plan. The council's 45-day review period shall run concurrently with the 60-day review period by the watershed management organization. The Metropolitan Council shall submit its comments to the watershed management organization and shall send a copy of its comments to the local government unit.

After approval of the local plan by the watershed management organization[s], the local government unit shall adopt and implement its plan within 120 days and shall amend its official controls accordingly within 180 days.

Plan Amendments and Future Updates

The City will provide draft copies of their SWMP to the watershed districts for review and comment. The stormwater plan will be adopted by the City as part of the Comprehensive Plan.

The Local Surface Water Management Plans will be incorporated into the City's next Comprehensive Plan update. The Plan is intended to be in effect for ten years, at which time an updated plan will be required. Following review by VBWD, MSCWMO, and SWWD, and the formal adoption process outlined above, the Afton SWMP, will be current.

The City may revise/amend the plan in response to City-identified needs. Minor changes to the plan will not require a re-submittal for agency review. Minor changes to the Plan shall be defined as changes that do not modify the goals, policies, or commitments expressly defined in this plan by the City. Adjustment to subwatershed boundaries will be considered minor changes provided that the change will have no significant impact on the rate or quality in which stormwater runoff is discharged from the City boundaries.

The City will update this plan within two years after the latest watershed management organization plan update. The MSCWMOs Plan is scheduled to expire in 2025. The VBWDs Plan is scheduled to expire in 2025, and the SWWDs Plan scheduled to expire in 2026.

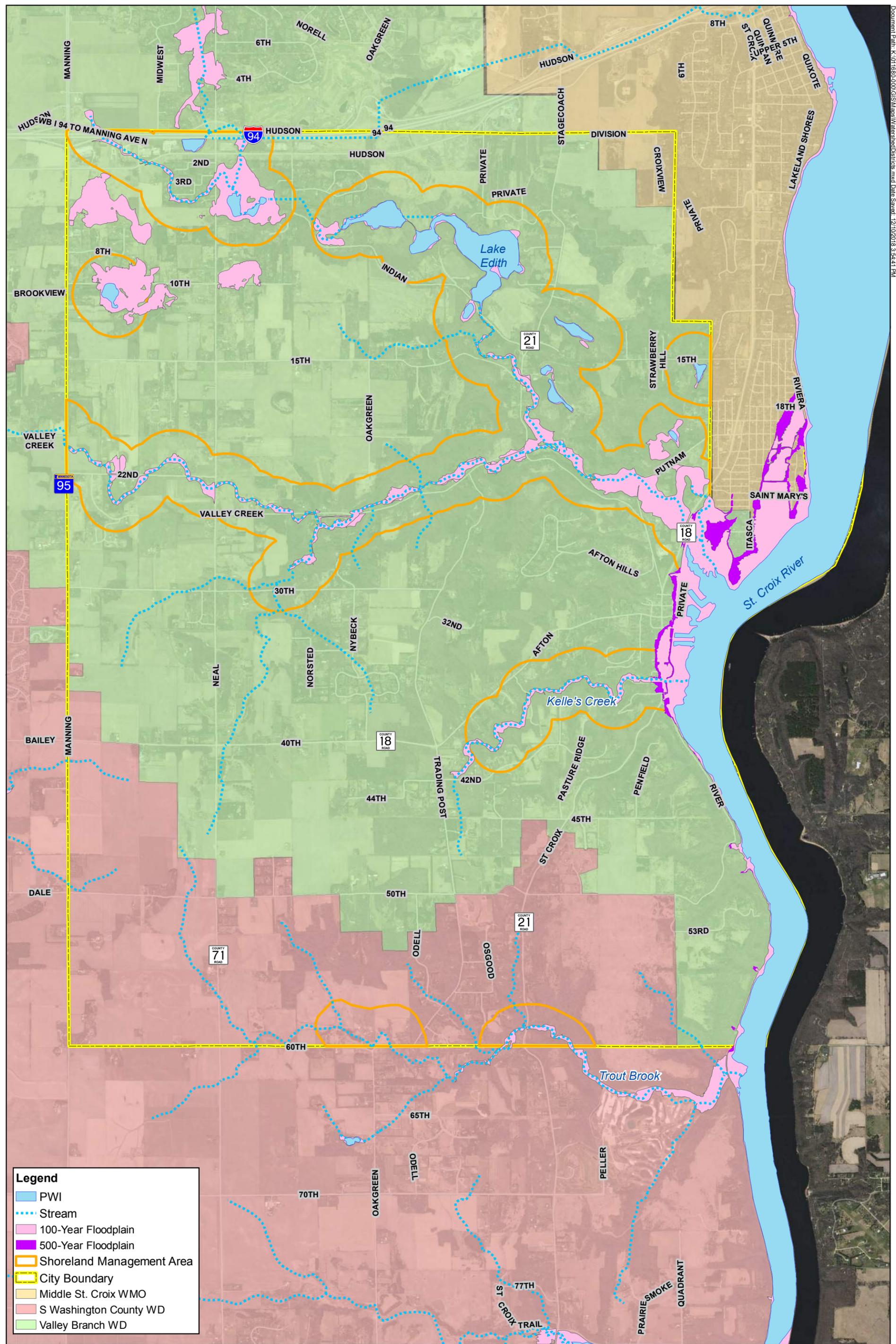
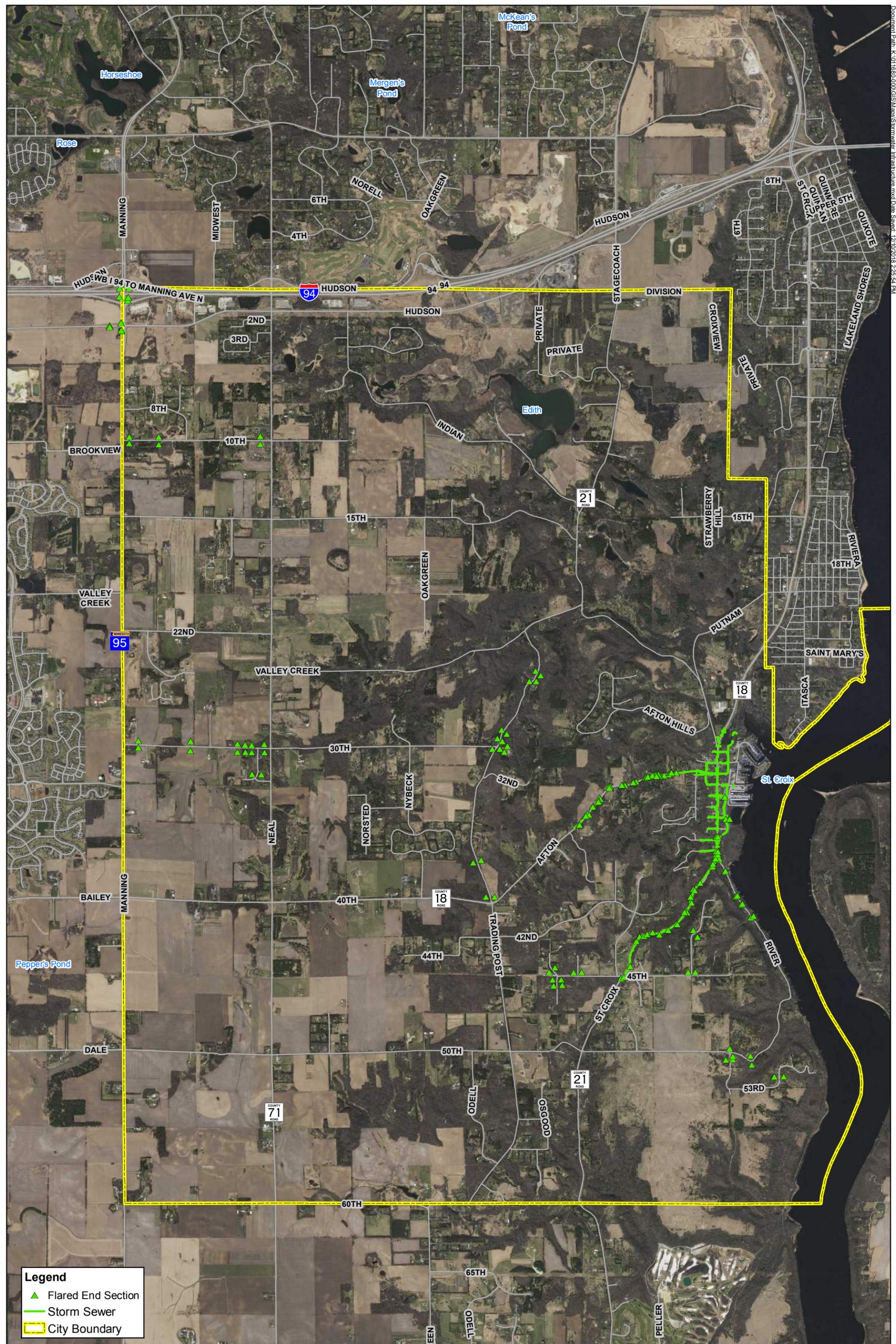


Figure 1 - Watershed Agencies
 Surface Water Management Plan
 City of Afton



Legend

- ▲ Flared End Section
- Storm Sewer
- ▭ City Boundary

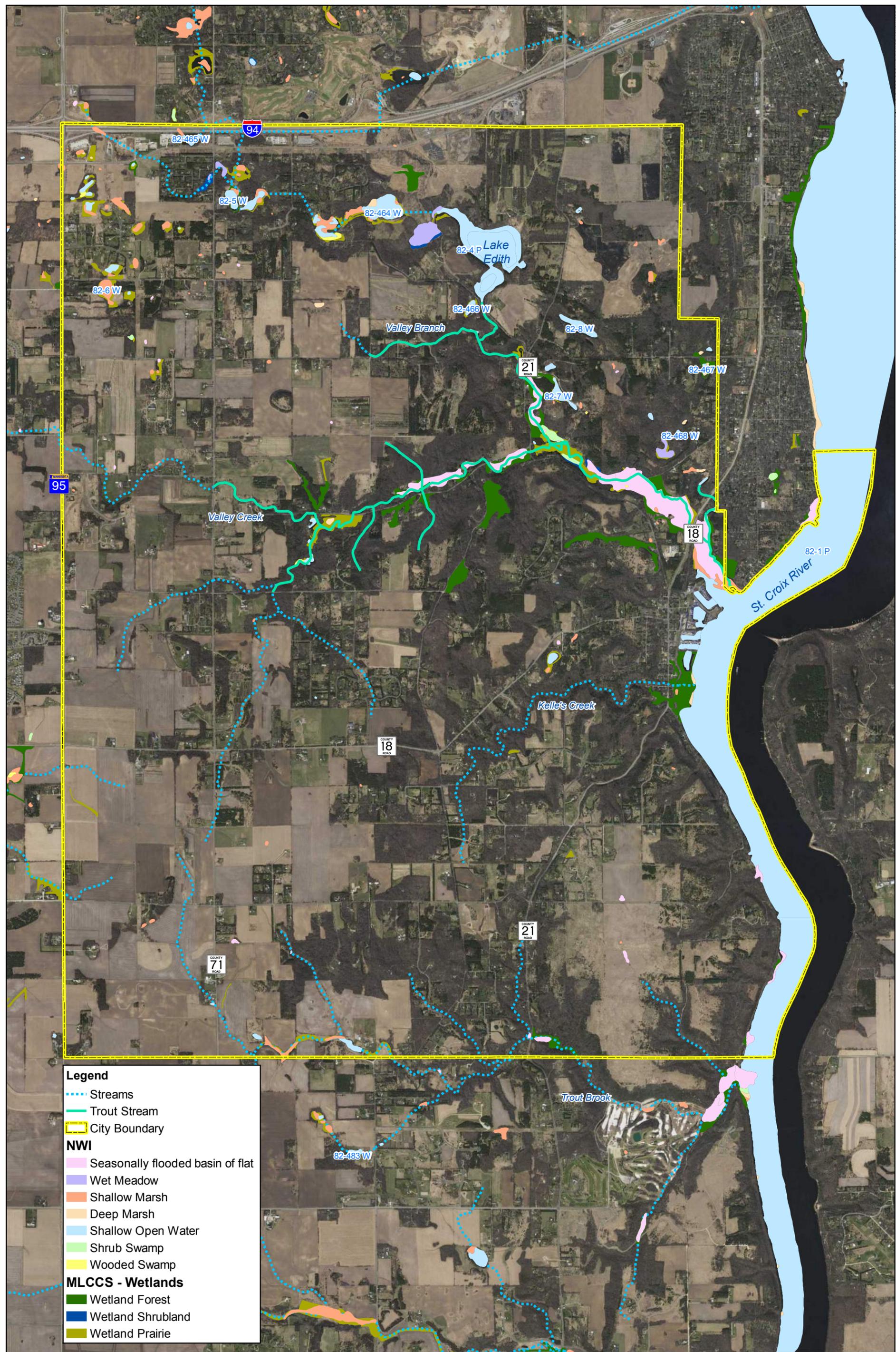


Figure 2 - Stormwater Infrastructure
 Surface Water Management Plan
 City of Afton

N

0 3,000 Feet
 1 inch = 3,000 feet

wsb



Legend

- ⋯ Streams
- Trout Stream
- City Boundary

NWI

- Seasonally flooded basin of flat
- Wet Meadow
- Shallow Marsh
- Deep Marsh
- Shallow Open Water
- Shrub Swamp
- Wooded Swamp

MLCCS - Wetlands

- Wetland Forest
- Wetland Shrubland
- Wetland Prairie

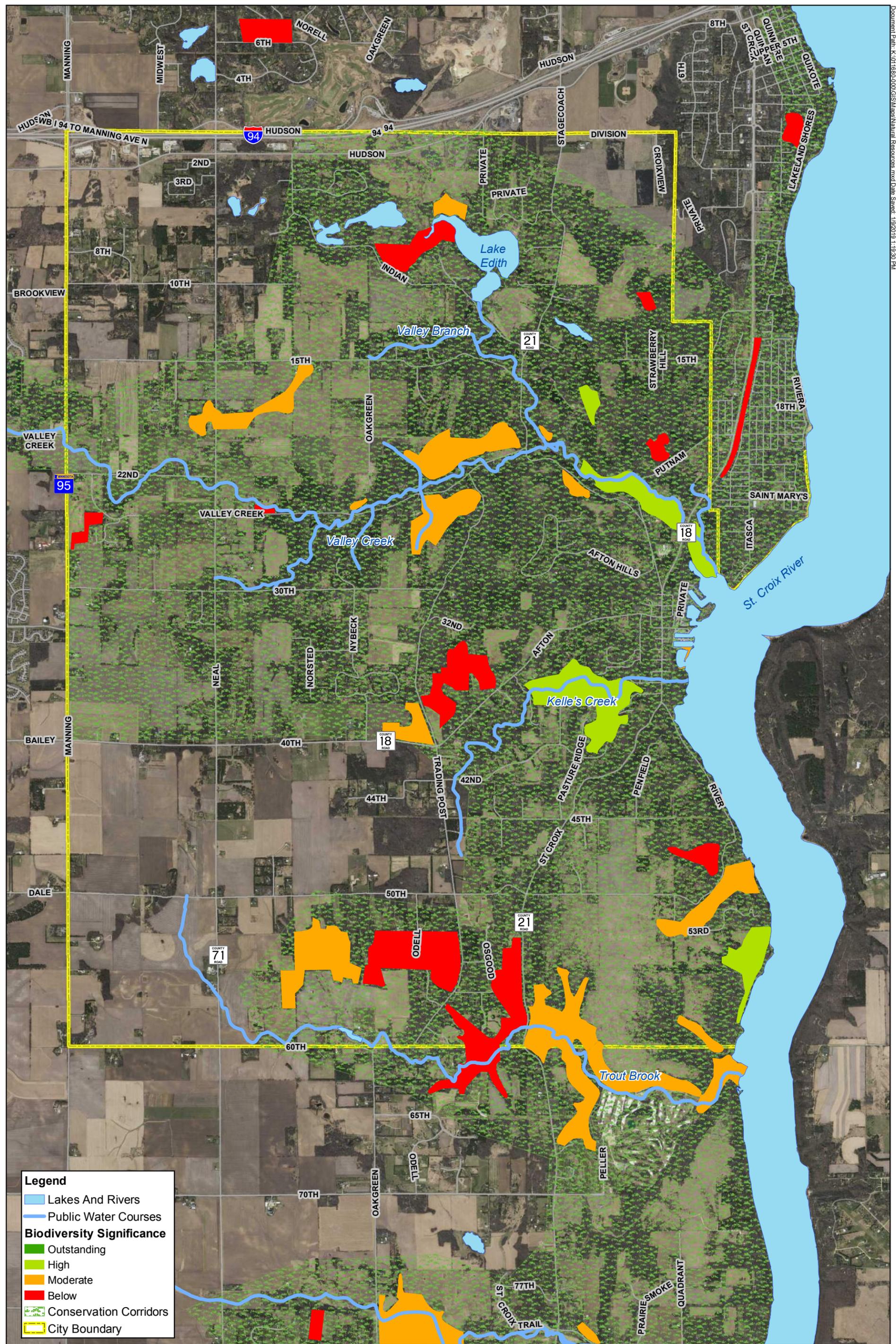
Figure 3 - Water Resources
 Surface Water Management Plan
 City of Afton

N

0 3,000

Feet

1 inch = 2,960 feet



Legend

- Lakes And Rivers
- Public Water Courses
- Biodiversity Significance**
- Outstanding
- High
- Moderate
- Below
- Conservation Corridors
- City Boundary

Figure 4 - Natural Resources
 Surface Water Management Plan
 City of Afton



0 3,000
 Feet
 1 inch = 3,000 feet



Appendix F: 2007 Community Survey

City of Afton 2007 Community Survey

As part of its Comprehensive Plan updating process, the City of Afton sent this survey to residents as part of the June issue of the Afton Newsletter. Approximately 1200 copies were sent out and 434 were returned. Since several questions provided space for two respondents, we heard from a total of 743 individuals or approximately 37% of the adult population. Note, however, that not all respondents responded to every question. This report summarizes the basic statistics of the responses to the survey.

The last general survey, conducted in 1997, was the basis for this year's survey. Where the questions are the same, the 1997 survey results are shown in parentheses ().

Current Land Use

1. How would you describe the primary use of your land in Afton?

Agriculture

Crop Land	9%	(10%)
Pasture	7%	(4%)
Livestock	4%	(0%)
Other Ag use	4%	(3%)

Residential

Owner Occupied	94%	(84%)
Rental	2%	(2%)
Vacant	0%	(3%)
Commercial or Industrial	1%	(0.8%)
Other	0%	(1%)

2. What are your long term (10-15 years from now) plans for your land?

Continue existing use	83%	(84%)
Change the use	3%	(2%)
Sell all the land	2%	(3%)
Sell part of the land	1%	(1%)
Pass on land to family members	7%	(2%)
Long term plans are unknown	10%	(5%)

3. How many acres of land or lots in the Old Village do you own in Afton?

Acres	Average 11.8 acres (11 acres)	Range 0-1200 acres (0-200 acres)
Lots	Average 1.1 lots (n/a)	

General Priorities

4. What do you like best about living in Afton? Choose up to three reasons.

[Listed in descending order of preference.]

Rural location and separation of homes from each other	66%	(301 responses)
Lots of open space	65%	(250 responses)
Presence of active farms and agriculture	49%	(184 responses)
Proximity to the St. Croix River	38%	(98 responses)
Good location and access for my needs	25%	(76 responses)
The Old Village area	20%	(44 responses)
Reasonable taxes	14%	(31 responses)
Good schools	13%	(43 responses)
Community identity	12%	(14 responses)
Other	4%	(18 responses)

[Notes: Many respondents selected more than three reasons in 2007. The 1997 report included actual counts instead of percentages.]

5. In general, which of the following topics should the city focus its efforts and funds on during the next 10 years?

Yes	No	No Opinion	
84% (82%)	2% (5%)	8% (13%)	Preservation and improvement of groundwater and surface water quality
71% (65%)	8% (24%)	13% (10%)	Preservation of agriculture and hobby farming as a viable, economic land use
80% (89%)	8% (4%)	4% (6%)	Preservation of a rural lifestyle (low density, large lots, private wells and septic tanks)
28% (26%)	44% (45%)	24% (29%)	Improve active parks and recreation (ball fields, skating, and play areas)
51% (47%)	29% (32%)	14% (21%)	Increase passive parks and recreation (picnic, nature study, hiking) and open space (wildlife areas, conservation preserves)
21% (13%)	64% (69%)	7% (18%)	Enhance opportunities for housing diversity (i.e., greater variety of price ranges and housing types – apartments townhouses and condominiums)
33% (21%)	42% (48%)	17% (30%)	Improve public access to the St. Croix River
43% (45%)	35% (26%)	13% (27%)	Preserve and encourage commercial development in the Old Village
50% (50%)	28% (30%)	13% (19%)	Establish non-motorized trails (walk/hike, bike, skate, ski)

Parks, Recreation and Open Spaces

The City has one active, developed park, Town Square, and a passive park along the St. Croix River, Steamboat Park. Both are located in the Old Village in Ward 1.

6. Do you want additional parks developed? Yes 18% (n/a)

7. If you want additional parks, where and what kind?

[Listed in descending order of preference.]

Yes	No	No Opinion	
39%	14%	8%	Passive nature areas and open space preserves throughout Afton (n/a 1997)
19% (21%)	30% (50%)	10% (29%)	Neighborhood parks in Wards 2, 3 and 4
12% (21%)	32% (47%)	11% (31%)	One active recreation area in Afton

8. Would you support increased property taxes to acquire and develop any of these facilities? [Listed in descending order of preference.]

47% (n/a)	Passive nature areas and open space preserves
41% (43%)	Non-motorized trails (walk/hike, bicycle, horse, ski, etc.)
39% (34%)	Passive parks (picnicking, nature trails, fishing, swimming)
19% (21%)	Active parks (baseball or soccer fields, ice skating or hockey rink, tennis courts, sand volleyball or basketball courts, playground equipment)
7% (4%)	Motorized trails (motorcycle, snowmobile, ATV)

What annual property tax increase would you accept to acquire and develop these facilities?

\$0: 21% (35%)	\$50: 12% (21%)	\$100: 13% (18%)	\$200: 12% (n/a)
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9. What, if any, facilities should the City develop in Steamboat Park? *See other comments, p. 7*

Groundwater, Farmland and Rural Character

The preservation of ground water resources, prime farmland and the rural character of the City are principal goals of the current Comprehensive Plan.

10. Which of the following policies would you support to meet these goals? Choose all that you feel the City should use. [Listed in descending order of preference.]

Yes	No	No Opinion	
65%	22%	7%	Maintain maximum permitted density of 4 homes per 40 acres in the Agricultural District in the western 1/3 of the City (n/a 1997)
61% (54%)	27% (25%)	6% (21%)	Public investment (taxes) to preserve environmentally sensitive areas such as trout streams, bluffs, ravines, wildlife habitat, wetlands, groundwater resources, steep slopes and floodplains)
48% (42%)	24% (28%)	17% (29%)	Develop a means to transfer or purchase development rights to preserve prime farmland
38% (37%)	46% (47%)	7% (21%)	Increase your property taxes to help place land in agricultural, scenic or other long-term conservation easements
37% (28%)	52% (57%)	5% (15%)	Permitting new developments on large acreage to use clustered, small residential lots with significant additional land area in the development which cannot be built on in the future (for example, protected by use of conservation easements)
31% (41%)	51% (42%)	11% (17%)	Increasing the minimum lot size from 5 to 10 acres in the Rural Residential Zoning District in the easterly 2/3 of the City

11. Are Afton’s traditional zoning regulations of 5 acre minimum lot size in the Rural Residential Zoning District in the easterly 2/3 of the City too restrictive?

Yes: 8%

12. Are Afton’s current zoning regulations of 4 homes per 40 acres in the Agricultural District in the western 2/3 of the City too restrictive?

Yes: 18%

13. Are Afton’s traditional zoning regulations of one-half acres in the Old Village too restrictive?

Yes: 8%

14. Washington County is in the process of implementing a county-wide 800 MHz radio system for public safety and public service organizations. Washington County is proposing that a 190 foot tall antenna tower be built in Afton to service the 800 MHz system. The desired location for the tower is north of County Road 18, south of Afton Hills, and ¼ to ½ miles east of Trading Post Trail. Afton’s present ordinances do not permit the proposed antenna tower to be built in Afton. (n/a 1997)

Should the City:			
Yes	No	No	
		Opinion	
45%	41%	7%	Change its ordinances to permit the building of the 190 foot tall antenna towers in Afton thereby allowing the proposed Washington County tower and possibly other towers to be built in Afton? (Federal laws contain equal access provisions for commercial providers)
15%	72%	8%	Permit condemnation of land through the use of Eminent Domain (the involuntary forced taking of private property) to obtain a site for the antenna tower if a willing seller cannot be found?
38%	46%	10%	Reject the Washington County 190 foot tower proposal?

Historic Old Village Development

15. The historic Village of Afton has a small business district near the ST. Croix River with the majority of the Village consisting of single family residences.

Should the City:			(n/a 1997)	[Listed in descending order of preference.]
Yes	No	No	Opinion	
67%	21%	10%	Encourage or support the construction of new single family homes on the open lots that remain in the Old Village and generally encourage and preserve the primarily residential nature of the Old Village?	
56%	30%	9%	Permit multi-use (commercial street level and living space above) in the Old Village residential zoning district?	
23%	71%	3%	Permit high density multi-family housing such as condominiums, townhouses and mixed residential/commercial developments in the Old Village commercial zoning district?	

Light Industrial Area Development

16. Afton's current tax base is over 90% residential and agriculture. The City has a small light industrial area along I-94, east of Manning Avenue. Should the City promote more intense use of this area by providing municipal sewer services for:

Yes	No	Opinion	
		No	
37% (25%)	44% (57%)	7% (17%)	Light industrial/office
30% (19%)	55% (64%)	5% (17)	Retail shopping/commercial uses
12% (10%)	69% (70%)	6% (19%)	Higher density residential areas
23% (17%)	55% (62%)	8% (20%)	A mix of the above

17. Afton recently changed its ordinances to expand the Light Industrial area into land located south of and adjacent to Hudson Road. A moratorium is currently in place, halting industrial development in the Light Industrial area.

Yes	No	Opinion	
		No	
34%	55%	7%	Should the Light Industrial area extend to the south of Hudson Road (the I-94 frontage road)? (n/a 1997)

City Finances and Services

18. How satisfied are you with the following services? Mark your opinion on the scale, with 1 being very dissatisfied, 5 very satisfied and N, no opinion.

Paving of gravel roads	Average 3.66 (3.3)
General street maintenance	Average 3.06 (3.7)
Parks and recreation facilities	Average 3.70 (3.8)
Police services	Average 4.13 (4.1)
Fire protection services	Average 4.18 (4.2)
Building inspection services	Average 3.69 (3.7)
Assistance at City Hall	Average 3.57 (3.7)
Other public services	Average 3.35 (3.7)

19. The City has traditionally adopted conservative budgets. Should the City budget and tax more or less for:

More	Same	Less	
17% (20%)	50% (57%)	27% (17%)	Paving gravel roads
33% (11%)	57% (78%)	5% (5%)	General street maintenance
19% (19%)	58% (54%)	15% (19%)	Parks and recreation
10% (9%)	78% (80%)	3% (4%)	Police services
11% (10%)	77% (80%)	3% (3%)	Fire protection
3% (2%)	65% (65%)	14% (13%)	Other services

20. Would you prefer that the City, to the extent possible, finance any increased spending through immediate tax increases, or through increased debt such as the recent four million dollar bond issuance for paving?

Tax increases	20%
Debt (bonding)	33%

21. In general, how satisfied are you with City services?

Average 3.24 (3.6) 1 = very dissatisfied; 5 = very satisfied

Household Information

22. How long have you lived in Afton? Average 21 years (16 years) max. 85 years

23. What is/are your age(s)?

Under 30	1% (15%)	30-39	9% (18%)	40-49	23% (33%)
50-59	36% (30%)	60 plus	32% (18%)		

24. Indicate the number of people within each age group living in your household:

under 6	5% (7%)	6-11	7% (10%)	12-17	15% (9%)
18-44	29% (30%)	45-64	61% (36%)	65 plus	23% (7%)

25. Do you live in the Old Village? Yes 7% (n/a 1997)

26. What is your marital status? Single 16% (17% incl. divorced, widow)
Married 75% (77%)

27. What is your household income before taxes? (optional)

Less than \$15,000	1% (1%)	\$55,000-74,999	7% (16%)
\$15,000-24,999	2% (4%)	\$75,000-99,999	11% (21%)
\$25,000-34,999	1% (6%)	\$100,000-124,999	9% (32% ...)
\$35,000-44,999	1% (9%)	\$125,000-150,000	7% (greater than ...)
\$45,000-54,999	4% (11%)	\$150,000 plus	19% (\$100,000 in 1997)

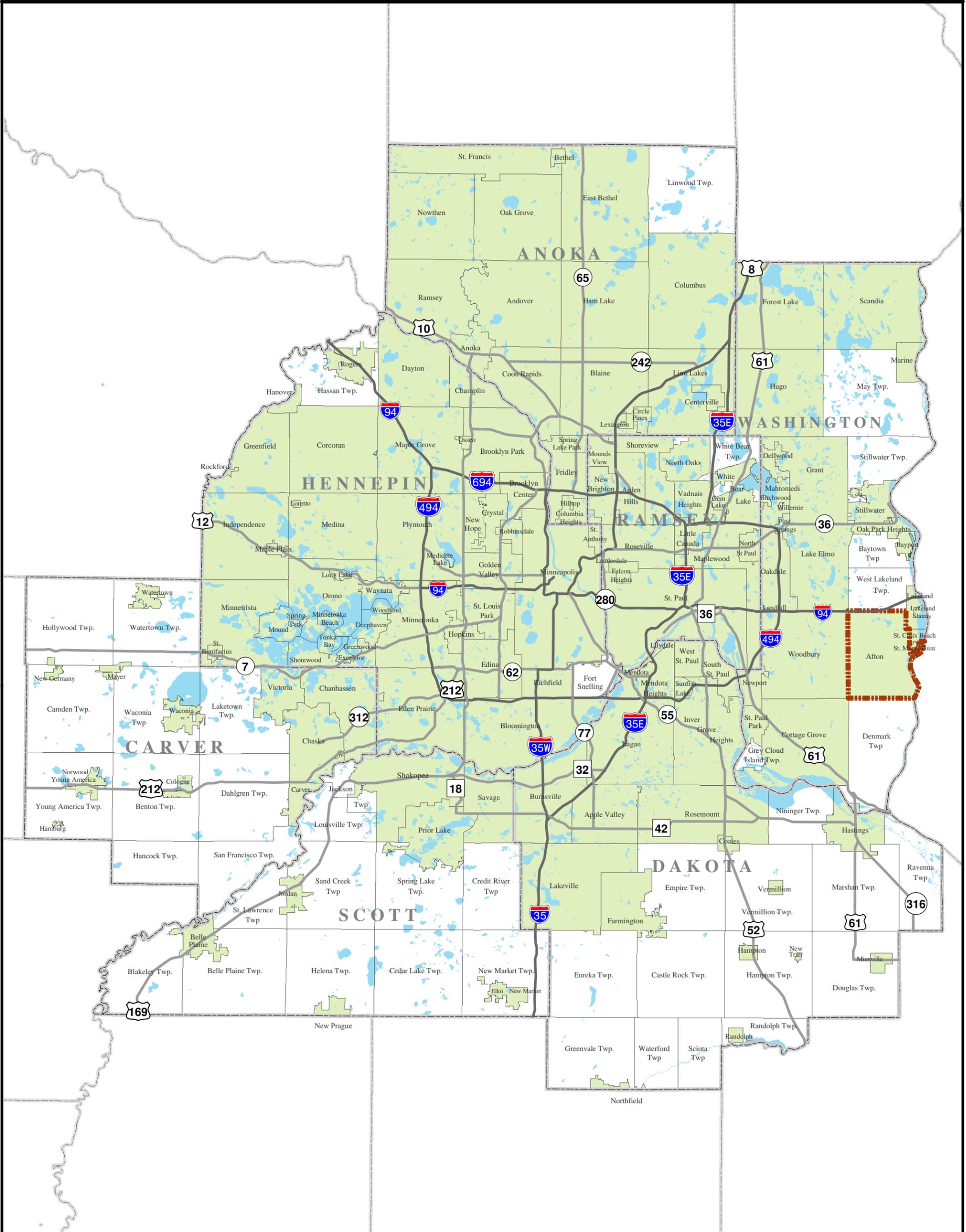
Other Comments

Many respondents included extensive write-in comments in addition to (or instead of) answering the specific questions on the survey form. The comments are very rich in their expansion of the survey questions and qualification of the answers to specific questions. All the comments are copied verbatim in a spreadsheet on the Afton city web site, www.ci.afton.mn.us/. The same spreadsheet contains all the raw answers to questions from the 434 surveys returned. Interested parties are urged to explore the diversity of responses available on the web page.

(JHF 9-2-07)

Appendix G – List of Maps

Map 1	Regional Context
Map 2	Soil Suitability
Map 3	Prime Agricultural Land
Map 4	Physical Features
Map 5	Topography
Map 6	Current Land Use – Use Types
Map 7	Current Land Use – Natural & Developed Uses
Map 8	Historic Sites
Map 9	Future Land Use
Map 10	Parks and Open Space
Map 11	Zoning
Map 12	Urbanization



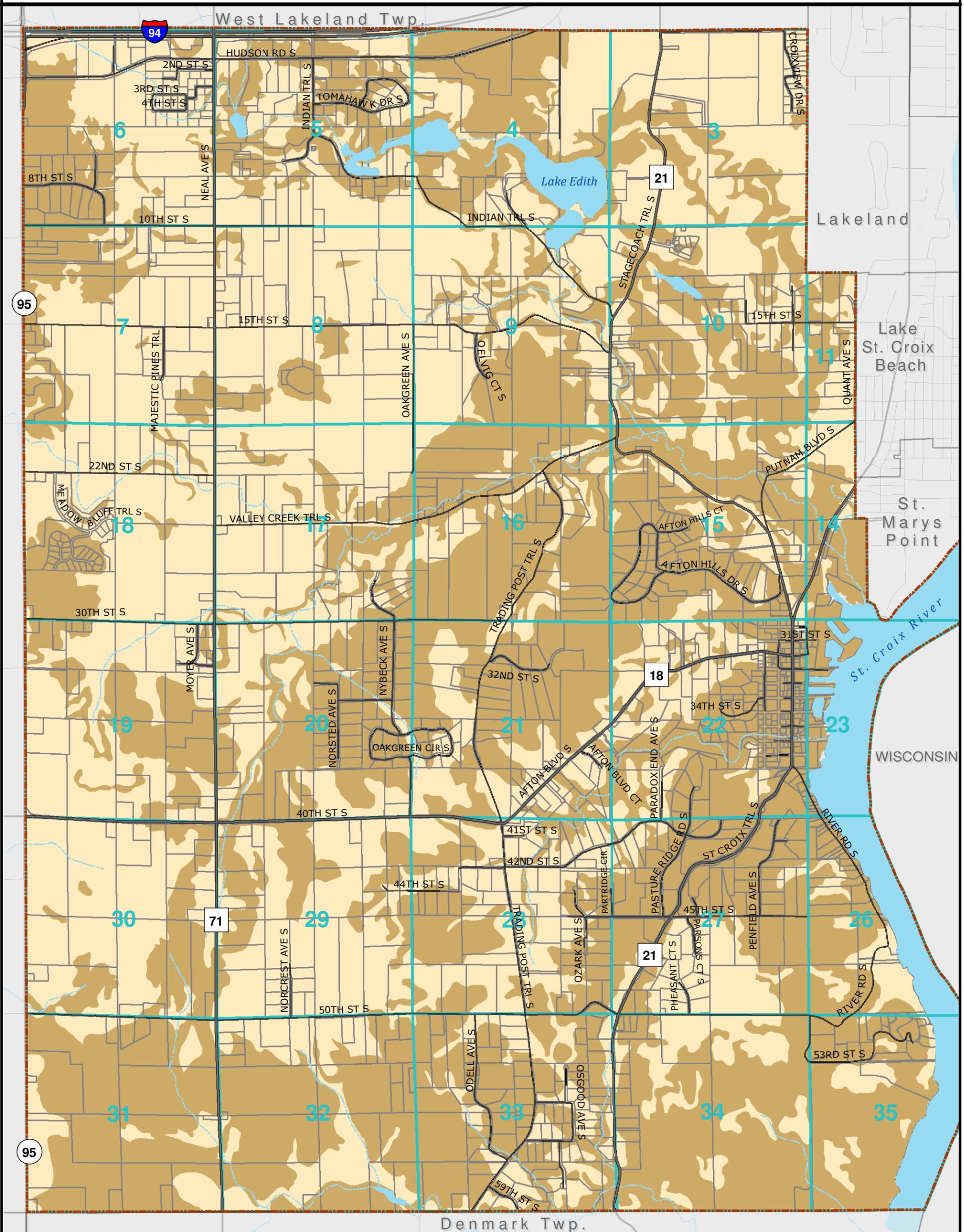
-  City of Afton
-  Metro Area County Boundaries
-  City
-  Township or Unorganized
-  Major Highway
-  Interstate
-  Lakes & Rivers



Afton

General Soil Suitability for Septic Systems

MAP 2

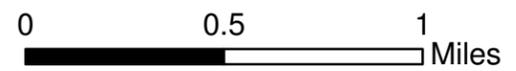


General Soil Suitability for Septics

- Unsuitable for Septic
- Suitable for Septic
- City of Afton

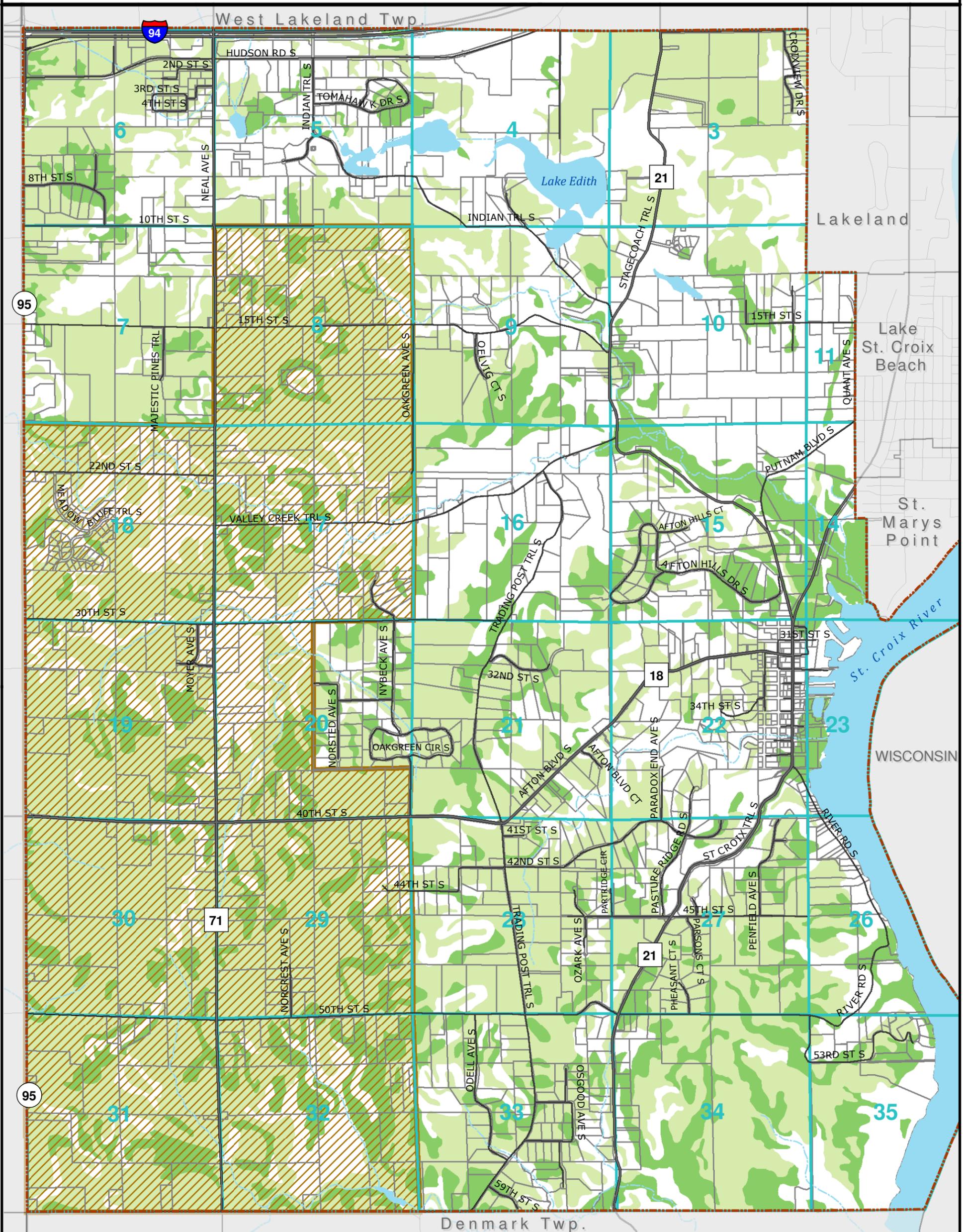
- Section Lines
- Parcel Boundaries
- Major Roads
- Local Road

- Lakes & Rivers
- Streams



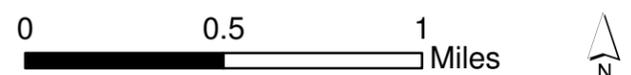
Prime Agricultural Land

MAP 3



- Agricultural Class**
- Prime Soils (Class I & II)
 - Soils of Statewide Importance
 - Area Meeting Met Council Prime Ag Criteria
 - City of Afton

- Section Lines
- Parcel Boundaries
- Roads**
- Major Roads
- Local Road
- Lakes & Rivers
- Streams



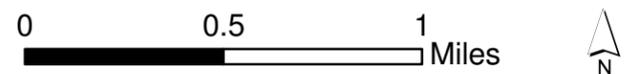
Afton

Physical Features

MAP 4



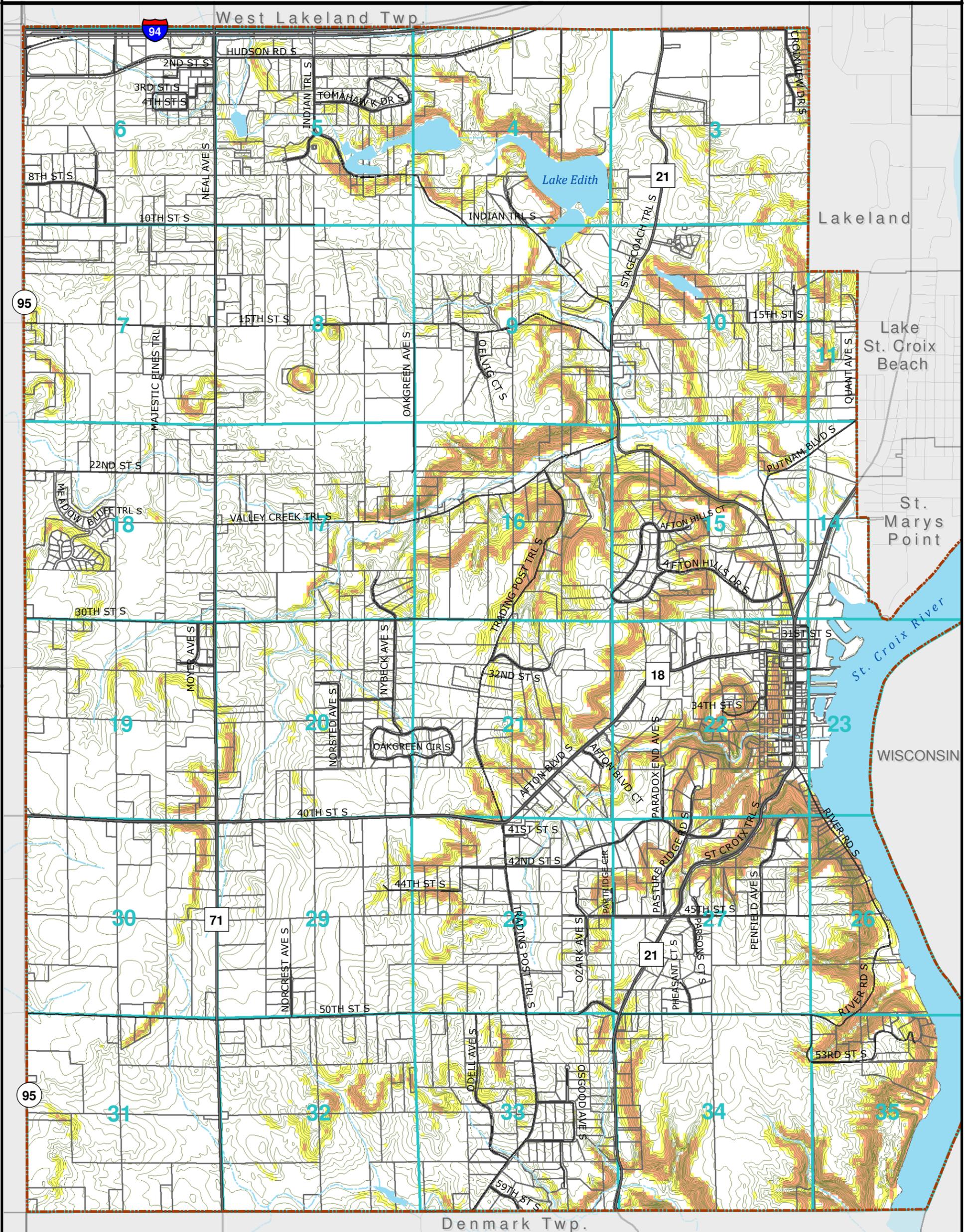
- | | |
|----------------------------|-------------------|
| Natural Features | Section Lines |
| Brushland and Grassland | Parcel Boundaries |
| Tree Cover | Major Roads |
| Wetlands | Local Road |
| Aggregate Resources (2020) | Lakes & Rivers |
| City of Afton | |



Afton

Topography & Steep Slopes

MAP 5



Steep Slopes

- Slope Greater than 12%
- Slope Greater than 18%
- 10-Foot Contours

- City of Afton
- Section Lines
- Parcel Boundaries

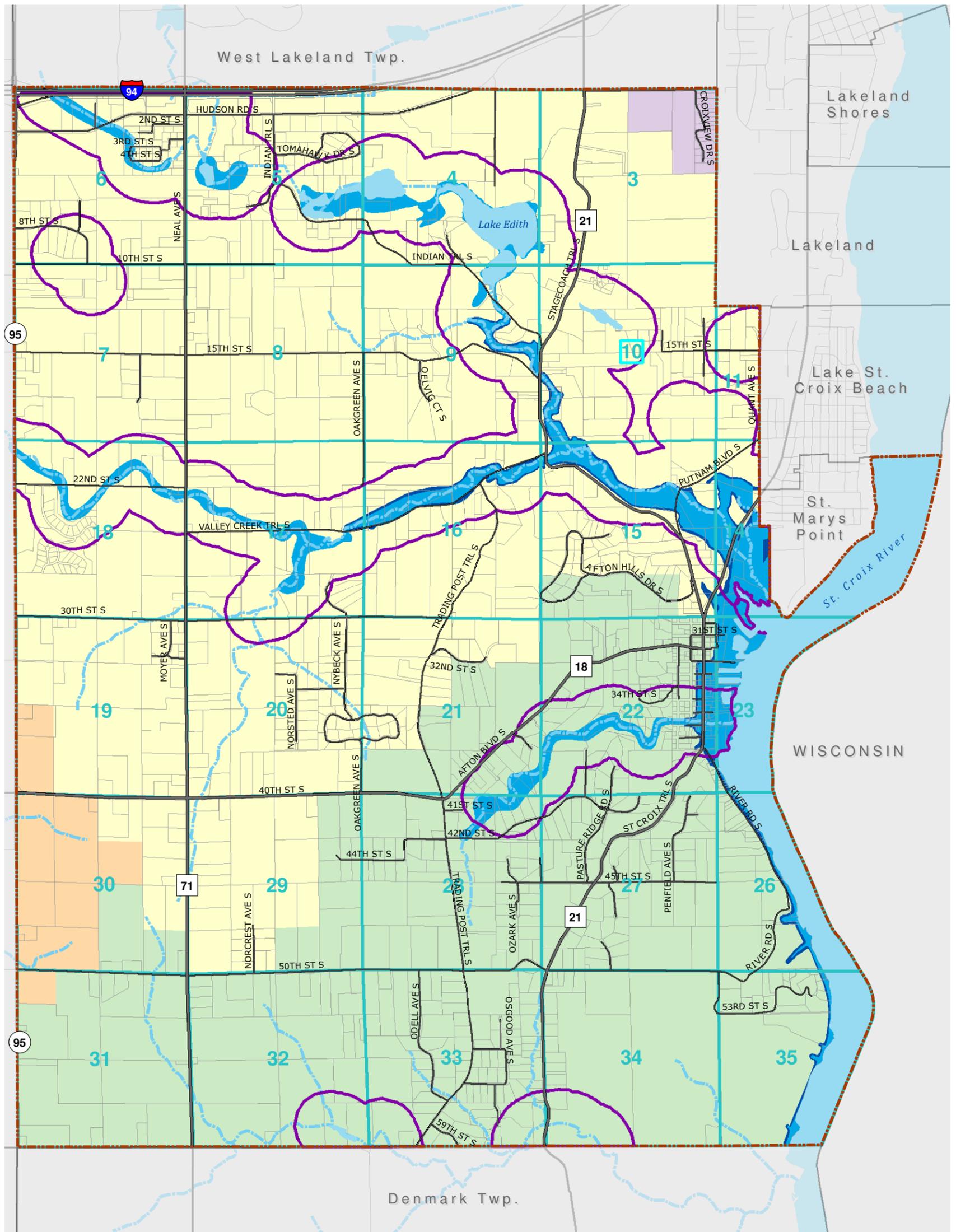
- Major Roads
- Local Road
- Lakes
- Streams

0 0.5 1 Miles



Afton

Surface Water Features & Watershed Districts MAP 6



Watershed District / WMO

- Lower St. Croix WMO
- Middle St. Croix WMO
- S. Washington Watershed
- Valley Branch Watershed
- Shoreland Management Areas

FEMA Floodplain

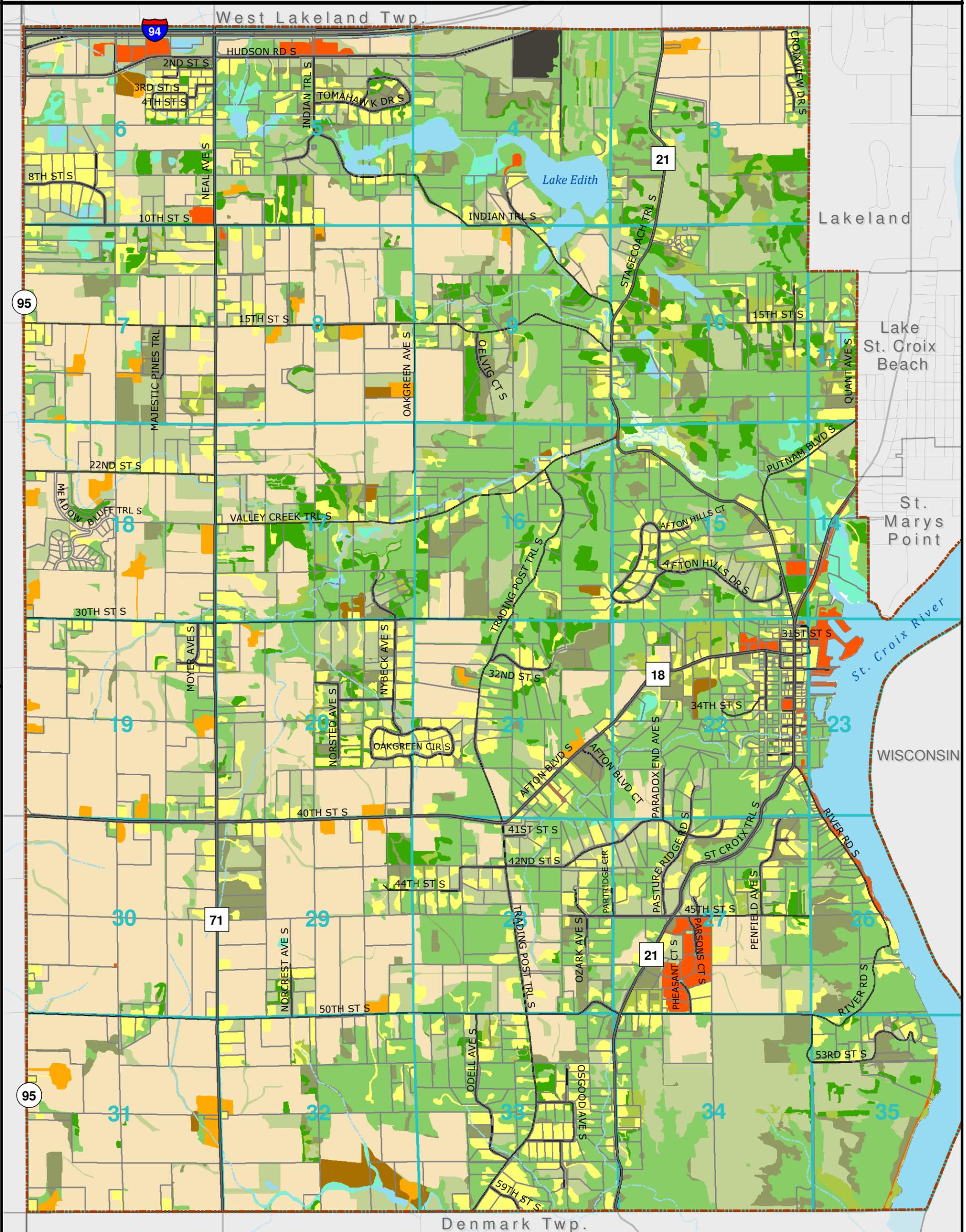
- 100-Year Floodplain
- 500-Year Floodplain
- City of Afton
- Section Lines
- Parcel Boundaries

Roads

- Major Roads
- Local Road
- Lakes
- Streams

0 0.25 0.5 1 Miles



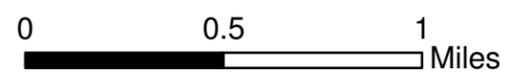


Land Use Categories

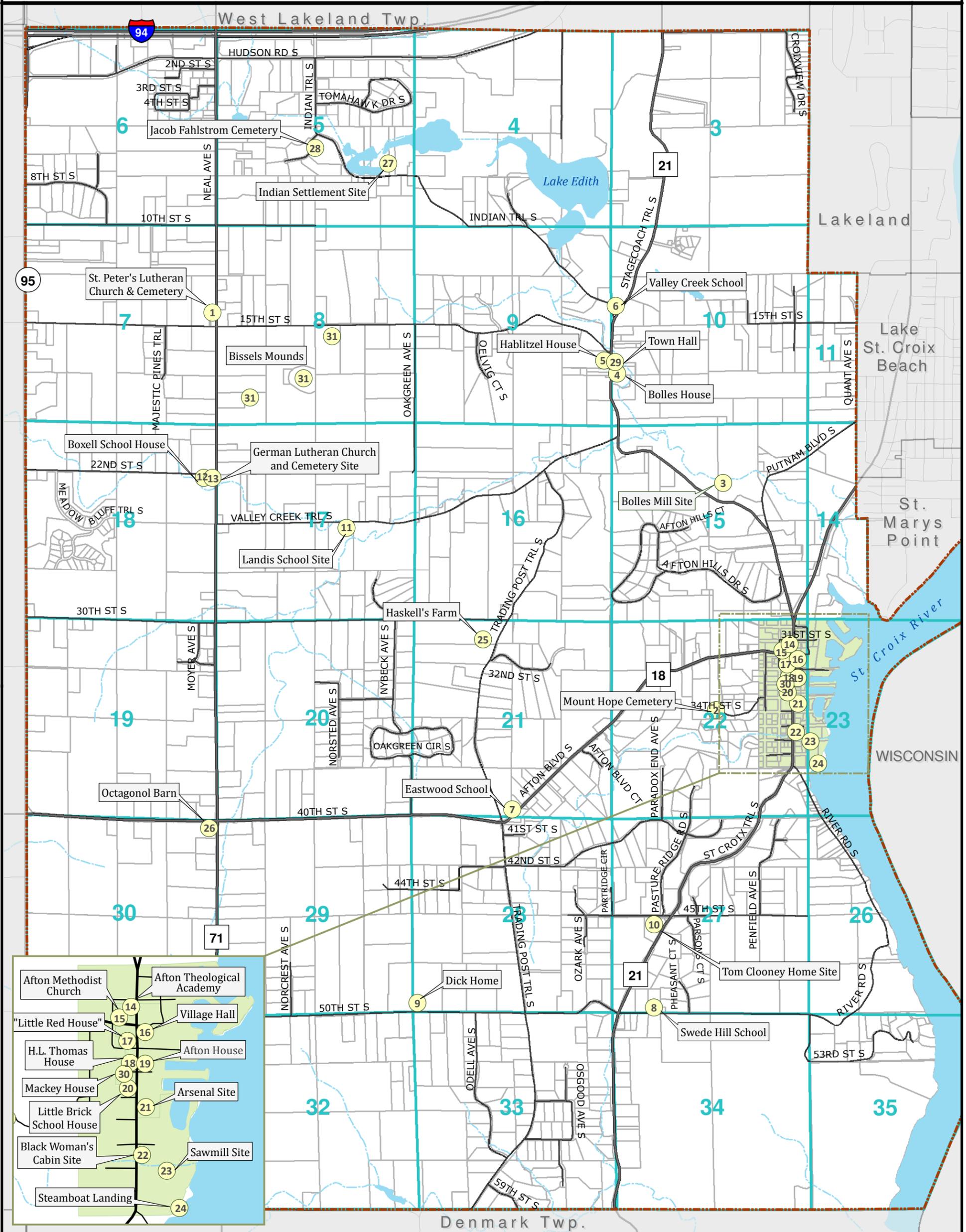
- Stream or Water Body
- Wetland
- Belwin
- Tree Cover - Coniferous
- Tree Cover - Deciduous
- Tree Cover - Mixed
- Brushland
- Grassland
- Pasture
- Cultivated
- Farmstead

Roads

- Residential
- Developed
- Roadway
- Mining
- City of Afton
- Parcel Boundaries
- Major Road
- Local Road
- Section Lines
- Lakes
- Streams



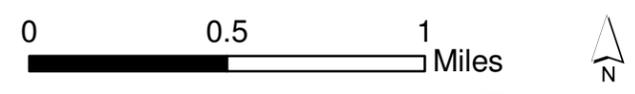
Afton



Village Historic Site

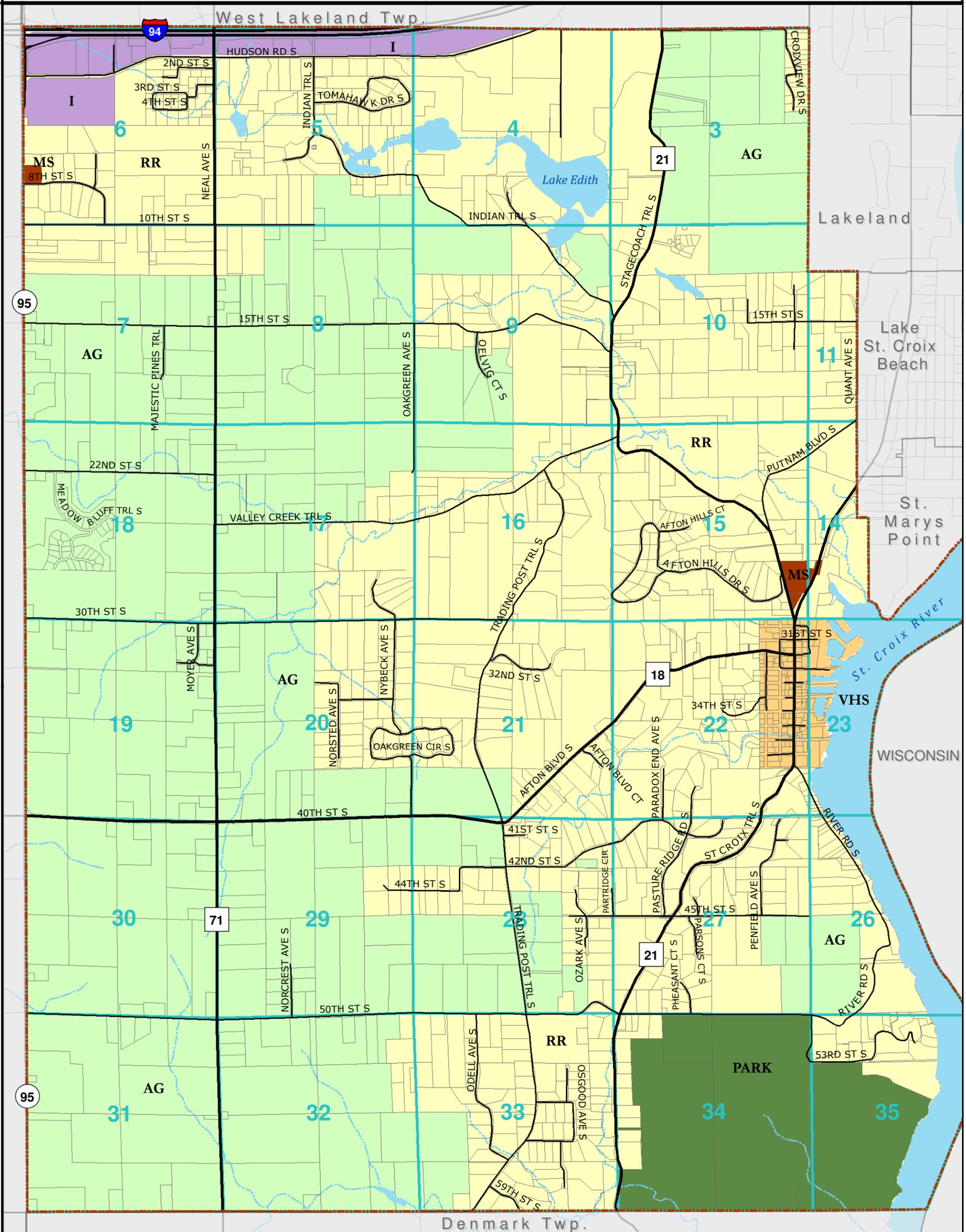
- 14 Afton Methodist Church
- 15 "Little Red House"
- 16 Village Hall
- 17 H.L. Thomas House
- 18 Mackey House
- 19 Little Brick School House
- 20 Black Woman's Cabin Site
- 21 Afton House
- 22 Arsenal Site
- 23 Sawmill Site
- 24 Steamboat Landing

- Historic Site
- Village Historic Site
- City of Afton
- Parcel Boundaries
- Section Lines
- Roads**
- Major Roads
- Local Road
- Lakes
- Streams



Future Land Use

MAP 9

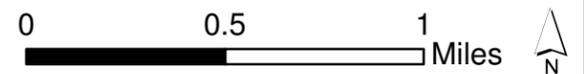


Future Land Use

- Agriculture
- Industrial
- Village Historic Site
- Rural Residential

- State Park
- Marina Services
- City of Afton
- Parcel Boundaries

- Section Lines
- Major Road
- Local Road
- Streams
- Lakes & Rivers



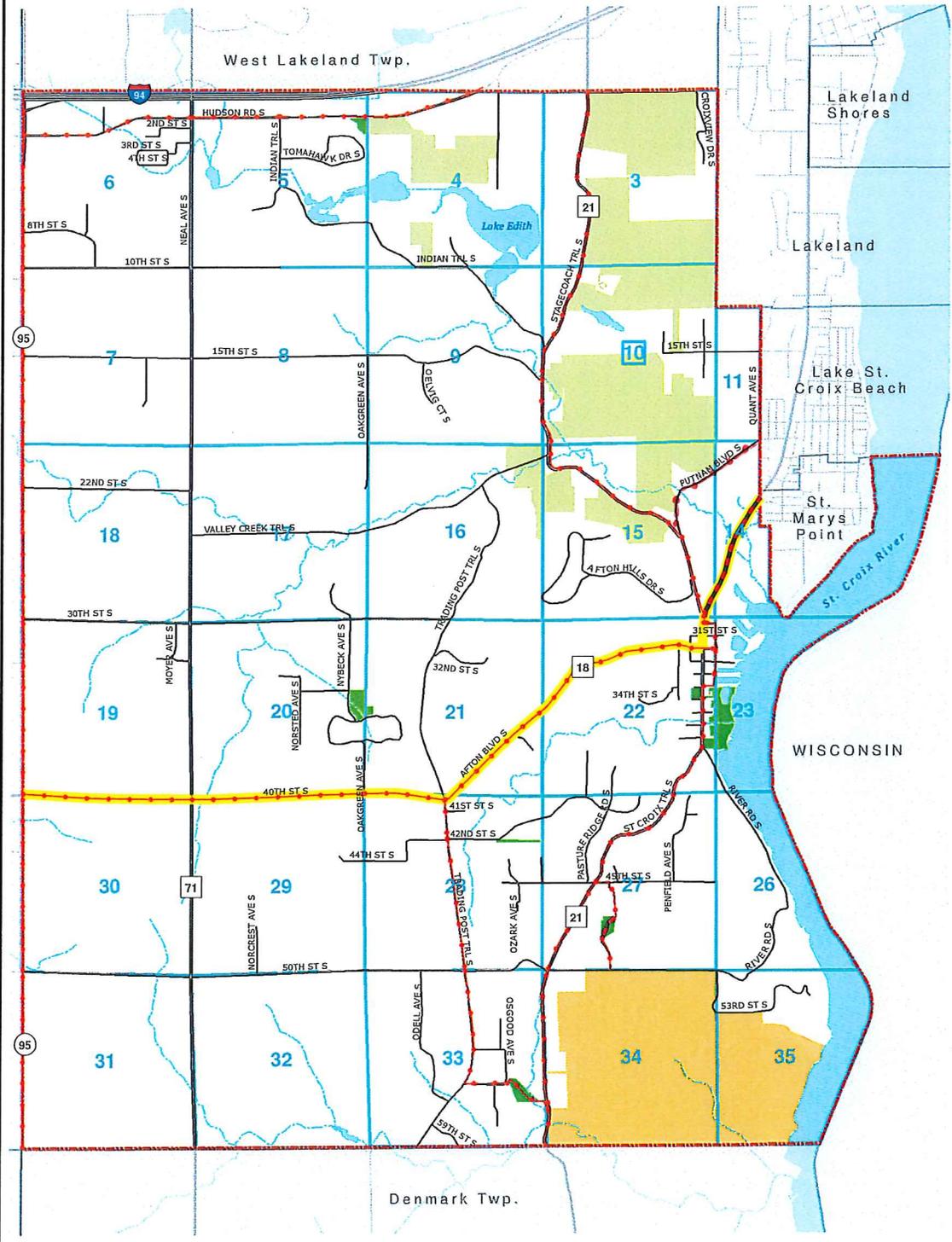
Current Households	Forecasted Households	Distributed to Agriculture District	Distributed to Rural Residential
1100	1250	50	100

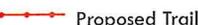
Map prepared October 2010 1000 Friends of Minnesota TRC
 Data Sources: City of Afton, Metropolitan Council, MN DNR, MN DOT, & Washington County



Parks and Open Spaces

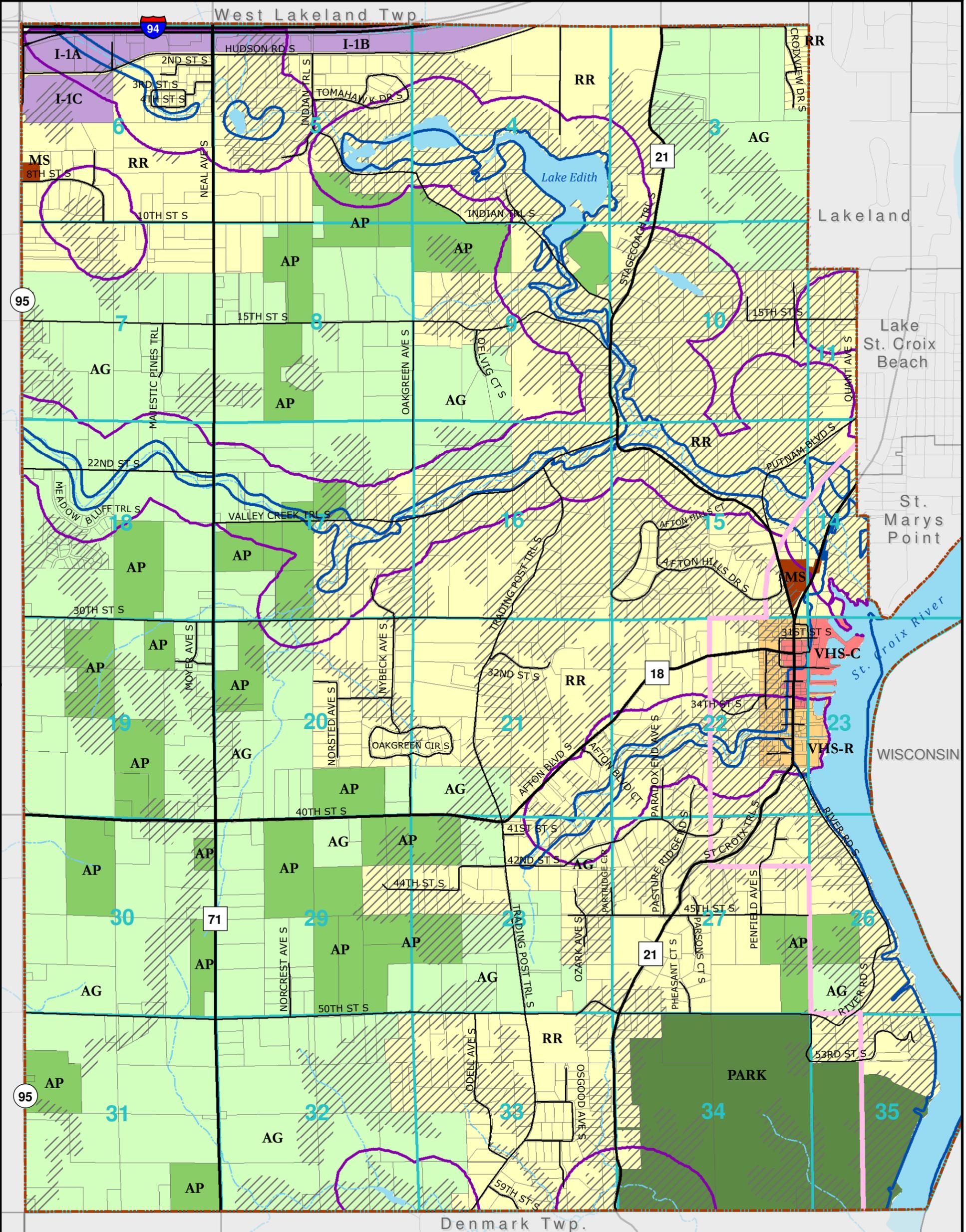
MAP 10



	Existing City Park	Trail System		Existing Trail		Roads		
	Afton State Park			Proposed Trail		Major Road		
	Belwin Property			Afton Bluffs Regional Trail		Local Road		
	City of Afton					Lakes		
	Section Lines					Streams		

Zoning Map

MAP 11



Zoning Districts

- Agriculture
- Ag Preserve
- Village Historic Site- Commercial
- Industrial
- Village Historic Site- Residential
- Rural Residential

- State Park
- Marina Services
- Conservancy Overlay
- St. Croix River Bluffland
- Floodplain Overlay (100 Year)
- Shoreland Management Areas

- City of Afton
- Parcel Boundaries
- Section Lines
- Major Road
- Local Road

Streams 0 0.5 1 Miles



PART III — URBANIZATION

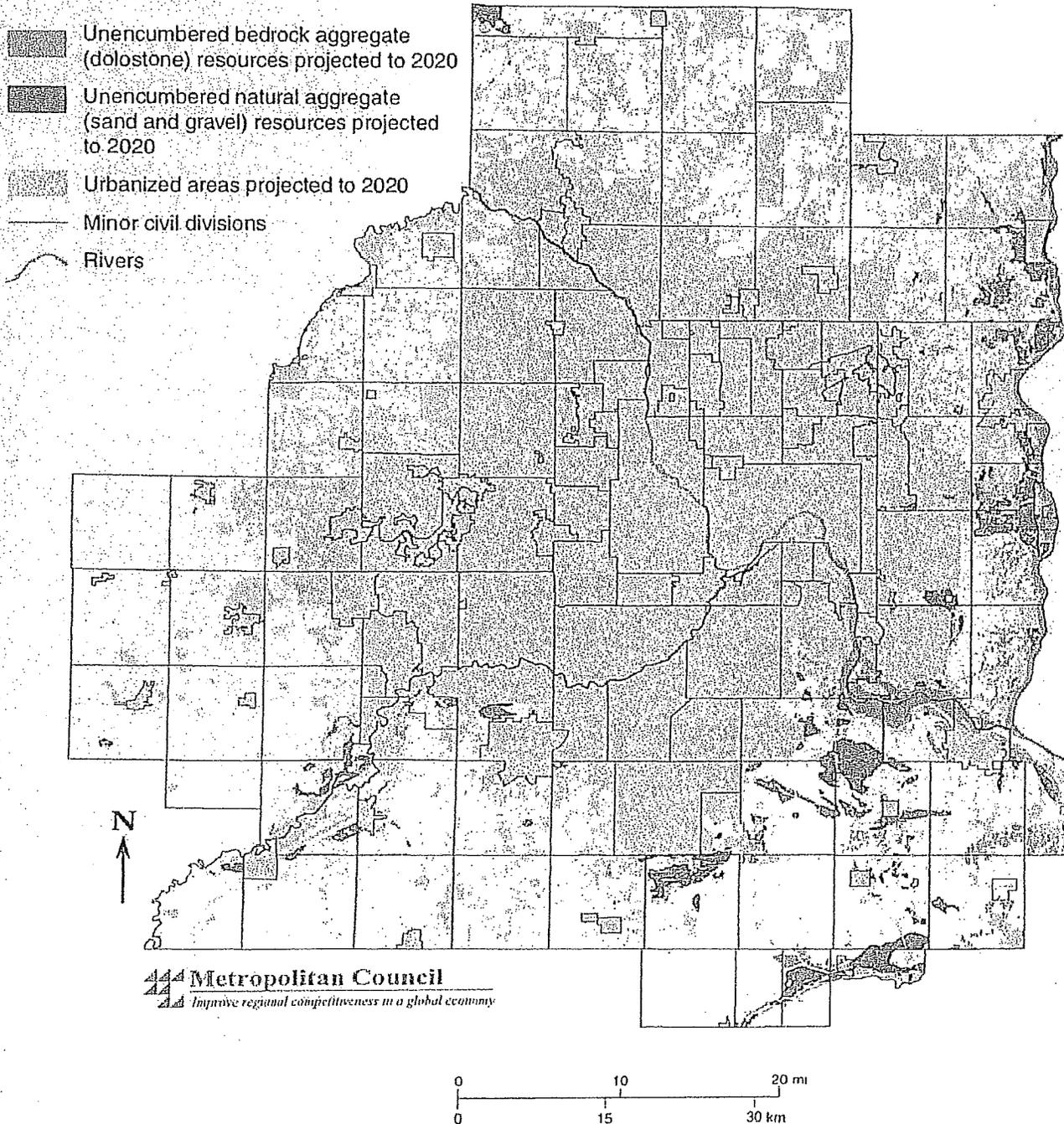


Figure 15. Map showing the projected extent of urbanized areas in 2020, and the aggregate-bearing lands that are projected to be unencumbered by alternative land uses in 2020.

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VENDOR COPY

WASHINGTON COUNTY

Contract # 5253

APR 29 2009

Dept. PHE
Div. SEPTIC
Term 1/1/09 - 12/31/10

CITY OF AFTON

Agreement for Individual Sewage Treatment System Inspection Services

20490

This agreement is made and entered into, by and between the County of Washington (hereinafter referred to as the County) and the City of Afton (Hereinafter referred to as the City).

I. WITNESSETH

WHEREAS, the City wishes to contract with the County to perform individual sewage treatment system (ISTS) inspection services within the City's boundaries; and

WHEREAS, the City adopted an Individual Sewage Treatment System Regulations Ordinance, hereinafter ISTSRO, regulating individual sewage treatment systems which is consistent with or more restrictive than the County's Individual Sewage Treatment System Regulations Ordinance #128 (Washington County Development Code Chapter 4), which applies to all areas of the City; and

WHEREAS, the County agrees to provide individual sewage treatment system inspection services under the terms and conditions hereinafter set forth; and

WHEREAS, this contract is authorized under Section 471.59 of the Minnesota Statutes.

NOW THEREFORE, it is mutually agreed between the County and City as follows:

II. SCOPE OF SERVICES

County's Responsibilities

1. The County agrees to provide, through its Department of Public Health and Environment, individual sewage treatment system inspection services for the City. The County shall provide a Qualified Employee(s), as described in Minn. Rule 7083.1010 and 7083.0020 subp 17.
2. The standards of performance, method of providing individual sewage treatment system inspection services, and other matters incident to the performance of services under this Agreement, including personnel to be employed, shall be determined by the County. The City shall be notified in advance of any proposed changes in standards of performance or methods of providing services.
3. The County shall provide the necessary ISTS application review and sewage system plan approval as required by laws, regulations and ordinances, provide all job site inspections of projects under permit, and conduct special inspections as deemed necessary to ensure compliance with the ISTSRO. Services shall include clerical support incidental to the performance of this agreement.

RECEIVED
MAR 26 2009
PUBLIC HEALTH

4. The County shall provide to the City all applications for new sewage permits to determine compliance with existing city zoning/land use ordinances and laws within 5 (five) working days of receipt of said application.
5. The County shall provide and issue all sewage permits as required by the ISTSRO, existing laws or regulations and shall maintain records of all such permits. A copy of each granted permit shall be submitted to the City within 5 (five) working days of the County granting the permit.
6. The County shall notify the City of the issuance of a certificate of compliance of the sewage system's completion within 10 (ten) working days.
7. In the event of a violation or threatened violation of the ISTSRO or sewage permit the County may pursue the administrative issuance of stop work orders, corrective orders, and notices of non-compliance.
8. The County shall advise the City if a misdemeanor citation is warranted for any violation of a sewage permit or ISTSRO.
9. The County may request appropriate actions or proceedings be brought by the City, to prevent, restrain, correct or abate violations or threatened violations of a sewage permit or ISTSRO.
10. The County will cooperate with the City's officials and/or employees in fulfilling its obligations under this Agreement.
11. The County is required to update the County ISTS Ordinance #128 to comply with changes to Minnesota Rules Chapters 7080 to 7083 by February 2010. The County will advise the City within 5 (five) working days of adoption of the revised County ISTS Ordinance.

City's Responsibilities:

1. Upon receipt of the all applications for new sewage permits from the County, the City shall review all applications determine compliance with existing city zoning/land use ordinances and laws. The City shall notify the County within 5 (five) working days of receipt of the application only if the sewage permit request does **not** comply with city zoning/land use ordinances and laws.
2. In areas not served by municipal sewer, the City shall not issue a building permit for new dwelling construction and/or for the addition of bedrooms until the County has issued a sewage permit.
3. The City shall act on all applications for special permits and variances to the ISTRO.

4. Upon request from the County the City shall issue a stop work order on projects commencing construction prior to the issuance of a sewage permit.
5. The City is responsible for appropriate actions or proceedings to prevent, restrain, correct or abate violations or threatened violations of a sewage permit or ISTSRO and shall represent the County during appeals of the administrative remedies issued by the County.
6. The City may issue misdemeanor citations for violation of the ISTSRO or sewage permit.
7. The City shall not issue a certificate of occupancy prior to receipt of the County's certificate of compliance.
8. The City, and its agents and employees, will cooperate and assist the County in the performance of this Agreement.
9. The City shall adopt a revised ISTS Ordinance which is consistent with or more restrictive than the County's revised ISTS Ordinance no more than 12 (twelve) months after the County revised ISTS Ordinance is adopted.

III. SCHEDULE OF FEES AND CHARGES

1. The County shall establish the schedule of fees for its individual sewage treatment system inspection services. The County shall collect, receipt for, disburse and maintain records for all fees and charges collected incident to the administration of individual sewage treatment system inspection services contained herein.
2. Fees and charges shall be due and payable by the permittee upon issuance of the permit and will be collected by the County from the applicant for said permit.
3. For permit fee purposes, the septic permit application and installation fees shall be in accordance with the fee schedule adopted annually by the Washington County Board of Commissioners.
4. The City agrees that in payment for the individual sewage treatment system inspection services provided by the County that the County shall retain, out of the fees and charges collected incident to this service, an amount equal to one hundred percent (100%) of all ISTS permit fees.
5. The City shall not assume any liability for the direct payment of any salary, wage, or other compensation to any County employee performing individual sewage treatment system inspection services pursuant to this agreement.

IV. GENERAL TERMS AND CONDITIONS

Data Privacy

1. All data collected, created, received, maintained or disseminated for any purposes by the activities of the County because of this Agreement is governed by the Minnesota Government Data Practices Act, Minnesota Chapter 13, as amended, the Minnesota Rules implementing such Act now in force or as adopted, as well as Federal Regulations on data privacy, including but not limited to, the Health Insurance Portability and Accountability Act (HIPAA) where it applies. The City and County agrees to abide by these statutes, rules and regulations and as they may be amended.

Indemnity Clause

2. The City agrees that it will indemnify and hold harmless the County, its officers and employees, against any and all liability, loss, costs, damages and expenses which the County, its officers or employees may hereafter sustain, incur, or be required to pay arising out of the City's negligent performance or failure to adequately perform its obligations pursuant to this Agreement.

The County agrees that it will indemnify and hold harmless the City, its officers and employees, against any and all liability, loss, costs, damages and expenses which the City, its officers or employees may hereafter sustain, incur, or be required to pay arising out of the County's negligent performance or failure to adequately perform its obligations pursuant to this Agreement.

Insurance

3. The City further agrees that in order to protect itself, as well as the County, under the indemnifications provisions set forth above that it shall at all times during the terms of this Agreement, provide maximum tort liability limits as set forth in Minnesota Statute 466.04. This provision shall be set as a condition subsequent; failure to abide by this provision shall be deemed a substantial breach of contract.

The County further agrees that in order to protect itself, as well as the City, under the indemnifications provisions set forth above that it shall at all times during the terms of this Agreement, provide maximum tort liability limits as set forth in Minnesota Statute 466.04. This provision shall be set as a condition subsequent; failure to abide by this provision shall be deemed a substantial breach of contract.

Independent Contractor

4. Nothing contained in this Agreement is intended or should be construed as creating the relationship of co-partners or joint ventures between the County and City. No tenure or any

rights or benefits, including workers compensation, unemployment insurance, medical care, sick leave, vacation leave, severance pay, PERA, or other benefits available to County employees shall accrue to the City or employees of the City performing services under this Agreement.

Records – Availability and Retention

5. Pursuant to Minnesota Statute 16C.05, Subd 5., the County/City agrees that the County/City, the State Auditor, or any of their duly authorized representatives at any time during normal business hours and as often as they may reasonably deem necessary, shall have access to and the right to examine, audit, excerpt, and transcribe any books, documents, papers, records, etc. which are pertinent to the accounting practices and procedures of the County/City and involve transactions relating to this agreement. The County/City agrees to maintain these records for a period of six years from the date of termination of this Agreement.

Nondiscrimination

6. During the performance of this Agreement, the City and County agrees to the following:

No person shall, on the grounds of race, color, religion, age, sex, disability, marital status, public assistance status, criminal record, creed or national origin be excluded from full employment rights, participation in, be denied the benefits of or be otherwise subjected to discrimination under any and all applicable Federal and State laws against discrimination.

Merger and Modification

7. It is understood and agreed that the entire Agreement between the parties is contained here and that this agreement supersedes all oral agreements and negotiations between the parties relating to the subject matter.

Any material alterations, variations, modifications, or waivers of provisions of this Agreement shall be valid only when they have been reduced to writing as an amendment and signed by the parties.

Severability

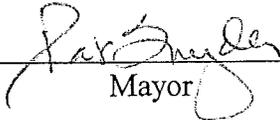
8. Every section, provision or part of this Agreement is declared severable from every other section, provision or part thereof to the extent that if any sections, provision or part of this Agreement shall be held invalid by a court of competent jurisdiction, it shall not invalidate any other section, provision or part thereof.

V. TERM AND EFFECTIVE DATE

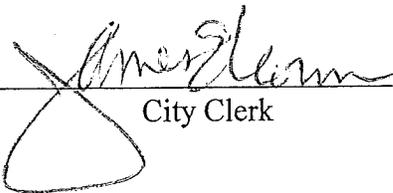
1. The effective date of this agreement shall be January 1, 2009, notwithstanding the date of the signatures below.
2. This agreement shall run until December 31, 2010, at which time it will automatically terminate unless it is renewed by official action of both the City and the County prior to the termination date. Notice of either the City's intent or the County's intent not to renew the agreement should be given to the other party ninety (90) days in advance of the December 31, 2010, termination date.

IN WITNESS WHEREOF, the City has caused this agreement to be signed by its Mayor and attested to by its Clerk, and the County of Washington, by order of its Board of County Commissioners, has caused this Agreement to be signed by its Board Chair and attested to by its County Administrator.

City of Afton, Minnesota

By: 
Mayor

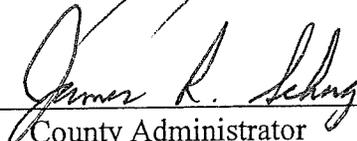
Date: 3-20-09

By: 
City Clerk

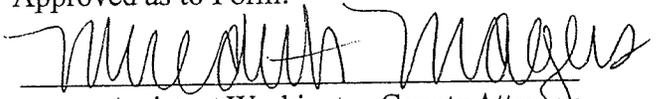
Washington County, Minnesota

By: 
Chair, Board of Commissioners

Date: 4/21/09

By: 
County Administrator

Approved as to Form:


Assistant Washington County Attorney

ORDINANCE 08-2010

**CITY OF AFTON
WASHINGTON COUNTY, MINNESOTA**

**AN ORDINANCE TO AMEND CHAPTER 12, ARTICLE IX, BY AMENDING SECTION 12-1952
AND REMOVING SECTIONS 12-2006, 12-2041, 12-2042, 12-2043, 12-2044 AND
REPEALING DIVISION 3 IN ITS ENTIRETY AND ADOPTING WASHINGTON COUNTY
ORDINANCE #179 BY REFERENCE.**

THE CITY COUNCIL OF THE CITY OF AFTON, MINNESOTA HEREBY ORDAINS:

Section 12-1952 of the Afton Code of Ordinances is hereby amended to delete definitions for the following: BOD; Building sewer; Individual sewage treatment system; NPDES permit; Replacement; and Sewage or wastewater.

Section 12-2006 of the Afton Code of Ordinance is hereby deleted and reserved.

Section 12-2041 through 12-2044 of the Afton Code of Ordinances is hereby deleted and reserved.

Division 3 of Article IX of the Afton Code of Ordinances is hereby repealed and replaced by adopting Washington County Development Code, Chapter Four, Ordinance #179 by reference.

This change will take effect upon publication of this ordinance.

PASSED BY THE CITY OF AFTON CITY COUNCIL THIS 21st DAY OF SEPTEMBER, 2010 .

SIGNED:



Pat Snyder, Mayor

ATTEST:



Ronald J. Moorse, City Administrator

MOTION by: Nolz
SECOND by: Nelson
Palmquist: Yes
Richter: Absent
Nolz: Yes
Nelson: Yes
Snyder: Yes

Appendix I - Afton Flora and Fauna

The Valley Creek watershed is located on the eastern edge of the Twin Cities Metropolitan Area and covers approximately 65 square miles that gathers the water eventually giving it to the St. Croix River. Valley Creek is a small (approximately 4.5 miles) but significant stream because it is one of the few remaining high quality trout streams in the Twin Cities Metro Area. Brown, brook and rainbow trout all are found in Valley Creek. The outstanding quality led the DNR to list Valley Creek as a state-designated trout stream. The Valley Creek watershed also is home to more than 20 endangered, threatened, and special concern species, including the American brook lamprey, the Hooded Warbler, and Blandings turtle. The exceptional habitat value of Valley Creek has been identified in Minnesota's State Wildlife Action Plan, which identifies Valley Creek as a "Key River Reach".

Valley Creek also is home to a species of crane fly (genus *Phantolabis*) previously un-described by science and currently the subject of research by the University of Minnesota. The Valley Creek Protection Initiative, composed of the Belwin Conservancy, the Minnesota Land Trust, the Conservation Fund, the Valley Branch Watershed District and Washington County have collaborated to protect and restore scientifically targeted sites (approximately 900 acres) that will ensure the long-term ecological stability of this riparian system. Belwin currently owns approximately 1,400 acres which has enabled a continuous protected corridor along 70% of Valley Creek.

The Middle St. Croix Watershed Management Organization encompasses approximately 19.8 square miles and is located in the east-central part of Washington County. The watershed is unique in that it has many small, parallel watersheds that all flow to the St. Croix, whereas the other watersheds in the County generally have one major drainage way with a headwaters and outlet. Land use in the watershed is evenly distributed between agricultural, rural residential and high-density residential/commercial land uses.

The St. Croix watershed basin consists of approximately 4,918,800 acres, or about 7,700 square miles, of which 2,258,800 acres (or 46%) are located within the state. It is one of the premier mussel habitats in the world, approximately 38 mussel species live in the St. Croix watershed. Additionally, the watershed is home to many highly valued native species such as wolf, bald eagle, peregrine falcon, and Karner blue butterfly.

The population of the basin prior to 1950 was 150,000. In the year 2000 there were 400,000 people. By 2020 it is estimated that there will be over 500,000 people living within the basin,. This increase in watershed residents will likely bring increased urbanization and agricultural activities, additional nutrient and sediment loading from wastewater discharges and polluted runoff, and a continued decline in water quality from these additional loadings The watershed basin has already been impacted by nutrient and sediment pollution.

The Afton Natural Resources Inventory and Stewardship Plan Natural Community Evaluation (2001) identified Kelle's Coulee as the most important and highest quality natural area within the City of Afton. It included mapped areas of native white pine/hardwood forest, mesic oak forest, bedrock bluff prairie and lowland hardwood forest and identified several rare plants, animals and natural communities in the area.

The far upper ephemeral reaches of the Kelle's Coulee stream begin in a rural residential area and pass through relatively low quality field grasses and lawn areas.

The ephemeral reaches of the stream then pass into an average quality area of lowland hardwood forest dominated by red oak. Other trees present include box elder, American elm, black willow, silver maple, hackberry and bur oak. A fairly diverse shrub layer includes common elder, sweet viburnum, red-berried elder, buckthorn, and wild grape. A highly diverse herbaceous layer exists including false Solomon's seal, common burdock, wood nettle, white snakeroot, Virginia waterleaf, sweet cicely, stinging nettle, swamp buttercup, common motherwort, yellow avens, violets, lady fern, jack in the pulpit, and hog peanut. Associate graminoids in the ground layer include Pennsylvania sedge, rice cut grass, and Virginia wild rye.

From this point, the streams perennial flow enters into a moderate quality lowland hardwood forest with small inclusions of black ash seepage swamp. Common tree species include black ash, black cherry, butternut, basswood, black willow, and white oak. The shrub layer is dominated by buckthorn but also contains a good diversity of native species including: speckled alder, blue beech, wild raspberry, common elder and sweet viburnum. A rich diversity of herbaceous species exist in the ground layer, including marsh marigold, marsh fern, yellow avens, wood nettle, Virginia stickseed, jack in the pulpit, saw toothed sunflower, hog peanut, maidenhair fern, wild ginger, horsetail, rice cut grass, giant manna grass, and Canada wild rye.

The perennial flow continues on through a very high quality lowland hardwood forest characterized by an upper canopy of cottonwood, black ash and black willow. Canopy trees in this area are quite large and some are 140+ years in age. Sub-canopy trees include basswood, American elm, sugar maple and hackberry while the shrub layer is composed of buckthorn, pagoda dogwood, and prickly ash. The herbaceous layer is very diverse including wild ginger, common burdock, zig-zag goldenrod, enchanter's nightshade, white avens, pale touch-me-not, Blue cohosh, fringed loosestrife, daisy fleabane, Virginia waterleaf, maidenhair fern, lady fern, Ostrich fern, and scouring rush. Common graminoids include bottle-brush grass, Virginia wild rye, reed canary grass, giant manna grass, and sedge species. This area contains the best quality forest complex within the City of Afton and is designated as Minnesota County Biological Survey site 59 by the MNDNR Natural Heritage Program.

The stream finally leaves the ravine, passes under St. Croix Trail and makes its way through a good quality floodplain forest and out across a small sandy beach to its confluence with the St. Croix River. Common tree species in this area include silver maple, cottonwood, green ash, and American elm. Buckthorn is common in the shrub layer. The herbaceous layer is composed largely of wood nettle, asters, stinging nettle, Virginia wild rye, and rice cut grass.

Appendix J - Public Involvement Planning Process

The City of Afton took a number of steps to measure public input and involve the general public in the assembling of this plan update.

- **Community Survey.** To begin the process, the City of Afton conducted a survey of all residents in 2007. Roughly 37% of the adult population of Afton responded to the survey. The survey probed the preferences of respondents on a number of land use-related issues and potential courses of action the City could pursue.
- **Open House Meetings.** Early in the update process, the City held two open house meetings. These were all-day sessions that gave residents opportunity to stop in any time during a twelve-hour period to register their thoughts on a number of exhibits. The first open house was topically broad and designed to identify the areas of greatest concern for residents as well as what they felt was the most significant opportunities for the community. The second open house meeting probed deeper into identified issues, comparing stated concerns to objectives in the existing Comprehensive Plan and clarifying lines of thinking that were ambiguous or conflicting.
- **Comprehensive Plan Advisory Committee (CPAC).** The City established a CPAC committee that included all members of the Planning Commission (themselves a broad representation of the community) and a number of other interested individuals. These meetings were also open to the public and anyone who attended a meeting was included in the discussion. The CPAC group met monthly throughout the planning process to discuss ideas, review feedback and edit plan drafts.
- **Wiki Group Editing.** During the text editing process, there were a number of individuals from the CPAC and the public that had specific changes they wanted to make to the plan. To accommodate this in a public and transparent manner, the entire draft plan was uploaded to a website that utilized a group collaboration approach known as a wiki. This allowed anyone to register at the site and then make direct changes to the plan that would then be reflected in the current version display on the site. Prior versions were saved along with a record of what had been changed, when and by whom. Participants were allowed also to register comments on each section and the entire process was open to the public. Many substantive changes to the plan were made during this process.
- **Public Hearing.** The Planning Commission received the plan from the CPAC and, after some review and editing, held a public hearing. After hearing comments from the public and making some additional changes in response, the plan was recommended to the City Council for approval.



WASTEWATER COLLECTION & TREATMENT SYSTEM FACILITY PLAN

City of Afton
Washington County, Minnesota

Prepared for:

CITY OF AFTON

Prepared by:

WENCK ASSOCIATES, INC.

1800 Pioneer Creek Center
P.O. Box 249
Maple Plain, Minnesota 55359-0249
(763) 479-4200

WSB & ASSOCIATES, INC.

477 Temperance Street
St. Paul, MN 55101
(651) 286-8450

Professional Engineer Certification

I hereby certify that this report was prepared by me or under my direct supervision and that I am a duly Registered Professional Engineer under the laws of the State of Minnesota.

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I hereby certify that this report was prepared by me or under my direct supervision and that I am a duly Registered Professional Engineer under the laws of the State of Minnesota.

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1.0 Introduction

1.1 BACKGROUND

The City of Afton is located along the St. Croix River in Washington County, Minnesota (Figure 1). Residents are served water by a combination of individual and community water supply wells. The community is unsewered and wastewater needs are met by individual subsurface treatment systems (ISTS)¹ or cluster subsurface sewage treatment systems (SSTS).

A select wastewater service area within the City has been determined and investigated. Wenck Associates, Inc. (Wenck) and WSB & Associates, Inc. (WSB) have been retained to investigate wastewater collection and treatment alternatives to replace existing ISTS. WSB has assessed wastewater collection alternatives and conducted an evaluation of regionalizing to a nearby sewer interceptor. Wenck was retained to assess the probable compliance status of the existing ISTS/SSTS, complete a preliminary soil investigation on designated lands, and to analyze wastewater treatment alternatives for viable long term infrastructure to treat wastewater for the service area.

Based on the 2010 census, there was an average of 2.67 people per household in Afton. The population of the service area is estimated at 182, based on 68 year-round residences at 2.67 people per residence.

¹ ISTS (a.k.a. septic system) is defined in Minnesota Rule Chapter 7080 as a type of Subsurface Sewage Treatment System (SSTS) that treats and disperses wastewater.

1.2 PREVIOUS INVESTIGATIONS

An Unsewered Area Needs Documentation² (UAND) and Community Assessment Report (CAR)³ were completed by Wenck in September 2012. The UAND was completed using records obtained from Washington County, soil survey data, and a visual survey of the area. Information gathered in the UAND was reviewed and incorporated into the findings of the September 2012 CAR.

1.3 REPORT PURPOSE

This facility plan is a planning document for possible long-term solutions for wastewater collection and treatment within the Afton service area. Within this report are developed concepts and a framework to provide sanitary sewer service to existing and future connections in this area. It has been prepared in accordance with MN Administrative Code 7077.0272 for approval by MPCA for use in obtaining funding and an Agency permit for system design and construction of the recommended alternative.

This Facility Plan was prepared in accordance with the requirements of the Minnesota Administrative Rules 7077.0272 and is intended to provide a plan to for the City of Afton. The goals of this plan are as follows:

- Define the existing condition of ISTS/SSTS.
- Estimate future wastewater infrastructure design requirements.
- Identify and investigate wastewater collection and treatment system rehabilitation alternatives that would help mitigate problems associated with existing infrastructure.
- Evaluate the technical, non-monetary, and environmental factors for each of the selected alternatives.
- Estimate the opinion of probable construction costs of each feasible alternative and conduct a 20-year present worth analysis on these alternatives.

² Unsewered Area Needs Documentation is a form created by the MPCA for unsewered communities to complete when applying for funding. The form provides a preliminary status of existing ISTS condition.

³ A Community Assessment Report is a study conducted to evaluate the condition of existing ISTS and evaluate replacement collection and treatment alternatives.

- Determine the impact the proposed improvements will have on user charge rates.
- Present a recommended alternative for approval by the Minnesota Pollution Control Agency (MPCA) to be implemented within the service area.

1.4 PROJECT PLANNING AREA

The Community of Afton is located along the St. Croix River south of Lake St. Croix Beach and east of Woodbury in Washington County, Minnesota. The County Seat, Stillwater, is also located along the St. Croix River approximately 11 miles north of Afton. Washington County is bordered on the east by the St. Croix River, on the west by Anoka, Ramsey, and Dakota counties, north by Chisago County, and on the south by Dakota County. The county has a total area of 423 square miles, of which 392 square miles is land and the rest is water. The service area within the City is outlined within Figure 1. Included within the service area are 77 residential dwellings (66 existing and 11 vacant parcels) and 25 commercial establishments (22 existing and 3 vacant parcels).

2.0 Existing Conditions

2.1 INTRODUCTION

This section summarizes the findings of the existing condition of ISTS/SSTS in the service area. The number of properties currently or historically generating wastewater identified for investigation by the City of Afton was 86. All properties within the service area are served by ISTS/SSTS including some on holding tanks. Existing collection components include only those on private property (building sewer from dwelling to the septic tank). The CAR included a determination of likely ISTS compliance status at each property. In addition, a determination was made as to whether it was feasible to replace the existing system with a combination of ISTS and/or cluster systems to provide compliant wastewater treatment.

2.2 METHODS

During the UAND and CAR field investigations; Wenck was able to complete a visual inspection (from the property boundaries) of existing ISTS with the intent of: documenting Imminent Threats to Public Health or Safety (ITPHS)⁴; assessing likelihood of ISTS protection of groundwater⁵; and evaluating future onsite ISTS alternatives. The determination of ISTS feasibility required an evaluation of the soils. In addition to the soil survey data available, Wenck used existing permit records to evaluate soils throughout the service area.

⁴ ITPHS is defined in 2011 MN Rules Chapter 7080.1500 Subp. 4A. "...a system that is an imminent threat to public health or safety is a system with a discharge of sewage or sewage effluent to the ground surface, drainage systems, ditches, or storm water drains or directly to surface water; systems that cause a reoccurring sewage backup into a dwelling or other establishment; systems with electrical hazards; or sewage tanks with unsecured, damaged, or weak maintenance hole covers."

⁵ Failure to protect groundwater is defined in 2011 MN Rules Chapter 7080.1500 Subp. 4B. "...a system that is failing to protect groundwater is a system that is a seepage pit, cesspool, drywell, leaching pit, or other pit; a system with less than the required vertical separation distance described in items D and E; and a system not abandoned in accordance with part 7080.2500."

Prior to commencement of field work, Washington County provided available past permitting/design/inspection records for individual parcels as well as the GIS shape file of the parcels. Wenck also relied upon the Washington County staff to answer certain parcel specific questions related to past permitting efforts.

Wenck visited the community in August 2010. During field work, wells and ISTS/SSTS were identified and evaluated via a visual survey from the property boundaries. The visual survey was performed to obtain the information found in Section 2.3.

2.3 FINDINGS

The purpose of the visual survey was to obtain:

- information on source of drinking water,
- the type of dwelling or wastewater generator contained within the parcel,
- type of ISTS (if any) currently serving the residence,
- location of the ISTS (if any) relative to required setbacks from wells, property lines, buildings, and surface water features,
- the likely compliance status of the ISTS, and
- the most likely next ISTS to serve the dwelling.

2.3.1 Drinking Water Source

The source of drinking water for the dwellings in the service area is individual and shared wells. The wells identified were either deep (screened at greater than 50 feet below ground surface) or shallow (screened at less than 50 feet below the ground surface or “sand point”). Depth and location of wells must be taken into account when considering setback requirements. Well locations were identified during the visual survey and by the Minnesota Department of Health County Well Index. Table 1 summarizes the makeup of the wells serving the 84 addresses in the service area as discovered during field reconnaissance and as reported by the County Well Index:

Table 1: Existing Well Types

Well Type	Number of Residences Served	Percentage
Shallow (<50')	3	4%
Deep (>50')	24	29%
Unknown	57	67%

2.3.2 Parcel Type

Table 2 summarizes the type of wastewater generating structures in the service area. Data was collected via visual survey and conversations with individuals knowledgeable about the parcel types. An important factor when considering the type of structure existing on a parcel is the flow and strength of wastewater generated. A business will produce a different strength of waste, as well as a different pattern of wastewater flow than a full-time residential home. One address had a septic system present, but did not have structures on the parcel, and was therefore considered vacant rather than residential.

Table 2: Parcel Types

Usage Pattern	Number	Percentage
Residential Only	63	75%
Vacant	2	2%
Business or multi-use	19	23%

2.3.3 ISTS Types

Table 3 provides a breakdown of the ISTS types in the service area for participating properties.

Table 3: Existing ISTS Types

ISTS Type	Number	Percentage
Drainfield	54	63%
Mound	9	10%
Holding Tank	4	5%
Unknown	19	22%

2.3.4 ISTS Likely Compliance Status

Upon visual survey of each individual parcel a determination was made regarding the potential that the ISTS for the dwelling(s) would be compliant or non-compliant with Minnesota Rules Chapter 7080 and Washington County ordinance.

The ISTS that are likely non-compliant were identified as such for one of two reasons; 1) ITPHS as identified from site reconnaissance, or 2) failure to protect groundwater (FTPG).

Table 4 summarizes the likely ISTS compliance status data for the properties. Compliance status is based on county permit information, soils data, information provided by county staff and/or property owners, and our visual survey.

Table 4: Likely ISTS Compliance Status

Status	Number	Percentage
Non-Compliant ITPHS	1	1%
Non-Compliant FTPG	24	29%
Compliant not Meeting Setbacks	15	18%
Compliant Meeting Setbacks	44	52%

Appendix A contains a table that shows the likely compliance status of evaluated addresses.

Figure 2 visually depicts the parcels' likely compliance status.

2.3.5 Existing Septic Tank Compliance

Even though a property's ISTS soil treatment area may be non-compliant, a septic tank may exist at a property that meets current compliance requirements and could be used in a future ISTS or community cluster system. Tanks were evaluated based on permit records. Some tanks were identified during the visual survey that did not have permit records, and could not therefore be considered water-tight.

Table 5: Likely Tank Compliance Status

Status	Number	Percentage
Properties having tanks with a permit	60	72%
Properties having tanks without a permit	23	28%

2.4 CURRENT ENVIRONMENTAL IMPACT

As documented in this section, there was one property identified during the visual survey that was an ITPHS with surfacing effluent. An additional 24 ISTS are currently failing to protect groundwater. An additional 15 of the 59 ISTS that are compliant do not meet one or more required setback to buildings, surface water, wells, or property lines, therefore requiring a variance.

2.5 SUMMARY

Of the 84 addresses that were evaluated, 30% (25 properties) are estimated to have an ISTS in non-compliance. The properties would be considered non-compliant due to surfacing effluent or a drainfield that fails to protect groundwater. An additional 15 were compliant however did not meet appropriate setback requirements.

3.0 Flows & Loadings

3.1 FLOWS & LOADINGS

Appendix D includes anticipated design flow and loadings for the City of Afton service area. Flow estimates were estimated by WSB and Wenck using the MPCA Design Guidance for Large Subsurface Wastewater Treatment Systems, April 2010. Both residential and commercial flows were estimated and are included in Appendix D. Table 6 below summarizes estimated hydraulic and organic loadings.

Table 6: Estimated Hydraulic and Organic Loadings

Parameter	Units	Value	Comments
Hydraulic Loading			
Residential Flow (77 households)	gpd	18,544	Includes vacant parcels (11) in service area
Commercial Flow (22 establishments)	gpd	28,349	Includes vacant parcels (3) in service area
Inflow/Infiltration Allowance	gpd	4,000	200 gpd/in. diameter piping/mile
Total Peak Wastewater Flow	gpd	50,893	Peak Wet Weather Flow
Organic Loading			
Biochemical Oxygen Demand (CBOD)	lb/day	152.4	Residential & Commercial
Total Suspended Solids (TSS)	lb/day	126.6	Residential & Commercial
Ammonia Nitrogen (NH ₃ -N)	lb/day	10.3	Residential & Commercial
Phosphorus (P)	lb/day	5.5	Residential & Commercial

Using the MPCA Design Guidance and 2011 Minnesota Rules, Part 7081.0120, an average daily flow for each system or wastewater generator is estimated using a formula. This formula calculates a flow based on the number of bedrooms in each of the residences, the treatment system type, and the total number of wastewater generating parcels included in each system. To decipher housing bedroom characteristics in the City of Afton, information from the 2010 US Census Bureau was utilized. This information was then rendered to a study area that includes 77 housing units, including 11 vacant parcels. Flow values for the dwellings were calculated using 2011 Minnesota Rules, Part 7080.1860 and 7081.0120. All commercial establishments' design flows were calculated using MN Rules, Part 7081.0130. Three vacant parcels are included in the design flow. Flow from these parcels was assumed at 500 gpd each. Finally, collection system inflow/infiltration was estimated and included in the total design flow. A detailed design flow calculation is included in Appendix D.

Information regarding the number of users and equivalent dwelling units (EDU) is included below. Determining EDUs is essential as over 50% of the wastewater flow is from commercial users including restaurants, bars, office buildings, banks, retail stores, a hotel, church, and a park. EDU calculations are as follows:

$$(18,544 \text{ gpd residential flow}) / (77 \text{ dwellings}) = 245 \text{ gpd/dwelling} = \text{wastewater flow per EDU}$$

$$(28,349 \text{ gpd commercial flow}) / (245 \text{ gpd/EDU}) = 116 \text{ commercial EDUs}$$

$$\textbf{Total number of EDUs = 77 residential + 116 commercial = 193 Total EDUs}$$

4.0 Need for Wastewater Project

4.1 Health, Sanitation, Economy, and Security

Afton, MN is a popular destination venue with its historical Old Village district and proximity to the St. Croix River. This location within the City is protected by a levee susceptible to annual flooding of various magnitudes. The levee is not FEMA accredited and deficiencies have been identified by the U.S. Army Corps of Engineers inspection efforts. Substantial flooding has occurred within the City in 1965, 1969, 1993, 1997, and 2001 with smaller flooding events occurring in other years. These flooding events have caused considerable damage. Associated expenses and impacts have caused a significant financial burden to not only the City and its Old Village, but its residents and other businesses.

Many non-compliant ISTS/SSTS serving residential dwellings and commercial establishments within the Old Village are inadequately treating wastewater. During these flooding events, discharge of inadequately treated wastewater occurs and has the potential to expose the public to infectious diseases caused by pathogenic organisms. The proposed project will replace non-compliant ISTS/SSTS and remove systems from levee associated flooding events. In addition, the improvement of these ISTS/SSTS will allow the necessary levee improvements to occur. These essential ISTS/SSTS and levee improvements will greatly reduce damage, financial, health and sanitation impacts to the City, residents, businesses, and general public.

4.2 System Operation and Maintenance (O&M)

Currently each homeowner and business is responsible for maintenance and upkeep of their own ISTS/SSTS. These systems are operated and maintained in variable conditions.

4.3 Growth

A modest growth is anticipated for the City of Afton service area over the next 20 years. Included in the design flow and loading estimates are 77 residential dwellings (66 existing and 11 vacant parcels), or a population of 206 people, and 25 commercial (22 existing and 3 vacant parcels) establishments. The estimated existing population within the service area is 176 people. Therefore, the design includes an estimated population growth of 30 people (17%) over the next 20 years.

5.0 Alternatives Analysis

5.1 INTRODUCTION

When considering alternatives for long term wastewater infrastructure, two primary components need to be evaluated. These components are:

1. Collection: The means in which wastewater leaves the individual structure and is conveyed to the primary treatment unit.
2. Treatment: Removal of pathogens and nutrients in primary, secondary, and tertiary processes. Treatment also includes the distribution of treated effluent to surface waters, the ground surface, or subsurface soils.

The following alternatives are available for long-term wastewater infrastructure and have been evaluated to serve the City of Afton service area:

- Collection Alternative 1: Gravity Collection System
- Collection Alternative 2: Low Pressure Forcemain Collection System
- Treatment Alternative 1: No Action
- Treatment Alternative 2: Existing homes install compliant ISTS
- Treatment Alternative 3: Cluster LSTS for the entire community
- Treatment Alternative 4: Regionalization to Metropolitan Council Environmental Services (MCES) sewer interceptor

5.2 COLLECTION SYSTEM

WSB completed a collection system alternatives analysis. Results of this evaluation provided by WSB, including descriptions of alternatives are found in the following sections.

5.2.1 Collection System Alternatives

Two alternatives were evaluated for collection of wastewater from properties within the proposed service area. The alternatives include: 1) gravity collection system; and 2) low pressure forcemain collection. A description of each alternative is presented below.

5.2.1.1 Gravity Collection System

A gravity collection system would be comprised of 8-inch diameter trunk lines that would run along Saint Croix Trail and 8-inch diameter branch lines that would extend from the trunk sewer down the side streets. Individual sewer services would connect the trunk sewer and branch lines and extend to the homes and businesses to be served. The trunk lines on Saint Croix Trail would run to a main lift station located along Saint Croix Trail between 34th Street and 35th Street, which would then pump the flow north through forcemain to the treatment and dispersal system. Figure 5 shows the proposed layout of the gravity collection system alternative. The total estimated capital cost for the gravity collection system alternative is approximately \$1,768,000. A detailed breakdown of the cost estimate is included in Appendix E. The annual operation and maintenance cost for the gravity collection system is estimated to be approximately, \$14,400 per year.

5.2.1.2 Low Pressure Forcemain Collection System

A low pressure forcemain collection system would be comprised of grinder pump stations that would collect wastewater from the individual homes and businesses and then pump the wastewater through small 1.5" and 2 " diameter forcemain lines to a central main lift station located along Saint Croix Trail. The main lift station would then pump the flow north through a 4-inch forcemain to the treatment and dispersal system. This type of system is comprised of many pumps, but has lines buried only to a depth to protect them from freezing. This alternative is estimated to be higher in construction cost than the gravity collection system as

well as higher in operation and maintenance cost, because of the grinder pump maintenance and replacement needs. Typically, a low pressure forcemain collection system is used when it is very difficult or expensive to obtain gravity flow such as around lakes or in bedrock. The total estimated capital cost for the low pressure forcemain collection system alternative is approximately \$2,125,000. A detailed breakdown of the cost estimate is included in Appendix E. The annual operation and maintenance cost for the low pressure forcemain collection system is estimated to be approximately, \$32,600 per year.

5.3 TREATMENT ALTERNATIVE 1 – NO ACTION

ISTS/SSTS serving residents and businesses within the City of Afton service area are posing threat to the general public and surrounding environment. These systems are not properly treating wastewater. Not remediating these issues and continuing to operate in an insufficient manner is not favorable. ISTS/SSTS would continue to discharge inadequately treated wastewater to groundwater, the St. Croix River, and the surrounding watershed. In time, the amount of failures will rise and the associated public health risks will increase. Also, associated pollutant loadings to potable drinking water wells and the watershed will rise. Therefore, the “No Action” alternative is an untenable alternative to protect the water resources in this area.

5.4 TREATMENT ALTERNATIVE 2 – ISTS REPLACEMENT

As stated in Section 2, 30% of ISTS at participating properties are estimated to be in non-compliance. This accounts for some type of imminent ISTS upgrade in the future. Appendix A shows each property’s most likely future ISTS alternative. The type of future ISTS varies based on the lot size, soils at the site, and current land use. Soil suitability was evaluated for all potential ISTS properties in the service area using permit records and soil survey data. Individual borings were not performed at each parcel.

For a dwelling that does not have a suitable area for an ISTS, the next ISTS would likely need to be a holding tank because of the lack of space. Minnesota Rules, part 7080.2200 – 7080.2400 (March 2011) define different ISTS system types; a brief summary of system types is given below:

- **Type 1:** Standard systems including subsurface drain fields or mound systems on undisturbed soils.
- **Type 2:** Holding tanks (tank with a sealed outlet requiring regular pumping), privies, and systems in floodplains.
- **Type 3:** Systems installed on problem soils, disturbed soils, or soils where high groundwater is within one foot of the ground surface.
- **Type 4 and 5:** Commonly referred to as “performance” systems. These systems offer a level of pretreatment through a mechanical treatment unit or media filter prior to discharge to a drainfield or mound. Also included in this category are systems installed with higher soil loading rates or reduced vertical separation distance to groundwater.

Type 1 systems meet all technical rule requirements, have adequate onsite soils, and are able to meet setbacks. Type 2 systems are holding tanks that need visual and/or audible alarms to notify the owner when pumping is required. The lack of an alarm on a holding tank or the neglect of a homeowner not to pump the tank when full can cause an ITPHS and fail to protect groundwater. Type 2 systems also include systems in floodplains. Type 3 systems require county approval, but can be installed on sites where disturbed soils exist or where a variance is required to install a system not meeting typical setbacks. Type 1 systems that do not meet compliance due to FTPG may be upgraded to a Type 4 or 5 systems if they currently have at least one foot of vertical separation. Adding advanced pretreatment (devices that reduce fecal coliform bacteria to less than 10,000 colonies/100 mL) allows wastewater effluent to be discharged with a reduced vertical separation to seasonally saturated soil requirement.

Type 2 (holding tanks) can become necessary on small lots, lots with high groundwater, lots with setback constraints, and/or lots with multiple structures with little usable land. These lot constraints can make the installation of any system that discharges to the soil not permissible. County governments typically will only permit a holding tank system in situations where no other system type is feasible and will not allow them with the construction of new homes. Holding tanks require a higher level of oversight/management than a Type 1 or Type 3 ISTS.

The hesitation for permitting holding tank systems comes from experiences where homeowners take it upon themselves to empty the tank in an unapproved manner or do not pump the tank when full. Not pumping when the tank is full allows it to overflow out the top or through the seam along the top of the tank.

Table 7 summarizes the make-up of the ISTS in the community after upgrades to all parcels (including currently compliant parcels) if all parcels stay on ISTS. Even if a parcel has a currently compliant Type 1 ISTS, the future system type installed when the current ISTS no longer functions as designed may be a Type 2, 3, or 4. This same information is reflected in Appendix A.

Table 7: Community Makeup of Future ISTS by Property

ISTS Type	Number	Percentage
Type 1 (standard)	32	37%
Type 2 (holding tank, privy, floodplain)	7	8%
Type 3 (other, <12", problem soils)	31	36%
Type 4 or 5	16	19%

Data presented in Table 7 indicates that only 37% of parcels have adequate room and suitable soil conditions on their property to install a Type 1 replacement ISTS. Nearly 8% (7 properties) have a Type 2 holding tank as their only feasible ISTS alternative that will require tank pumping on a regular basis. Type 3 systems comprise about 36% (31 properties) of parcels. Most of the Type 3 systems are classified as such because they will require a variance from a required setback (well, property line, surface water, or building) for installation.

Sixteen residences would likely employ a Type 4 ISTS as their system of choice for meeting wastewater treatment and dispersal needs. Type 4 ISTS employ an additional pretreatment unit in addition to the septic tank prior to final dispersal in the soil treatment area. Because of the additional treatment provided, Type 4 systems typically have a smaller landscape footprint

and may also have reduced vertical separation requirements. However, Type 4 systems typically have greater operation and maintenance costs in the form of electricity, chemical, and/or maintenance by a service provider.

Due to the fact the majority (63%) of the existing structures evaluated do not have a suitable site to install a replacement Type 1 ISTS, it has determined to remove the ISTS replacement alternative from consideration.

5.5 TREATMENT ALTERNATIVE 3 - CLUSTER LSTS

When a series of homes, are connected to a decentralized wastewater treatment system, it is commonly referred to as a cluster system. Cluster system ownership, operation, and management occur through a municipality, the formation of a special purpose district (District), or through private ownership. For the purpose of this report the assumption is made that any cluster system would fall under the ownership of the City to qualify for public funding.

Design flows will impact permitting of any wastewater alternative. Average daily flow estimates dictate the level of treatment required and other permitting requirements. For average daily flows greater than 10,000 gallons per day within a ½ mile radius of each SSTS owned by one entity, the system is classified as a Large Subsurface Wastewater Treatment System (LSTS) and permitting is completed through a Minnesota Pollution Control Agency State Disposal System (SDS) Permit. Greater permitting effort increases the overall cost of design, construction, and operation and maintenance as more research and investigation is required upfront and greater pretreatment of effluent would be required.

Because the total daily wastewater flow discharging to the soil is greater than 10,000 gpd, the MPCA recommends the design follow the April 2010 Design Guidance for Large Subsurface Wastewater Treatment Systems. Table 8 lists specific LSTS constituents and limits for soil dispersal. BOD and TSS do not have particular limits per say; however these constituents have

direct correlation to applicable soil loading rates. Simply stated, if the pretreatment technology reduces BOD/TSS, then effluent may be applied to the soil at higher loading rates (gpd/ft²).

Table 8: MPCA LSTS Subsurface Discharge Effluent Limits

Constituent	Limit
CBOD ₅	None, however for system performance this parameter should be low (i.e. less than 30 mg/L)
TSS	None, however for system performance this parameter should be low (i.e. less than 30 mg/L)
Permit alternative #1: Total Nitrogen	10 mg/L end-of-pipe
Permit alternative #2: Nitrate Nitrogen	10 mg/L @ property boundary
Fecal Coliform	None
Phosphorous	None

Of greatest importance is the nitrogen permitting alternatives. The MPCA nitrogen policy was chosen to ensure the state’s groundwater is protected and to provide a consistent technical baseline during permitting. The policy is based on safe drinking water standards set by federal and state laws (40 CFR part 141.62 and Minn. Rules 4717.7500, subp. 68). Two nitrogen treatment performance permitting alternatives are available and include: 1) total nitrogen less than 10 mg/L at the end-of-pipe prior to soil dispersal; and 2) an annual average nitrate-nitrogen limit of 10 mg/L placed at the property boundary.

The first alternative is the simplest and fastest in terms of permitting. This alternative requires the LSTS meet an end-of-pipe (before soil dispersal) limit of 10 mg/L total nitrogen measured as an annual average. A limited hydrogeologic review is required, but nitrogen modeling and the installation of monitoring wells are not.

The second alternative requires a complete hydrogeologic investigation and groundwater monitoring network. An annual average nitrate-nitrogen limit of 10 mg/L would be placed on

monitoring wells at the property boundary. Even with choosing alternative #2, a level of total nitrogen reduction will be required to achieve the nitrate-nitrogen property boundary limit. The actual total nitrogen limit at the end-of-pipe is determined after the hydrogeologic and groundwater investigation. The results of these studies and characteristics of the treatment area's soil will determine the total nitrogen limit provided by the MPCA. If during operation this limit is exceeded, the permittee must evaluate to identify potential problems and may need to apply additional technology/components to reduce total nitrogen, as necessary. Therefore, there is a level of risk as limits are issued by the agency based on model results and, if flawed, corrective measures may be taken to ensure proper nitrogen treatment is achieved.

5.5.1 Treatment and Dispersal System

5.5.1.1 Soils

Evaluating the receiving environment is critical in determining suitable areas and site capability to safely treat and disperse wastewater. This information is very useful in ruling specific areas favorable or non-favorable and gaining knowledge of potential soil-based treatment system types. Soil information that aids decision making includes soil texture, soil structure, drainage, permeability, high water table depths, flooding, ponding, and depth to the limiting condition: seasonal groundwater, bedrock, or an impermeable soil layer.

During the preparation of the CAR, property access was allowed for a soil investigation on two sites designated as potential treatment areas nearby Afton; 1) property located south of town, MSJR Properties, Jean Langlais, 15923 45th Street South; and 2) property located north of town, David Eastwood, 2318 St. Croix Trail South (Figure 3). The field investigations, reviewing soil maps, and general viewing of the property reveal that soil at both locations would be suitable for a soil-based dispersal component; however the CAR concluded that the northern property is much more favorable (Figure 4).

Soils are mapped across the north property as the Burkhardt and Mahtomedi loamy sand. These deep, lacustrine outwash soils are found on outwash plains, terraces, and moraines.

Eight soil borings were completed within this area to an average depth of 72-inches below grade. Within the profile, loamy sands and sands extend to coarse sands with no signs of redoximorphic features or bedrock observed. Soil loading rates within this area could be up to 1.6 gpd/ft² as highly pretreated effluent would be applied. Figure 4 shows locations of recorded soil borings at the north site. Boring results are located in Appendix B.

5.5.1.2 Soil Dispersal

Soils of the selected north site are favorable for the use of in-ground soil dispersal technologies. Seepage beds have been chosen as they would best suit the site in terms of construction and long-term operation.

Pressurized in-ground infiltration seepage beds are first excavated to designated bottom elevations and suitable aggregate is placed into the excavation until the top of the aggregate is at the elevation of the distribution piping. Piping components, typically 2-inch diameter PVC, are utilized. Additional aggregate is placed over the distribution laterals and covered with a geotextile fabric. Finally, backfill is placed on top of the fabric. Effluent is pumped into the distribution piping at specific rates and volumes for infiltration into the soil. Because of the loamy sands and sands and no signs of seasonal groundwater, the seepage cells would be completely below grade and can be loaded up to 1.6 gpd/ft².

Actual infiltrative surface area constructed and in operation is described in Attachment 7 of the LSTS guidance document and requires that the constructed infiltrative area be completed as follows:

- (1) Divide the total design wastewater flow by the soil loading rate = infiltrative area required.
- (2) Multiply the total infiltrative area by 2.0; this accounts for the reserve area.
- (3) Construct and operate 1.5 times the area required; the remaining area (difference of step (2) and (3)) shall be set aside and serve as reserve/replacement area.
- (4) Divide the constructed area in to multiple cells/zones.

The design flow used to calculate the required infiltrative area is 51,000 gpd. Table 9 displays soil loading rates and infiltration areas required. There are several categories of areas; required infiltrative area, reserve area, required constructed area, and estimated constructed footprint. The estimated constructed footprint is the final area required including the expansion/reserve area, component spacing, cell/zone spacing, tanks, required setbacks, pretreatment components, and pipe routing; in other words, the total estimated footprint required for the entire wastewater treatment and dispersal system.

Table 9: Soil Loading Rates and Infiltrative Area Requirements

Dispersal Method	Design Soil Loading Rate (gpd/ft ²)	Required Infiltrative Area (ft ²)	Required Constructed Area (ft ²)*	Resultant Loading Rate (gpd/ft ²)**	Reserve Area* (ft ²)	Total Estimated Constructed Footprint (acre)
Pressurized seepage cells	1.6	31,875	47,815	1.06	15,940	3.0

* Must construct 1.5 times or 150% the required infiltrative area: $31,875 \text{ ft}^2 + 15,940 \text{ ft}^2 = 47,815 \text{ ft}^2$

** Design wastewater flow divided by constructed infiltrative area: $(51,000 \text{ gpd}) / (47,815 \text{ ft}^2) = 1.06 \text{ gpd/ft}^2$

5.5.1.2.1 Environmental Impacts

Air quality: The soil dispersal methods should not have odor problems as highly pretreated effluent would be dispersed below grade.

Water quality: Water quality within the service area would improve. The failing and non-conforming ISTS would be replaced with a functional wastewater treatment component. Highly pretreated effluent would be evenly dispersed to the soil where it recharges the local groundwater.

Floodplains: Afton MN is approximately 60,000 feet above the confluence with the Mississippi River. The approximate 500 year, 100 year, 50 year, and 10 year floodplain elevations are roughly 695 ft, 691.5 ft, 690 ft, and 686.5 ft (Appendix C). The proposed treatment site located

north of town is well above these floodplain elevations and should not be influenced (Figure 4).

Alterations to landforms, streams and natural drainage patterns: The soil dispersal cells would be positioned along the contour. Landforms, streams and drainage patterns within the vicinity of the soil dispersal cells would be unchanged.

Wildlife: Wildlife would be minimally affected by the construction of the facility. The surrounding land use is densely populated residential areas and wildlife corridors in the vicinity have been greatly minimized due to past development.

5.5.1.3 Pretreatment Technology

Utilization of a pretreatment system would provide advanced treatment by lowering the constituents in the wastewater that must be decomposed by biological activity in the soil. Benefits of pretreating include: increased soil loading rates leading to less required infiltrative area, protection of groundwater resources, and increased system life. Examination of feasible pretreatment alternatives is critical in component selection. Within this study, each alternative was evaluated based on the following criteria:

- Ability to achieve regulatory requirements
- Constructability
- Environmental Impacts
- Operation and maintenance requirements
- Opinion of probable costs (20 yr. present worth analysis)

As described earlier, the LSTS would need to address nitrogen treatment by either supplemental components to treat total nitrogen to 10 mg/L end-of-pipe, or treating total nitrogen to greater than 10 mg/L end-of-pipe and monitoring nitrate-nitrogen at the property boundary via groundwater wells. There is risk with this alternative. If these limits are not met at the property boundary, additional components may be needed. Also, due to the sandy textured soils present across the proposed treatment site, there would be minimal nitrogen uptake within the soil. Water movement within the soil would be rapid and dominantly vertical prior to groundwater recharge. By choosing the 10 mg/L total nitrogen end-of-pipe alternative,

the upfront detailed hydrogeological assessment would not be required, monitoring wells do not need to be installed or monitored throughout the life of the system, and most importantly nitrogen treatment uncertainty would be eliminated. Therefore, each alternative will be evaluated on achieving less than 10 mg/L total nitrogen at the end-of-pipe.

Not all common pretreatment technologies would meet the required limit and therefore special design considerations must be applied. Pretreatment devices that are anticipated to reduce total nitrogen to less than 10 mg/L total nitrogen end-of-pipe limit are:

1. Recirculating Gravel Filter (RGF) with an anoxic denitrification filter and carbon source additive.
2. Submerged Attached Growth Bioreactor (SAGB) with carbon additive.
3. Attached growth Aerobic Treatment Unit (ATU) with an anoxic filter and carbon additive.

5.5.1.3.1 Recirculating Gravel Filter

The fundamental components of the RGF system include a septic tank, recirculation tank, the media filter, pumps and controls, and a dose tank for final dispersal. The media filter is a fixed film process in which the wastewater is distributed over the media. Bacteria present in the wastewater attach themselves to the media surface and as more wastewater passes over, aerobic bacteria extract nutrients, organic matter, and pathogens by utilizing the dissolved oxygen within the filtrate. Ambient oxygen is readily available within the filter and promotes various chemical and biological reactions. The wastewater is recirculated through the media for further treatment at 3:1 to 5:1 recirculation ratios. A design consists of select gravel media, coarse rock, pea gravel, underdrain piping, cleanouts, a PVC liner, and a distribution network typically of 1 to 2-inch diameter piping. To meet the LSTS total nitrogen 10 mg/L end-of-pipe limit, supplemental denitrification components would be needed as described below.

Recirculating media filters require routine operation and maintenance responsibilities. Typical tasks include monitoring and logging flows, rotating cells, inspecting pumps and controls,

examining the media filter, field flushing distribution laterals, inspecting filtrate quality, and checking treatment tanks for sludge. The tanks must be pumped periodically (as required by MPCA). Advantages: passive and resilient technology; influent strength capacity; excellent treatment performance; flexibility; straightforward operation and maintenance; low operational costs; limited mechanical and control components; and ease of construction. During normal operation RGFs are very quiet. Disadvantages: media cost and availability; area requirement; and temperature loss during winter months.

5.5.1.3.2 Aerobic Treatment Unit – Attached Growth

An attached growth ATU is a proven pretreatment technology. This packaged unit consists of a precast concrete tank, treatment media substrate, and a remote blower. Wastewater flows up through the media via ambient air which is forced from the blower, through the piping and into the media chamber. It exits the piping at the bottom of the chamber and flows upward lifting aerated wastewater, or mixed liquor, toward the top of the chamber. The mixed liquor gravitates through the media where aerobic bacteria utilize dissolved oxygen to physically break down or digest wastewater constituents.

To achieve sufficient total nitrogen reduction, supplemental nitrification and denitrification components would be required. The nitrification components are similar to that of the ATU where air is forced through a media substrate. Nitrogen not converted to nitrate within the first ATU would be in the nitrification unit. A denitrification unit would also be required to achieve regulatory requirements.

ATUs would require routine operation and maintenance responsibilities. Typical tasks include monitoring and logging flows, inspecting blower and controls, examining the media chamber, inspecting effluent quality, and checking treatment tanks for sludge. Dependent upon use, the tanks will have to be pumped periodically. Advantages: low aerial footprint requirement; operational flexibility; excellent treatment performance; low aesthetic impact; and ease of

construction. Disadvantages: addition of blowers leading to higher operational costs and noise.

5.5.1.3.3 Submerged Attached Growth Bioreactor

The SAGB is similar to a sequencing batch reactor system with an added attached growth media substrate. The system operates on a “fill” and “draw” activated sludge technology where wastewater is cycled through the media. A SAGB is a packaged wastewater system that is delivered complete and prepared for installation within precast concrete tanks. The system includes an anaerobic anoxic chamber, pump tanks, blowers, carbon feed equipment, and the SAGB basin. Most of the processes of this activated sludge/attached growth system occur automatically via system controls however added monitoring is required due to the many processes. Therefore this system requires a skilled operator to successfully monitor and operate.

These systems require routine operation and maintenance tasks for examination of all process streams. This increases operational costs, as additional operator presence is mandatory to adjust timer settings related to the batching. Also, tanks, controls, valves, and pumps must be inspected regularly. Advantages: consistent treatment performance; low aerial footprint requirement; and operational flexibility. Disadvantages: extensive operation, monitoring, and maintenance requirements.

5.5.1.3.4 Anoxic Denitrification Filter

An anoxic denitrification filter is a device designed specifically for total nitrogen reduction. The filter itself includes a media substrate that promotes the growth of denitrifying bacteria which are affixed to the media’s surface area. A circulation pump is included to mix the nitrified wastewater and carbon source additive. As the wastewater passes the media, affixed bacteria uses nitrates within the wastewater (as oxygen is not available) transforming the nitrates to harmless nitrogen gas. As the bacteria die off, they will slough and fall to the tank bottom.

Depending upon the amount of total nitrogen in the wastewater stream, the extent of solids within the device varies.

To ensure there is an adequate carbon source, a flow proportional pump would be utilized to supply a supplemental carbon additive (the electron donor). Dependent upon incoming flow, temperature, detention time, and nitrate concentration, an established amount of carbon additive would be mixed with the nitrified effluent. Implementing this technology, the operator would be able to “dial in” the system to achieve 10 mg/L total nitrogen or lower. Once the proper amount of carbon is established, this system is relatively passive or self-sufficient. Also, as this is an attached growth, or fixed system, it is more resilient to flow fluctuations and atypical conditions that would otherwise hinder the pretreatment process.

5.5.1.3.5 Environmental Impacts

Air quality: The advanced pretreatment technologies described above should not have odor problems. Sewer gases may exit tanks via air vents but odors associated are anticipated to disperse before encountering the general public as the treatment site is relatively remote. The actual pretreatment devices would have minimal odor as highly pretreated aerobic effluent would be discharged to/from components.

Water quality: Water quality within the service area is anticipated to improve. The failing and non-conforming ISTS/SSTS would be replaced with a functional wastewater treatment system. Highly pretreated effluent from the pretreatment device would be evenly dispersed to the soil where it would recharge the groundwater.

Floodplains: Afton MN is approximately 60,000 feet above the confluence with the Mississippi River. The approximate 500 year, 100 year, 50 year, and 10 year floodplain elevations are roughly 695 ft, 691.5 ft, 690 ft, and 686.5 ft (Appendix C). The proposed treatment site located north of town is well above these floodplain elevations and should not be influenced (Figure 4).

Alterations to landforms, streams and natural drainage patterns: Landforms, streams and drainage patterns within the vicinity of the pretreatment system would be unchanged. Subtle drainage patterns that may be altered by installation would be directed around the system. Proper design considerations would be taken into account not to disrupt any natural drainage patterns.

Wildlife: Wildlife would be minimally affected by the construction of the facility. The surrounding land use is densely populated residential areas and wildlife corridors in the vicinity have been greatly minimized due to past development.

5.6 TREATMENT ALTERNATIVE 4 - REGIONALIZATION

WSB has analyzed the regionalization alternative which would consist of connecting to a MCES sewer interceptor. MCES was contacted during the analysis and they determined that the south Washington County interceptor would be viable. This interceptor conveys sewage to the Eagle's Point Wastewater Treatment Facility. MCES concluded this treatment facility has adequate capacity to accommodate wastewater generated within the service area.

The collection system would collect and convey raw wastewater to a lift station. Approximately 33,000 feet of 6-inch diameter forcemain would be routed along Afton Boulevard, 40th Street, Bailey Road (CR18), and County Road 19. It is estimated three lift stations would be required to convey the wastewater to the interceptor connection point.

MCES would be compensated based off Sewer Availability Charges (SAC) and treatment user costs based on wastewater generated. SAC charges are defined as a user generating 274 gpd and currently are \$2,435/user. MCES currently charges \$2.03 per 1,000 gallons of wastewater treated by the treatment facility. Both of these charges have been included in the cost estimate analysis.

5.6.1 Environmental Impacts

Air quality: The regionalization alternative should not have odor problems. Sewer gases will exit lift stations and air release valves but odors associated are anticipated to disperse before encountering the general public.

Water quality: Water quality within the service area is anticipated to improve. The failing and non-conforming ISTS/SSTS would be replaced with a functional wastewater collection system that would convey raw wastewater to the Eagle's Point Wastewater Treatment Facility.

Alterations to landforms, streams and natural drainage patterns: Landforms, streams and drainage patterns would be unchanged. Proper design considerations would be taken into account not to disrupt any natural drainage patterns.

Wildlife: Wildlife would be minimally affected by the construction of regionalization alternative as the majority of components will be located within road right-of-way.

6.0 Cost Comparison of Alternatives

Wastewater infrastructure alternatives have been identified within the scope of this report. Side by side comparisons of capital and operation and maintenance costs have been provided for each alternative. This section gives cost comparisons, starting with capital costs, and ending with a present worth analysis for 20 years.

6.1 COLLECTION SYSTEM

Table 10 provides the cost estimates for two collection system alternatives including installation of all components.

Table 10: Collection System Capital Costs

	Gravity Collection System	Low Pressure Forcemain Collection System
Capital Costs	\$1,339,000	\$1,610,000
Contingency (10%)	\$134,000	\$161,000
Non-construction	\$295,000	\$354,000
Total Capital Cost	\$1,768,000	\$2,125,000

6.2 WASTEWATER TREATMENT

Table 11 provides the cost estimates for three cluster treatment systems including installation of all primary, secondary, and tertiary treatment; and soil dispersal components (pressurized seepage cells).

Table 11: Wastewater Treatment Alternatives Capital Costs

Alternative	Capital Cost	Contingency (10%)	Non-construction*	Land	Total Capital Cost
ATU w/ anoxic filter	\$1,543,140	\$154,320	\$369,500	\$560,000	\$2,626,960
SAGB	\$1,467,000	\$146,700	\$352,750	\$560,000	\$2,526,450
RGF w/ anoxic filter	\$1,242,000	\$124,500	\$303,500	\$560,000	\$2,230,000
Regionalization	\$2,551,000	\$255,000	\$1,041,480	\$0	\$3,847,480

*Includes: Engineering (18%), survey (treatment area), wetland delineation, hydrogeologic/mounding investigation, legal & administrative (2%), MCES SAC charges, and easement acquisition.

Advanced pretreatment alternative costs were based on daily flow and organic loading estimates for all users in the service area (residential and commercial) as detailed in Section 3. Adding users would change the size requirement for the LSTS and therefore the overall cost. Table 11 reflects the difference in capital cost estimates, non-construction costs including engineering, survey, wetland delineation, hydrogeologic/mounding investigation, legal, administrative, and includes a 10% contingency. Costs also take into account constructing 1.5 times the amount of drainfield required to disperse the daily permitting flow, as required by MPCA.

All alternatives assume a soil dispersal treatment system consisting of pressurized seepage beds. The soil infiltration system would be designed into multiple cells to allow for smaller pumping and piping components thus lower equipment cost. More importantly, the operator would have the ability to manage the system by bringing cells in and out of service depending on the volume of wastewater to be treated. For higher flows, all cells can be put into service and during periods of low flow the number of active cells can be reduced, again depending on flow volumes. The rotation of cells in and out of service serves as a resting period for the cells, increasing the longevity of the soil dispersal system. The cell configuration would consist of seepage cells totaling 47,815 ft²; another 15,940 ft² would be set aside as reserve area.

6.3 ANNUAL OPERATION AND MAINTENANCE COSTS

When comparing costs for wastewater infrastructure alternatives, all costs including capital and annual operation, maintenance, and replacement (OM & R) must be considered. Table 12 provides the average annual operation, maintenance, and replacement cost estimates for each cluster LSTS pretreatment alternative. LSTS OM & R costs include the costs for the entire wastewater system including pretreatment components and the drainfield system (see Appendix E).

Table 12: Annual Operation, Maintenance, and Replacement Costs

Alternative	Estimated Annual OM & R
Gravity Collection	\$14,400
Low-pressure Collection	\$32,600
ATU w/ anoxic filter	\$68,575
SAGB	\$72,100
RGF w/ anoxic filter	\$41,550
Regionalization	\$82,040

6.4 PRESENT WORTH ANALYSIS

Alternatives discussed in this report require different capital, operation, maintenance, and replacement costs. Certain alternatives can require more infrastructure (capital) costs at the start of the project; while other alternatives experience higher or lower maintenance costs throughout the life of the project. Also, infrastructure components have different expected life spans requiring replacement costs at varying intervals. All of these variables can create misconceptions when trying to compare the costs of one alternative versus another.

A present worth analysis allows the direct comparison of alternatives by converting all future costs into present-day dollar amounts. Future expenditures including capital and operation and maintenance are converted into present-day dollar amounts by using standard financial

calculations, an assumed time-frame for the expense to occur, and a discount rate. The timing for the expenses was based on typical recurrences for maintenance and average life spans for infrastructure. The discount rate is generally described as the difference between the available rate of return on an investment and the average inflation rate. A discount rate of 4% was utilized in this study in the conversion of future costs to a present worth.

6.4.1 Collection System

For the purposes of this report, a 20-year present worth analysis was completed to compare the wastewater collection system alternatives from an economic perspective. The 20-year present worth analysis includes the initial capital investment, but also considers the long-term costs, such as operation, maintenance, and replacement (OM & R), salvage values, and other significant long-term costs for a period of 20 years,. A summary of the opinion of probable capital costs and 20-year present worth values for the wastewater collection system alternatives are summarized in Table 13. Details for calculating the present worth costs and equivalent annual life cycle costs are included in Appendix E.

Based on this present worth analysis, construction of a gravity sewer collection system, would result in the lowest cost for the City of Afton.

Table 13: Wastewater Collection System Present Worth Analysis

	Gravity Collection System	Low Pressure Forcemain Collection System
Capital Costs	\$1,339,000	\$1,610,000
Contingency (10%)	\$134,000	\$161,000
Non-construction	\$295,000	\$354,000
20-year Present Worth O,M,R	\$310,442	\$645,667
Total Salvage Value of Expenditures	\$457,000	\$239,000
Estimated Total 20-year Present Worth	\$1,621,442	\$2,531,667

6.4.2 Wastewater Treatment Alternatives

Table 14 summarizes a present worth analysis over a 20-year period showing the calculated present worth costs for wastewater treatment alternatives. These alternatives include ATU w/ anoxic denitrification filter, SAGB, RGF w/ anoxic denitrification filter, and regionalization to the MCES south Washington County Interceptor. Of the four alternatives, the RGF with an anoxic denitrification filter is the least expensive when comparing both capital and 20-year present worth dollars; the regionalization alternative is the most expensive.

Table 14: Wastewater Treatment System Present Worth Analysis

	ATU w/ anoxic filter	SAGB	RGF w/ anoxic filter	Regionalization
Capital Costs	\$1,543,140	\$1,467,000	\$1,242,000	\$2,551,000
Contingency (10%)	\$154,320	\$146,700	\$124,500	\$255,000
Non-construction	\$369,500	\$352,750	\$303,500	\$1,041,480
Land	\$560,000	\$560,000	\$560,000	\$0
20-year Present Worth O,M,&R	\$931,950	\$979,900	\$564,600	\$1,506,600
Total Salvage Value on Expenditures	\$163,800	\$122,130	\$188,630	\$91,000
Estimated Total 20-year Present Worth	\$3,395,110	\$3,384,220	\$2,605,970	\$5,263,080

7.0 Selected Project

7.1 DESIGN and SYSTEM PARAMETERS

Section 3 and Appendix D includes wastewater flows and loading estimates which were utilized within this plan. These loadings include both residential and commercial users and were used to size collection system piping, pretreatment components, tertiary treatment components, and required soil dispersal area. Hydraulic flow and organic loading values that will be utilized in design include the design wastewater flow, BOD loadings, and NH₄ organic loadings; 51,000 gpd, 152 lbs per day, and 10.3 lbs per day, respectively. There are no anticipated industrial users within the City of Afton and therefore pretreatment of such wastes would not be needed.

Septage and/or sludge would accumulate within the pretreatment components particularly within the precast concrete tanks. Regular monitoring and periodic removal of the solids would be required. All septage activities including removal and disposal would follow MPCA Chapter 7080 (maintenance) and Chapter 7083 (maintenance license responsibilities). Septage disposal would occur at a MPCA permitted treatment plant and/or land application following MPCA Septage Management Guidelines and Federal Land Application of Septage Regulations – 40 CFP part 503. Specific monitoring and management requirements would be outlined in the LSTS MN state permit.

Residential dwellings and businesses within the City of Afton service area are currently served by ISTS. These ISTS vary in condition and the level of wastewater treatment. During construction of the proposed collection and treatment systems, these ISTS would continue to provide wastewater treatment until the new system is operational. It is anticipated the wastewater treatment system would be constructed initially and/or concurrently the main collection system. It is certain residential and commercial hookups would not occur until the system is operational.

7.2 RECOMMENDED COLLECTION SYSTEM

The proposed collection system to serve the City of Afton service area is the conventional gravity sewer system. The gravity collection system would be comprised of 8-inch diameter trunk lines that would run along Saint Croix Trail and 8-inch diameter branch lines that would extend from the trunk sewer down the side streets, within the service area. Individual sewer services would be connected to the trunk sewer and branch lines and extend to the homes and businesses to be served. The trunk lines on Saint Croix Trail would run to a main lift station located along Saint Croix Trail between 34th Street and 35th Street, which would then pump the flow north through forcemain to the treatment and dispersal system. Figure 5 shows the proposed layout of the gravity collection system alternative.

7.3 RECOMMENDED TREATMENT SYSTEM

The proposed treatment system to serve the City of Afton service area is the RGF with anoxic denitrification filter in conjunction with a soil-based drainfield. Non-compliant ISTS serving residential dwellings and commercial establishments would be replaced with this treatment alternative which would provide necessary improvements to protect the waters of the State. The system consists of communal septic tanks, an anoxic denitrification component, recirculation tank, recirculating gravel filter, and a dose tank sized to store and meter flows throughout the day to a seepage cell soil dispersal drainfield. A control building would be included to house various valves and controls. It would also serve as a location to store miscellaneous items pertinent to system operation and maintenance.

The proposed treatment system would be located north of town on the David Eastwood, 2318 St. Croix Trail South property (Figure 4). The exact system location is not known however the system elevation would likely be within 720 to 730. Afton MN is approximately 60,000 feet above the confluence with the Mississippi River. The approximate 500 year, 100 year, 50 year, and 10 year floodplain elevations are roughly 695 ft, 691.5 ft, 690 ft, and 686.5 ft (Appendix C). Therefore, the proposed treatment site is well above these floodplain elevations and would be operable during the 25-year flood and protected during a 100-year flood event.

The system would include necessary tertiary equipment and be designed to meet LSTS end-of-pipe effluent constituent limitations of 10 mg/L total nitrogen. Because of sufficient separation distances to the seasonal groundwater, a below-grade seepage cell drainfield would provide final dispersal and assimilation to the local aquifer. The recirculating gravel filter would be designed to accommodate anticipated wastewater flows and loadings (BOD, TSS, and NH₃). The filter would be lined with a synthetic liner and contain select gravel media to serve as the substrate. Wastewater would flow via gravity from the septic tanks and denitrification unit to the recirculation tank. Duplex pumps within the recirculation tank would dose a specified volume of filtrate to one gravel filter cell. The gravel filter would be divided into twelve cells each 10 ft. x 100 ft. RGF zone dosing would be sequenced and would depend on which zones are active. Wastewater that is pumped to the filter flows downward through the gravel media where it undergoes various physical, chemical, and biological treatment processes. There would be no need for blowers to provide oxygen as the filter utilizes ambient oxygen from the atmosphere.

An anoxic denitrification filter would be included and designed specifically for total nitrogen reduction to ≤ 10 mg/L total nitrogen. A precast concrete tank would contain a plastic media substrate. The substrate would provide surface area to promote the growth of denitrifying bacteria. A circulation pump is included to mix the nitrified wastewater and carbon source additive. As the wastewater passes the media, affixed bacteria uses nitrates within the wastewater (as oxygen is not available) transforming the nitrates to harmless nitrogen gas. As the bacteria die off, they will slough and fall to the tank bottom. To ensure adequate carbon, a flow proportional pump would be utilized to supply a supplemental carbon additive (acetic acid). Dependent upon flow, temperature, detention time, and nitrate concentration, an established amount of carbon additive would be mixed with the nitrified effluent.

The soil dispersal system would consist of twenty 21 ft. x 115 ft. pressurized seepage beds totaling 48,300 ft²; another 16,000 ft² would be set aside as reserve area. Duplex pumps within the dose tank would dose a specified volume of pretreated effluent to one seepage bed. Each

seepage bed would be pressurized containing a network of distribution piping. Independent electronically actuated valves controlled by the main panel would direct the effluent to the appropriate active bed. Dosing would occur on a timed basis throughout the day.

7.4 TOTAL ESTIMATED PROJECT COST

The entire project is estimated to cost \$3,970,000. Operation, maintenance, and equipment replacement costs are estimated at \$55,950 annually. These costs include operator wages, insurance, supplies, sampling and associated analytical fees, repairs, maintenance, utilities, permitting fees, sludge hauling, treatment site lawn and snow maintenance, and equipment replacement costs.

7.5 ESTIMATED ANNUAL SEWER SERVICE CHARGES

The annual sewer service charges have been estimated based off the following costs: (1) projected wastewater collection, treatment and land purchase capital costs, (2) operation, maintenance, & replacement costs, (3) projected debt recovery scenarios as described below:

Income: This project proposes setting up a system of user fees based on EDUs. User fees will go toward debt retirement and operation, maintenance, and replacement costs. The user fees are calculated based on an estimated total project cost of \$3,970,000. Total project costs will be recovered through grants, loans, and assessments. Grants are estimated at \$2.6 million. The remaining portion will be recovered through a low-interest loan and assessments. Also, land purchase costs will be recovered through a low-interest loan. The exact interest rate is not known and will be determined based off the median household income for the City of Afton (\$89,000). Two categories are included in the estimated annual sewer service charges; 10-year 2.0% and 20-year 2.0% loans. See the following table below for the user fee information.

Operations, Maintenance and Equipment Replacement Costs: are estimated at \$55,950 including operator wages, insurance, supplies, sampling and associated analytical fees, repairs, maintenance, utilities, permitting fees, sludge hauling, treatment site lawn and snow maintenance, and equipment replacement costs.

Debt Repayment: The following table gives a breakdown of the estimated sewer service charges based on income sources described above.

Table 15: Estimated Sewer Service Charges

Category	10-yr Loan	20-yr Loan
Total EDUs:	193	193
Total Estimated Construction Costs:	\$3,970,000	\$3,970,000
Yearly OM&R Cost Estimate:	\$55,950	\$55,950
Grant Amount:	\$2,603,000	\$2,603,000
Loan Amount:	\$1,367,000	\$1,367,000
Interest Rate:	2.0%	2.0%
Loan Length (years):	10	20
Yearly Loan Payment:	\$152,200	\$83,600
Yearly Loan & OM&R Payment:	\$208,150	\$139,550
Annual Total User Charge Estimate per EDU:	\$1,080	\$725
Monthly Total User Charge Estimate per EDU:	\$90.00	\$60.50