



*Banks of the St. Croix River*

## Chapter 6

# Water Resources



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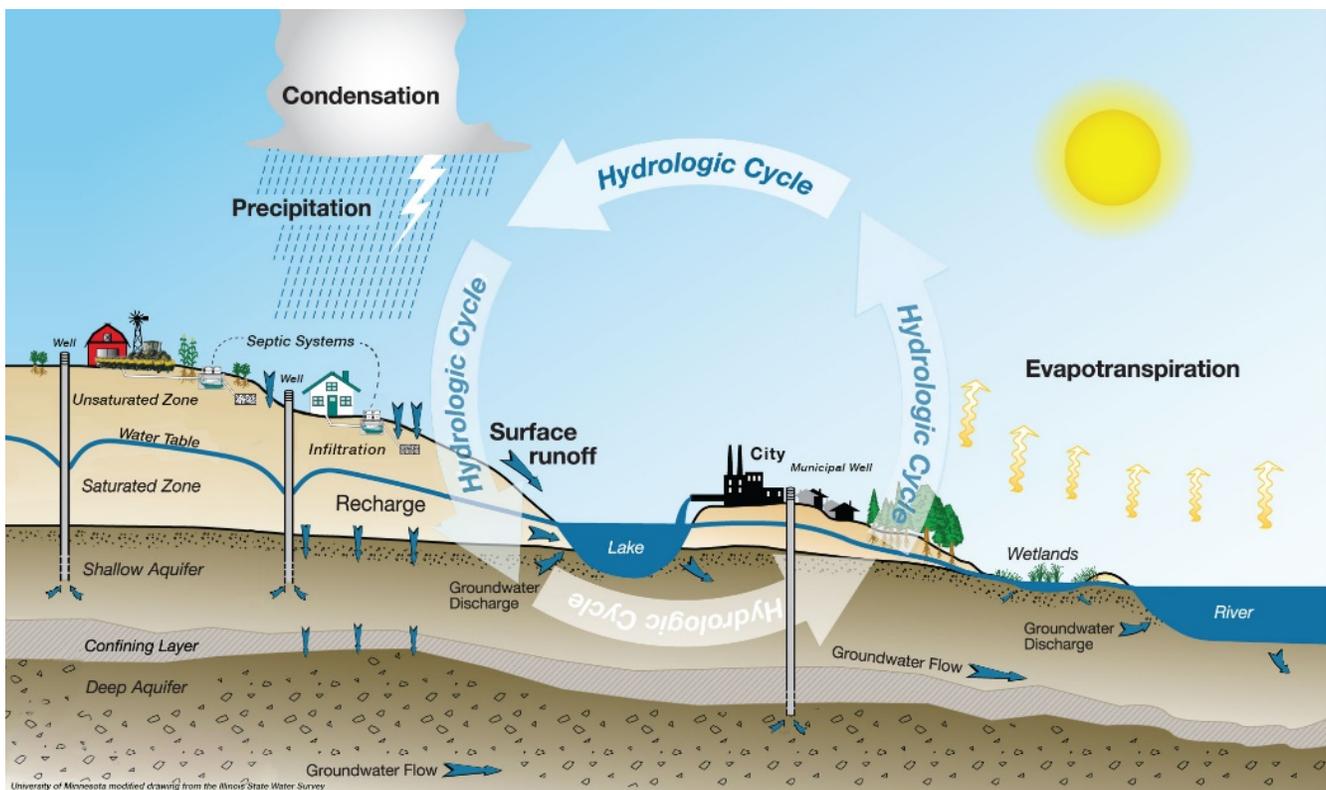
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# Executive Summary

Washington County recognizes that groundwater and surface water are one of its most valuable natural resources, and has made a strong commitment to understanding this resource. Our surface, groundwater, and wastewater systems are connected through the water cycle (see Figure 1). The water cycle describes how water evaporates from the surface of the earth, rises into the atmosphere, cools and condenses into rain or snow in clouds, and falls again to the surface as precipitation. Some of that precipitation runs off into surface water, and some percolates into the ground to replenish groundwater systems. As humans have developed and altered the natural landscape, with the mindset to simply move water away from buildings, structures, and roadways, the cycle has been interrupted. In recent years, this mindset has shifted, with local, regional and state agencies all working together to try and mimic the natural cycle and restore balance to the system. In addition, our climate and precipitation patterns are changing. Within the county and the state, the frequency of precipitation and high intensity storms is increasing. Integrated water management is critical as management our water resources continues going forward.

Figure 1: The Water Cycle



High quality drinking water, healthy streams and lakes, fish habitat, rare plants, and economic vitality all depend on protecting and conserving water resources. Water availability can impact our natural systems, and the ability for the county to continue to grow and support development and housing. The county has played and continues to play a leadership role in water management, and natural resource management as a whole. It has allocated a

significant amount of resources to planning and collaboration using the Washington County Groundwater Plan as a guide.



Washington County promotes holistic management of groundwater and surface water resources and strives to work with local and state agencies to maintain a safe and abundant supply of water resources.

The county also recognizes that management of our water resources is directly tied to larger natural resource objectives. Many practices that improve or protect water quality also achieve co-benefits for wildlife, habitat, pollinators, general open space preservation, and recreation opportunities. It is important to recognize and support these connections, both through implementation of a comprehensive plan, as well as other county plans and programs. An example of this type of project is the Grey Cloud Crossing project in Grey Cloud Island Township. This project, a joint partnership between the county, South Washington Watershed District, and the state, primarily constructed in 2017, will improve water quality, restore fish and plant habitat and natural shoreline, provide new recreation opportunities, as well as improve public safety during potential flood events.

The following chapter plan summarizes existing conditions related to surface water, water supply, and wastewater; and discusses the structure for managing these resources across multiple agencies and levels of government. The goals, policies, and strategies have been identified in the following section and in Chapter 3. It is also of note that many additional strategies can be found in the county's [Groundwater Plan](#).

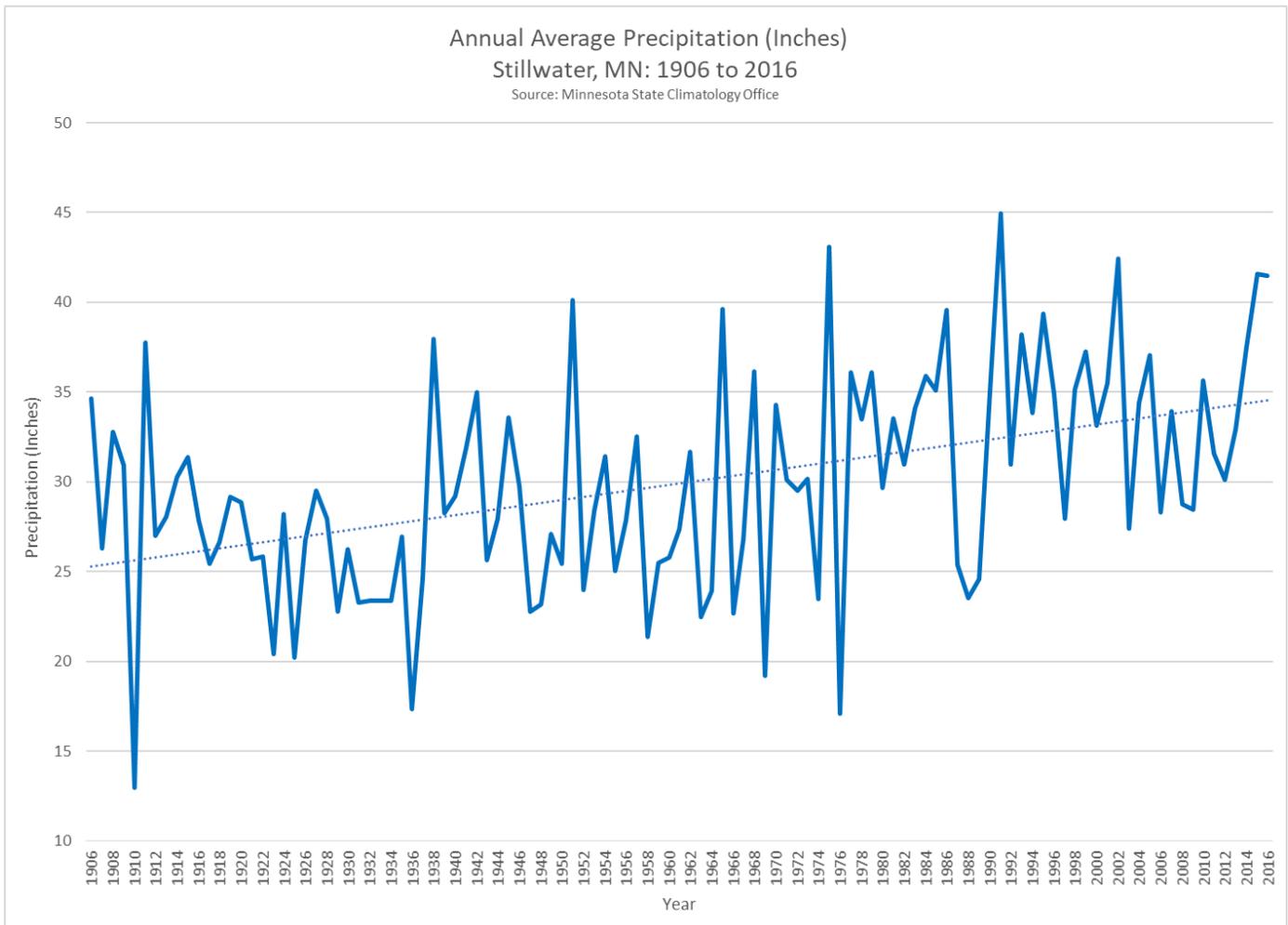
## Existing Conditions

### Climate and Precipitation

The county lies in the northern mid-continental region of North America and exhibits a climate of warm humid summers and cold dry winters. The climate is influenced by three major elements: polar air masses originating in Canada, subtropical air masses originating in the Gulf of Mexico, and variable air masses from the Pacific regions. The region experiences marked short, near and long-term climatic variations in temperature and precipitation. In this region, the amount of precipitation considerably exceeds the amount of evaporation resulting in abundant surface water resources and groundwater recharge.

The average annual precipitation for Washington County (near Stillwater) is 33.94 inches. This represents a 30-year average (1987–2016) based on data from the Minnesota Department of Natural Resources (DNR). The Washington Conservation District (WCD) recalculates this average every year. Figure 2 shows the long-term precipitation since 1891. Average precipitation quantities are increasing. On a statewide basis, Minnesota's precipitation patterns are changing. From 1895–1959, annual precipitation decreased about 0.2" per decade, while from 1960-2016, annual precipitation increased 0.5" per decade. From a regional perspective, the upper Midwest has seen a 37 percent increase in heavy precipitation events from 1928–2012. Seven of the fifteen Minnesota "mega rain events" have occurred since 2002. These changes in rain events create challenges to water resource management. These are discussed throughout this chapter and in other plan elements such as transportation and resilience.

Figure 2: Historical Precipitation in Washington County – 1906-2016



## Surface Water

The county is covered by two major watershed areas. Two-thirds of the county is in the Lower St. Croix watershed and one-third is in the Mississippi River-Twin Cities watershed. There are 36 minor watersheds throughout Washington County. Surface waters cover about ten percent of Washington County's 424 square miles. The majority of the county's surface waters consist of lakes and wetlands, and most are located in the northern half of the county.

## Rivers and Streams

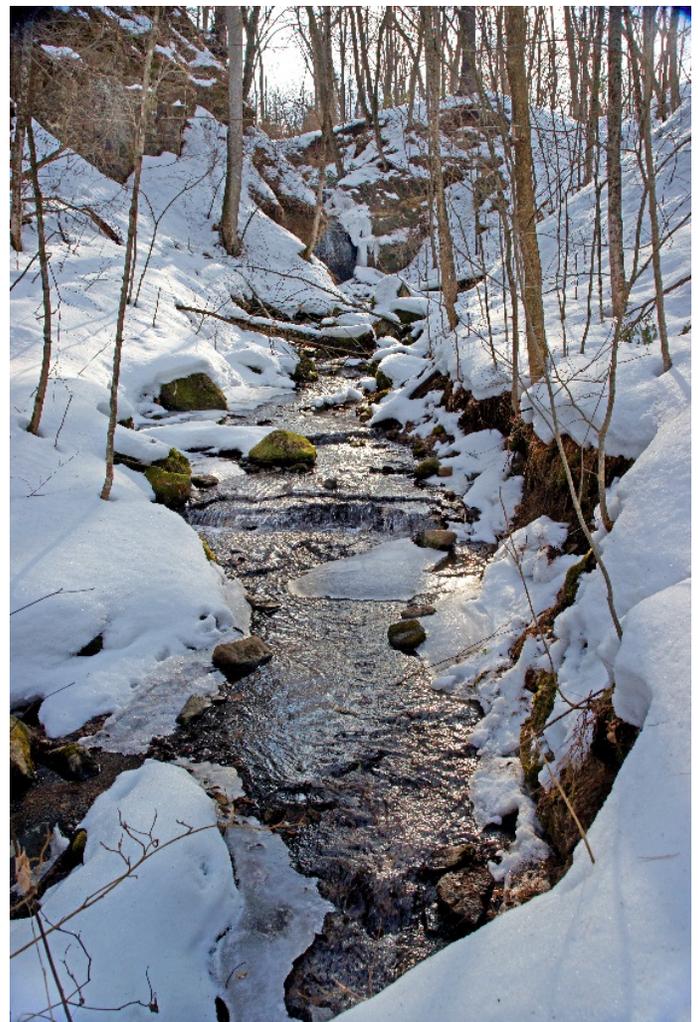
The St. Croix River drains the eastern portion of the county and forms the entire eastern border of the county. In 1968, the United States Congress dedicated the St. Croix River as a National Scenic Riverway, in recognition of its “outstandingly remarkable scenic, recreational, and geologic values.” In 1972, it added the lower reaches of the river that flow through Washington County to the designated Riverway. The National Park Service and the Minnesota and Wisconsin Departments of Natural Resources manage the Riverway. The National Park Service has land acquisition authority north of Stillwater. The state of Minnesota regulates uses within the Riverway

south of Stillwater. The National Park Service adopted a Cooperative Management Plan and Environmental Impact Statement for the Lower St. Croix National Scenic Riverway in 2002 that:

- Preserves and protects the Riverway’s ecological integrity, unimpounded condition, natural and scenic resources, and significant historic resources.
- Accommodates a diverse range of recreational opportunities that do not detract from the exceptional natural, historic, scenic, and aesthetic resources.
- Provides an environment that allows the opportunity for peace and solitude.
- Provides an opportunity for the education and study of the geologic, historic, ecological, and aesthetic values to further enhance stewardship of the river.

Small streams and springs flow into the St. Croix River, draining upland lakes. Brown's Creek, Valley Branch, and Trout Brook are the St. Croix River's largest tributaries with their headwaters in Washington County.

The Mississippi River drains the western portion of the county and forms the southwestern border of the county. In 1988, the United States Congress designated the length of river flowing through the Twin Cities Metropolitan Area from Dayton to just south of Hastings as the Mississippi National River and Recreation Area (MNRAA). This part of the river provides an array of activities and benefits including recreation and education, tourism, transportation, and natural habitat. The National Park Service prepared a management plan to: help communities manage the river corridor’s resources in order to preserve and enhance the environmental values; enhance opportunities for outdoor recreation; conserve and protect the scenic, historical, cultural, natural, and scientific values; and provide for commercial use consistent with the purpose of MNRAA designation. Two important tributaries to the Mississippi River have their headwaters in the county: Rice Creek originates at the outlet of Clear Lake, in the City of Forest Lake, and drains the northwestern part of the county; and Battle Creek originates in Woodbury and flows west to the Mississippi River.



Washington County has many intermittent streams that depend on snowmelt and rain water rather than groundwater for their flow. Streams with permanent flows are spring-fed for the most part. Storm sewers control runoff in urbanized areas, and drainage ditches in historically agricultural areas have replaced some naturally existing streams. Groundwater discharges maintain flows in the major rivers that have their flows augmented by precipitation and runoff.

**Lakes**

Washington County has 186 lakes that are ten acres or larger, the largest being Forest, Big Marine, White Bear, and Lake St. Croix. Many of the larger lakes were once resort and vacation spots that are now home to year-round residential development. Figure 3 shows the major water bodies in Washington County.



Many of the cleanest lakes in the Twin Cities Metropolitan Area are in Washington County while some of the region’s most polluted lakes are also in Washington County. Water quality trends are variable throughout the county depending on location, amount of development, agriculture, and other factors.

Many lakes are connected to groundwater, by providing recharge, discharge, or flow through. Figures 4 and 5 show lake classifications for the northern and southern halves of the county, with respect to surface-groundwater connection. These classifications were determined through a series of studies on surface and groundwater interaction from 2003 and 2005.

**Water Quality**

Many state and local agencies manage and monitor lake water quality. Volunteers for the Metropolitan Council’s Citizen Assisted Monitoring Program (CAMP) monitor many lakes. Water management organizations and some communities use staff, volunteers, consultants, and the Washington Conservation District (WCD) to conduct water-quality monitoring. The WCD, watershed districts, and volunteers monitor more than 80 lakes throughout the county. In addition, the WCD and watershed districts monitor more than 40 streams, rivers, and stormwater sites for water quality and flow. Monitoring results and analysis are summarized in annual reports including ranking, grading, and water quality trends for each lake. Water quality trends are developed to aid in the long-term analysis of possible impacts to receiving waters. The WCD monitors the water clarity, dissolved oxygen, temperature, and nutrients on a monthly or bi-monthly basis in priority lakes. Nutrient data and measured discharge are used to determine total phosphorus and total suspended solids loads for the subwatershed at each monitoring station. Figure 6 shows monitoring activity and water quality ratings by lake. The data was provided by the Washington Conservation District and the Rice Creek Watershed District. These ratings use a system developed by the Metropolitan Council that grades all water bodies (deep lake, shallow wetland, and stormwater ponds) in a like manner. Other grading methods are available. For example, Valley Branch Watershed District uses a performance-based system that sets goals for each water body and uses data to determine how well the water body is meeting its goal.

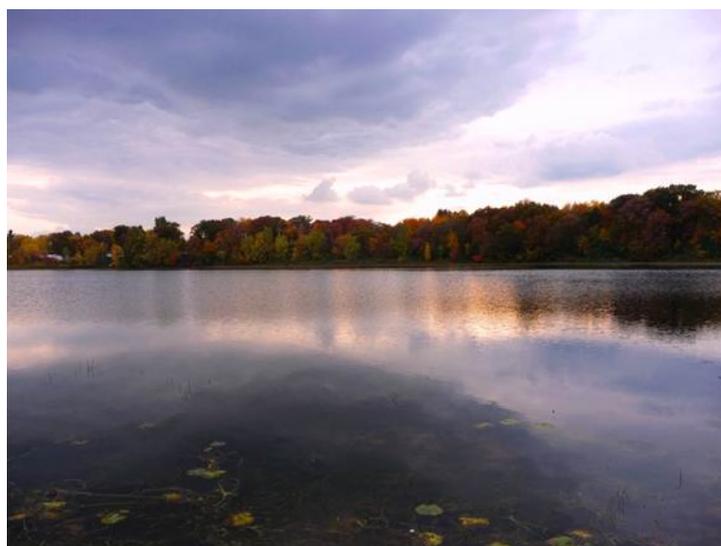
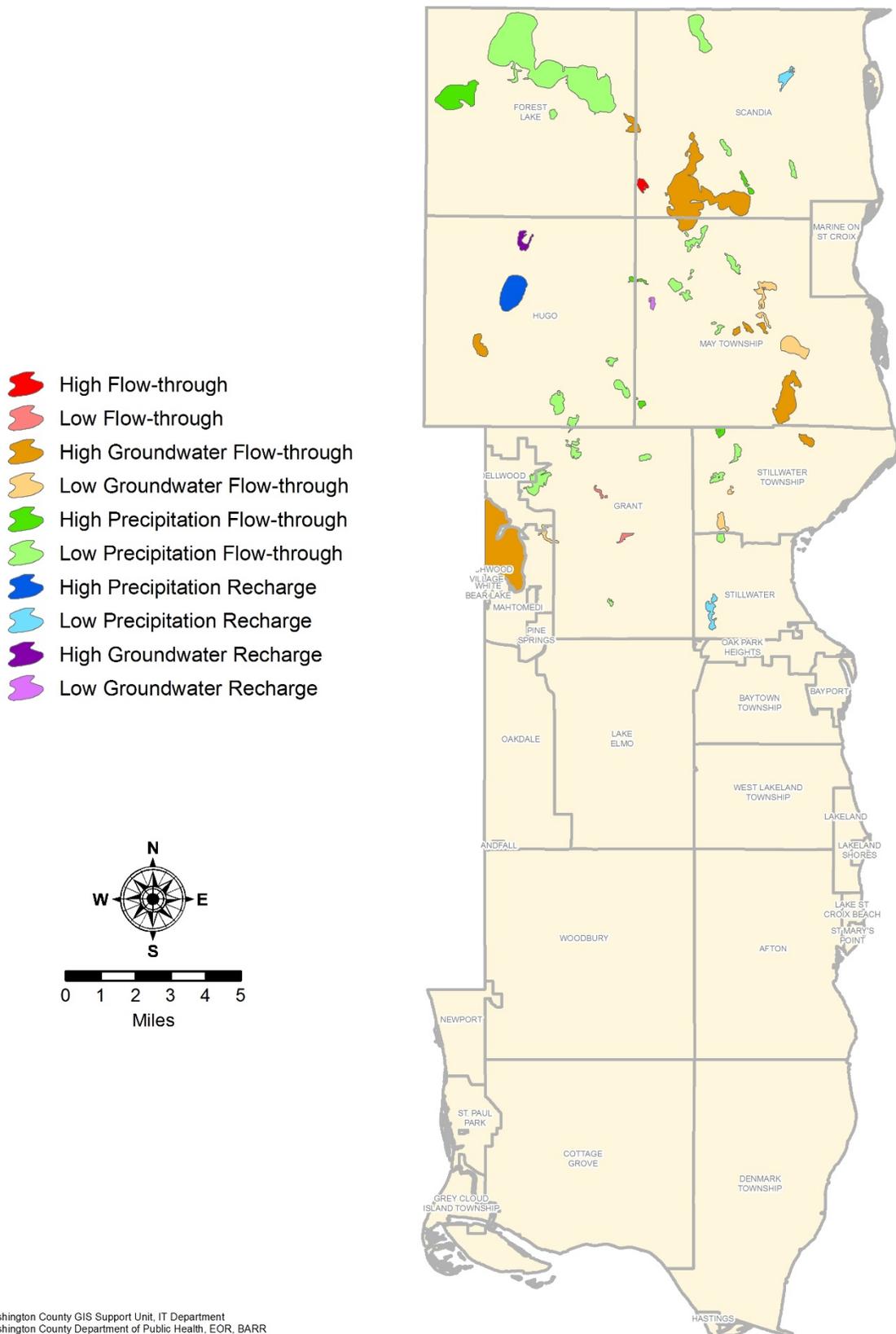


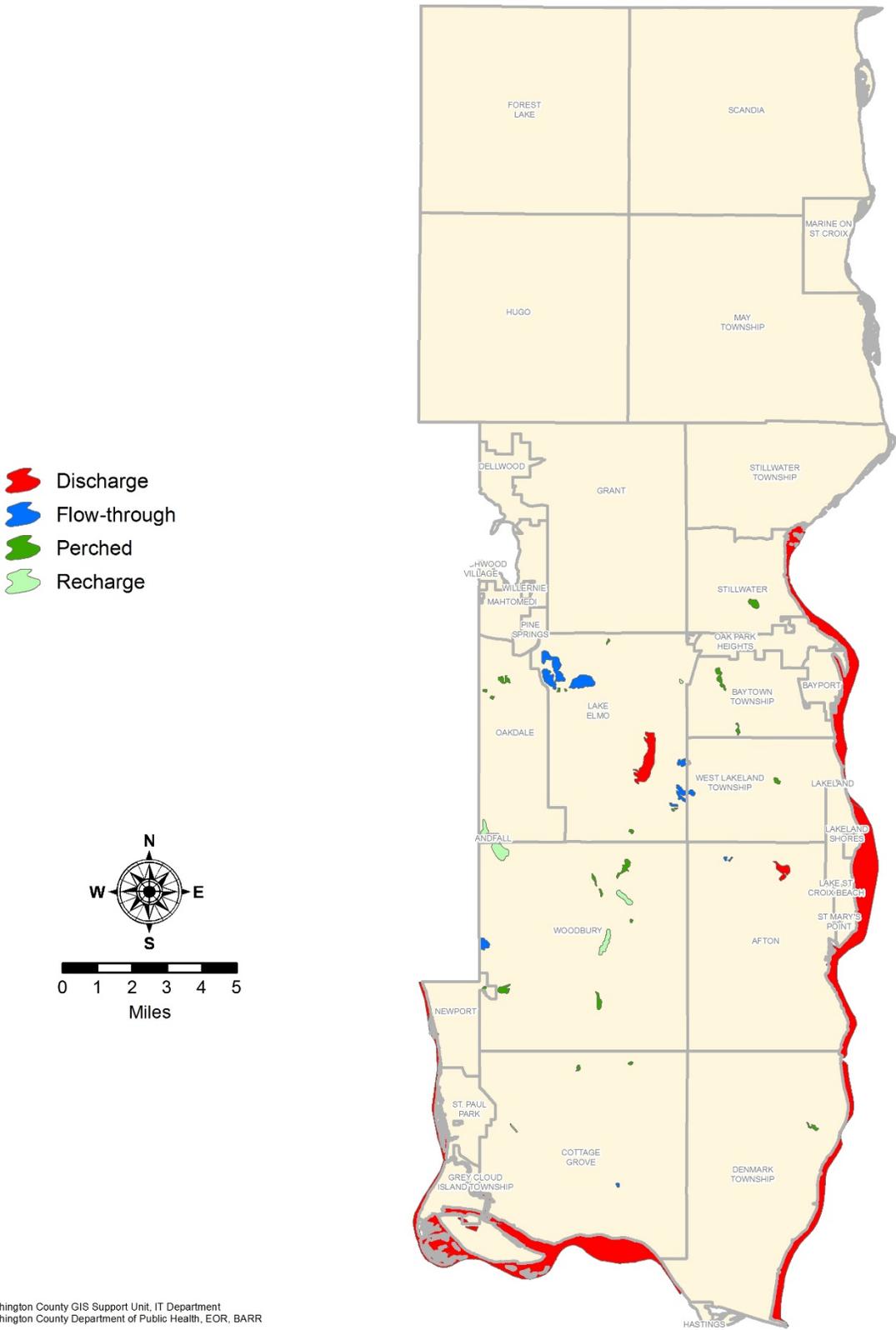


Figure 4: Lake Classifications - Northern Washington County



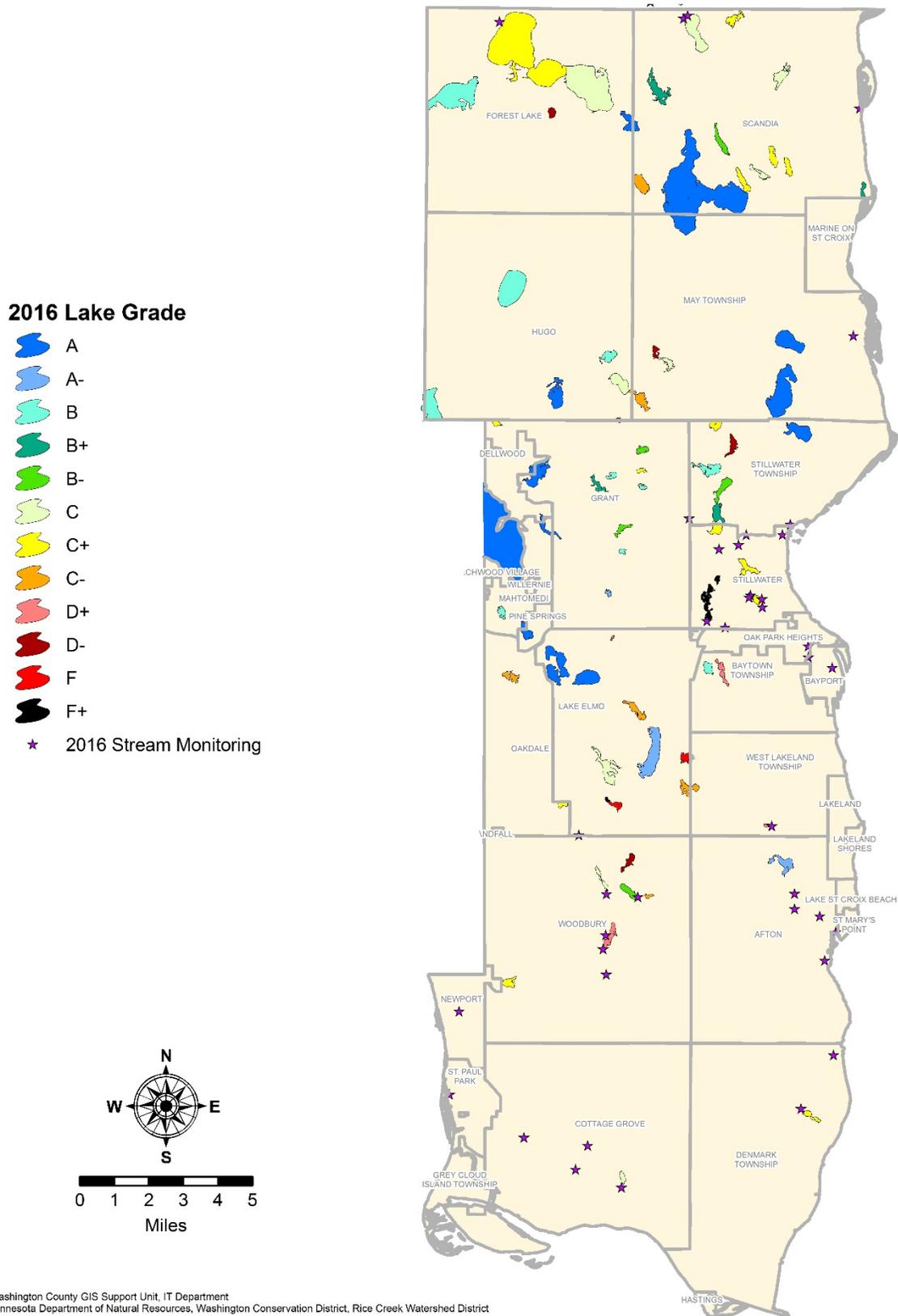
Prepared By: Washington County GIS Support Unit, IT Department  
 Data Source: Washington County Department of Public Health, EOR, BARR

Figure 5: Lake Classifications - Southern Washington County



Prepared By: Washington County GIS Support Unit, IT Department  
Data Source: Washington County Department of Public Health, EOR, BARR

Figure 6: Water Quality Ratings



Prepared By: Washington County GIS Support Unit, IT Department  
 Data Source: Minnesota Department of Natural Resources, Washington Conservation District, Rice Creek Watershed District

The federal Clean Water Act requires states to adopt water quality standards to protect surface waters from pollution. These standards define how much of a particular pollutant can be in the water and still meet standards for designated uses, such as drinking water, fishing, and swimming. The standards are set for a wide range of pollutants, including bacteria, nutrients, turbidity, and mercury. Section 303(d) of the Clean Water Act requires states to publish and update a list of waters that are not meeting one or more of the water quality standards. The list, known as the 303(d) Impaired Water List, is created by the Minnesota Pollution Control Agency. Minnesota's Impaired Waters List, first published in 1992, is updated periodically. See Appendix N for the list of impaired water bodies from the 2016 proposed list. There is a proposed list available for 2018, which was not included because it was submitted to EPA in April 2018. Figure 7 shows the impaired waters in the county, based on the 2016 list. A total of 65 waterbodies in Washington County are impaired, including Bald Eagle Lake and Rice Creek, which are technically listed in Anoka County. That does not include those impaired for mercury or Polychlorinated biphenyls (PCBs) in fish tissue, which accounts for another 28 impaired waters designations. Mercury and/or PCBs in fish tissue is typically caused by air deposition and is therefore handled through statewide plans.

The Clean Water Act requires states to take specific steps to address the impaired waters, including:

- Evaluate impaired water to determine sources of pollution and the amount of reduction needed to restore the waters.
- Implement corrective measures to meet Total Maximum Daily Load pollutant reduction goals and restore waters to standards. The inventory of impaired waters determines the timing for when a Total Maximum Daily Load (TMDL) study must be completed.

To implement the Clean Water Act, the MPCA implements a watershed approach to restoring and protecting water quality, by conducting intensive monitoring and assessments in each of the 80 major watersheds, every ten years. The Lower St. Croix is slated for intensive monitoring in 2019; the Mississippi River (Twin Cities) is slated for monitoring in 2020. This intensive watershed monitoring then allows MPCA and local agencies to complete Watershed Restoration and Protection Strategy (WRAPS) reports, and a TMDL study if appropriate, for impaired waterbodies. A number of TMDL studies have been completed in Washington County, along with a select number of WRAPS reports.

Even the cleanest lakes in the county will be susceptible to pollution as the county's population grows. Some of the more common water pollution problems include excess nutrients, suspended sediments, and mercury contamination.

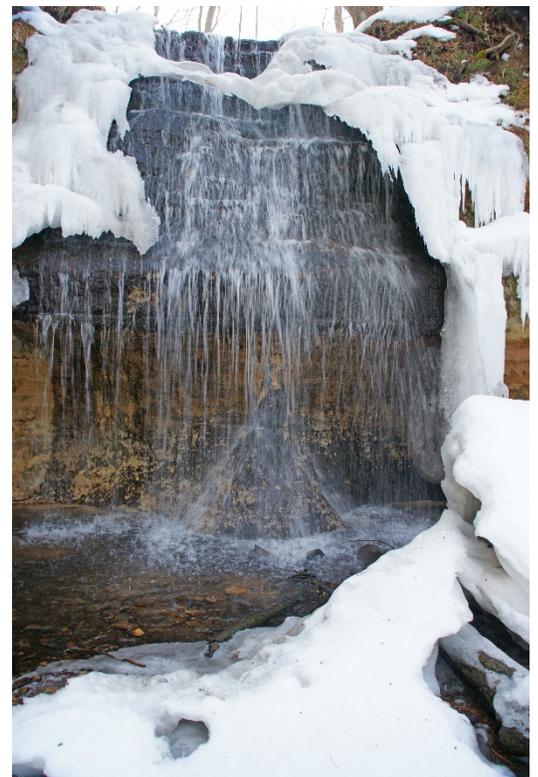
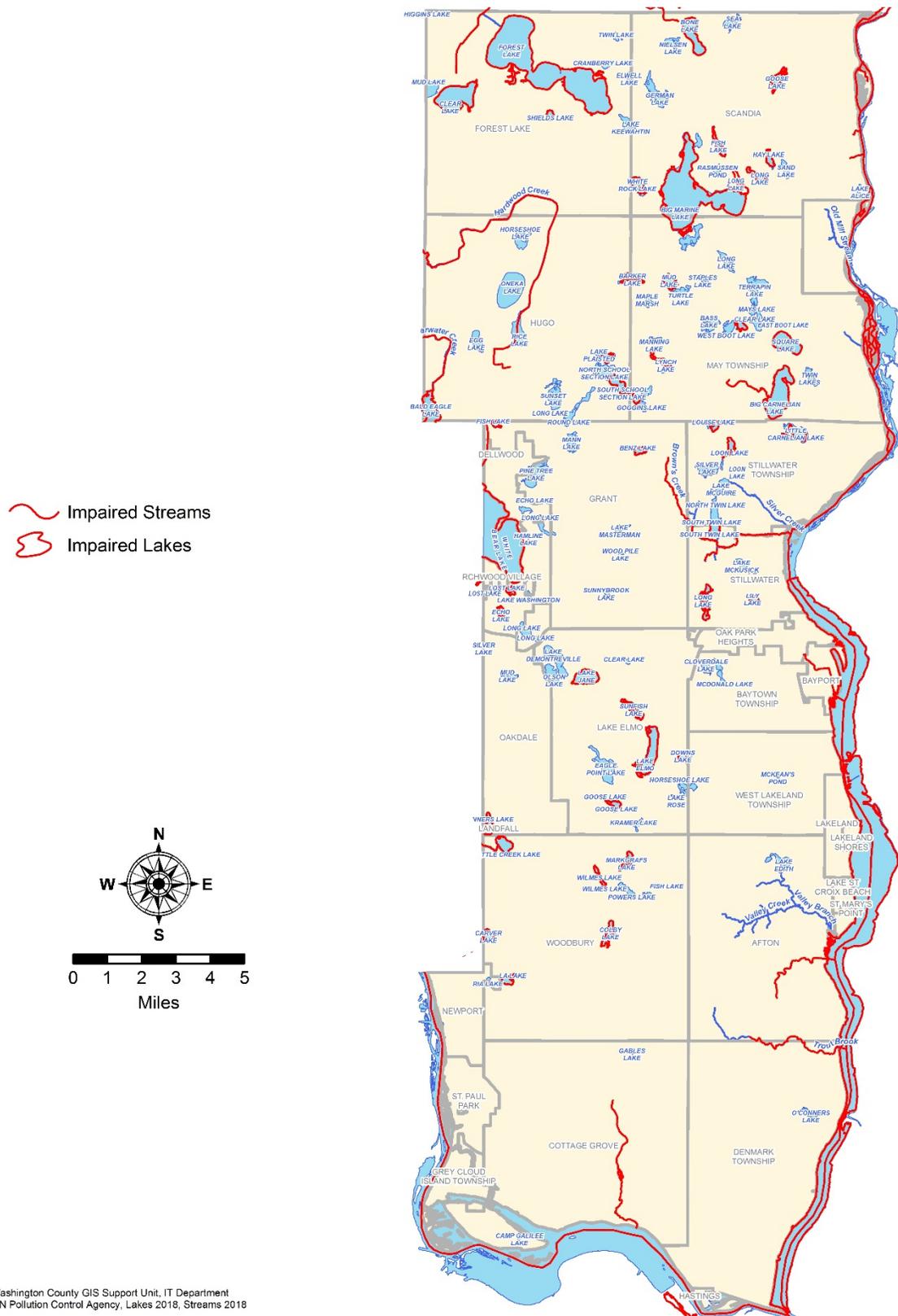


Figure 7: Impaired Waters in Washington County



Prepared By: Washington County GIS Support Unit, IT Department  
 Data Source: MN Pollution Control Agency, Lakes 2018, Streams 2018

A contaminant of growing concern in Washington County and across the Twin Cities Metro area is chloride. Salts, such as sodium chloride and magnesium chloride, are widely used to de-ice roads, parking lots, driveways, and sidewalks. Chloride has been shown to have detrimental effects on aquatic ecology. The storage and application of de-icing salts creates the potential for surface water and groundwater pollution. During winter, snow removal concentrates road salt and sand in ditches and in snow removal stockpiles. Spring melting results in the release of runoff contaminated with chloride and trace metals. The polluted runoff may contaminate surface water or infiltrate into the groundwater. Unprotected road salt storage sites also pose a risk to water quality by allowing rain and melting snow to leach contaminants into groundwater. Covered and lined facilities will eliminate groundwater contamination from stockpiled road de-icing materials. Limiting de-icing compound use or using less environmentally damaging products will reduce the level of contamination spread during de-icing operations. There are currently five waterbodies in the county listed as impaired for chlorides, but many others are trending upwards. A 2013 MPCA report revealed that 30 percent of metro wells exceed chloride levels. While chloride concentrations in Washington County wells generally do not exceed the secondary drinking water standard, temporal trend analyses conducted annually by MPCA has found that chloride concentrations increased in 11 of the 16 wells that had sufficient data.

Thermal pollution is another issue that may impact Washington County lakes and streams. Stormwater moving across urban landscapes warms the water and increases the temperature in receiving water bodies. Warm water can hold less dissolved oxygen than cold water, thereby reducing oxygen levels in urban water bodies. Cold water fish, such as trout, require stream temperatures below 20 degrees Celsius/68 degrees Fahrenheit; long-term or sudden increases in temperature can harm the fish populations. In addition, these cold-water streams face additional impairment challenges. A portion of Brown's Creek (from 110th Street to the St. Croix River) does not meet the State's water quality standards and is impaired for aquatic life due to lack of cold water fish assemblage and high turbidity. Through the stressor identification process, the primary stressors to the biota in the impaired reach of Brown's Creek were identified as high suspended solids and high temperatures.

Volume control practices that increase infiltration and transpiration will minimize runoff of warmed waters to surface water features, as well as filter water of excess nutrients and other contaminants. Minimal Impact Design Standards (MIDS) represent the next generation of stormwater management in Minnesota. The emphasis today is on keeping the raindrop where it falls in order to minimize stormwater runoff and pollution and preserve natural resources. Low Impact Development (LID) is an approach to stormwater management that mimics a site's natural hydrology as the landscape is developed, and preserves and protects environmentally-sensitive site features such as riparian buffers, wetlands, steep slopes, valuable (mature) trees, floodplains, woodlands, and highly permeable soils. Adapting and using LID approaches offers multiple benefits including minimizing and reducing the amount of pollution reaching our lakes, rivers, and streams and helps to recharge groundwater resources.

### Aquatic Invasive Species

Washington County also has many lakes that are infested with aquatic invasive species (AIS). Twenty-one lakes (and two rivers) are on the Minnesota Department of Natural Resources' Infested Waters List, including those affected by Eurasian watermilfoil (Alice, Big Marine, Bone, Camp Galilee, Clear, Colby, DeMontreville, Elmo, Forest, Horseshoe, Jane, four Long lakes, Mud, Olson, Powers, Sunset, White Bear, and Wilmes lakes; Mississippi and St. Croix rivers), flowering rush (Forest Lake, Mississippi River), zebra mussels (Forest and White Bear lakes; Mississippi and St. Croix rivers); and bighead, grass and silver carp (Mississippi River).

In 2014, the Minnesota State Legislature passed MN Statute 477A.19 Aquatic Invasive Species Prevention Aid providing counties with \$10 million annually with the amount designated for each county based on the number of watercraft trailer launches and watercraft trailer parking spaces. As of 2017, Washington County has 24 watercraft trailer launches and 353 watercraft trailer parking spaces, resulting in a 2018 allocation of \$136,065.

Washington County has run a competitive request for proposals process since the program's onset to award funds to entities focusing on AIS prevention projects that align with the Minnesota State Management Plan for Invasive Species (2009). The county has also used a portion of the funds available to contract directly with the Washington Conservation District for countywide AIS prevention, including watercraft inspections, monitoring for zebra mussels, and public outreach and education activities.

### Wetlands

Prior to European settlement, wetlands covered over 14,000 acres of the county. Less than half remain today. Figure 8 shows their location. Much of the wetland loss was attributed to wetland draining for agricultural purposes prior to the 1970s and urban development in more recent decades.

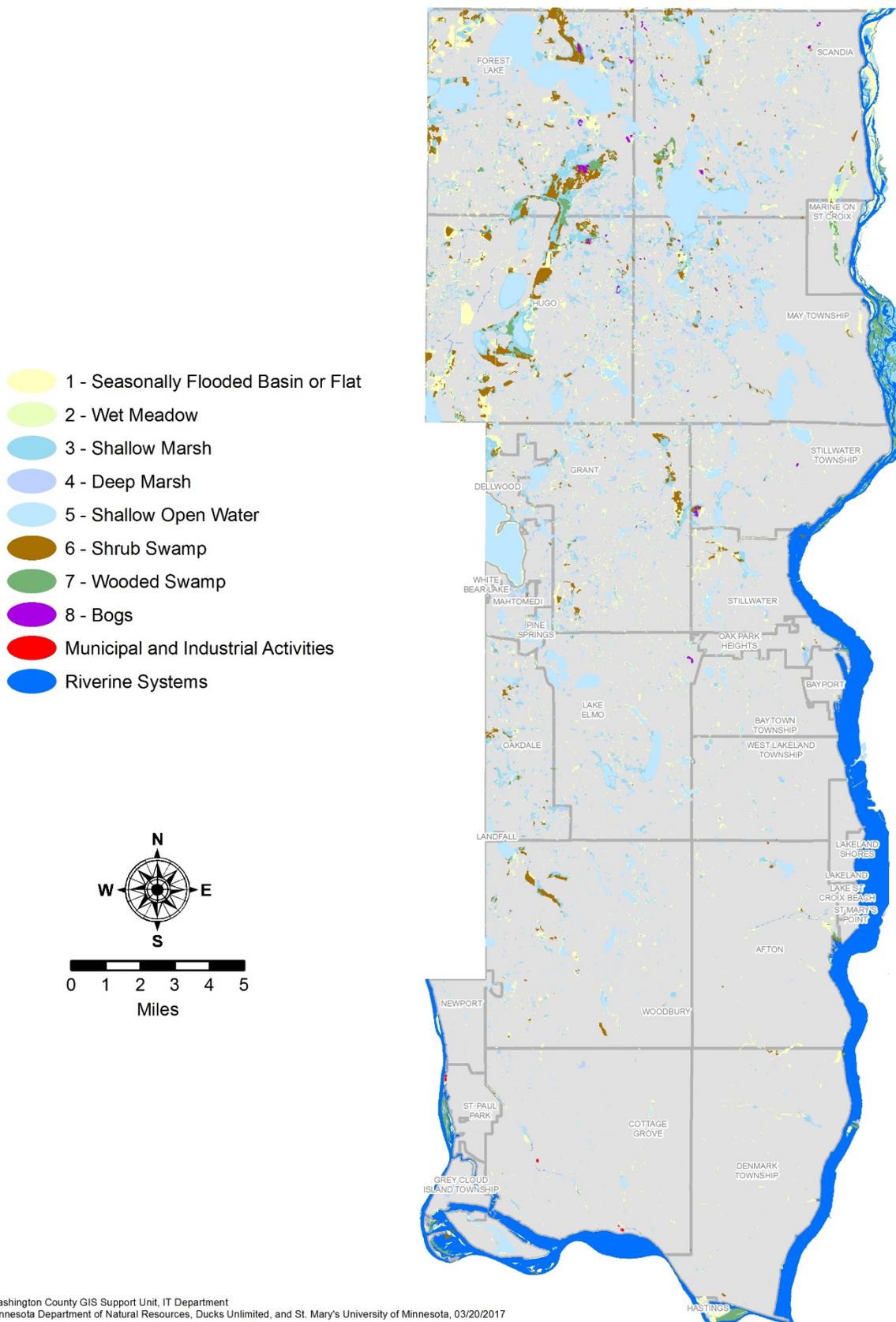
Wetlands fulfill many functions including filtration of surface water, infiltration for groundwater recharge, flood attenuation, wildlife habitat, aesthetics, recreation, and spatial separation between other land uses. As part of their wetland management planning process, the county's watershed districts have placed an ecological value on those functions and have adopted regulations to protect or enhance those values.

The Minnesota Department of Natural Resources regulates wetlands on the 1985 Public Waters Inventory (PWI). The PWI (which includes lakes, rivers, major streams, and ponds) lists 399 type 3, 4, and 5 wetlands that are either over 10 acres in unincorporated areas or two and one-half acres in the incorporated areas of the county.

The National Wetlands Inventory (1992) and the MLCCS (2004-07) also compiled wetland information countywide. Most watershed management organizations have compiled more localized and detailed inventories and functional assessments. These inventories may include wetlands that are not on the PWI.

The federal Clean Water Act initiated wetland protection. The state followed with passage of the Wetland Conservation Act (WCA) in 1991 that set the state wetland protection policy. The state act strives to "achieve no net loss in the quantity, quality, and biological diversity of Minnesota's existing wetlands," as well as to promote restoration of formerly impacted wetlands. This law requires avoidance of direct and indirect impacts that would destroy or diminish wetlands and replacement of wetland values where avoidance is not feasible or prudent. The WCA applies to all wetlands except those under the jurisdiction of the Minnesota DNR. The WCA provides for the local governmental units to administer the law. Most municipalities in Washington County have accepted the authority or have delegated it to a watershed district. Washington County participates in the WCA review process via the Washington Conservation District, as per statutory mandate and voluntary cooperative agreements.

Figure 8: Washington County Wetlands



Prepared By: Washington County GIS Support Unit, IT Department  
 Data Source: Minnesota Department of Natural Resources, Ducks Unlimited, and St. Mary's University of Minnesota, 03/20/2017

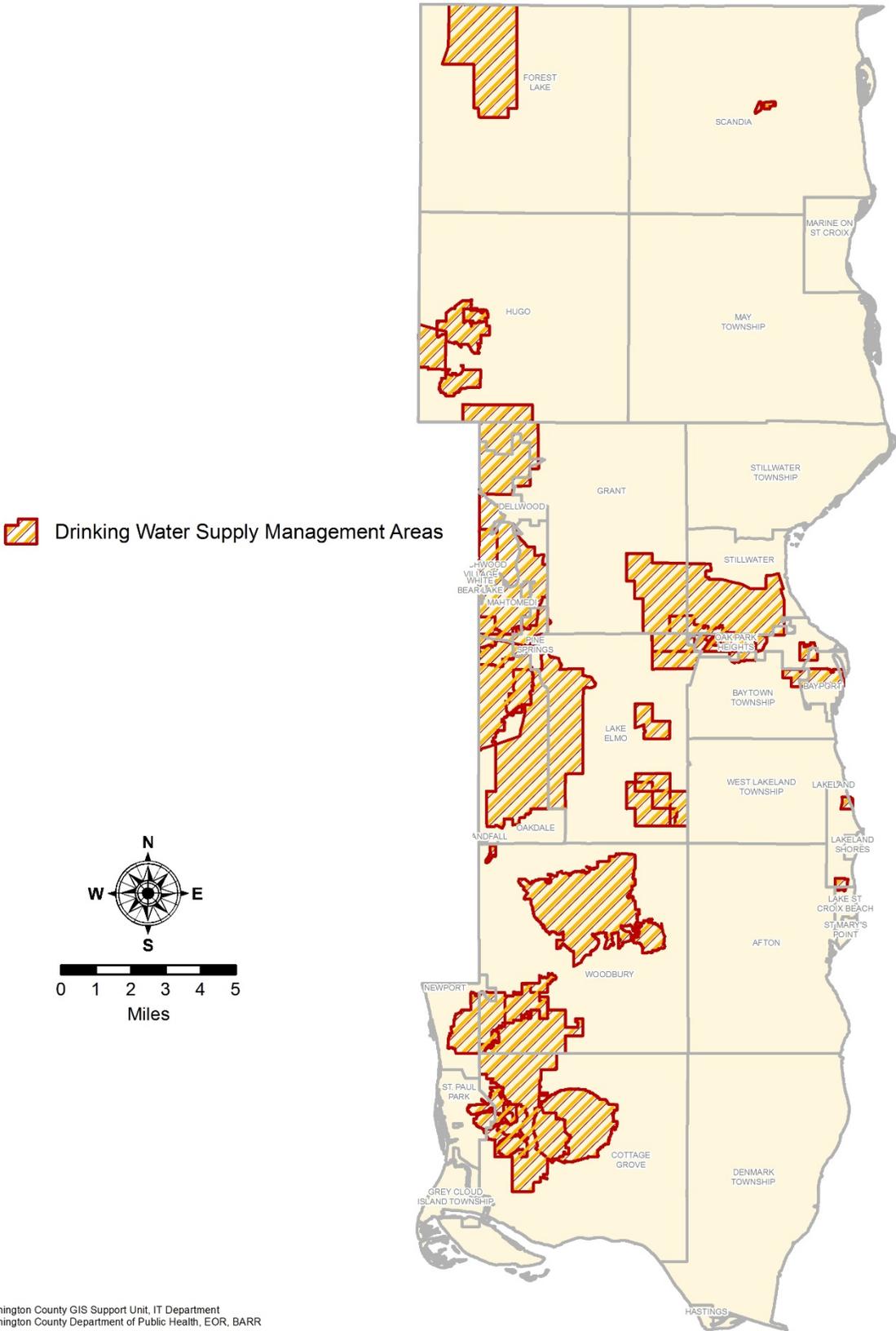
## Water Supply

Groundwater supplies 100 percent of the drinking water for residents and businesses of Washington County. Although Washington County has substantial reserves of high quality groundwater, groundwater is a finite resource and contaminants have been found above the established health risk limits in some locations. Both the presence of this contamination, along with increased water withdraw, have the potential to impact not just natural systems, but also projected and planned population growth in the county.

The county has 13 municipal water suppliers, serving about 80 percent of residents. Public water supplies are regulated by Minnesota Department of Health (MDH) under the Safe Drinking Water Act and are tested regularly for contaminants. Each public water supply well must maintain a Drinking Water Supply Management Areas (DWSMA) (see Figure 9). The remaining 20 percent of county residents, or about 50,000 people, are served by private wells. The exact number of private wells is not known, but can be estimated at around 17,000. Figure 10 shows well locations based on the Minnesota Well Index. This dataset is maintained by MDH. Private well owners are responsible for their own testing and maintenance. The county maintains a fee-for-service well testing program and encourages residents to follow MDH guidance to test annually for coliform bacteria and nitrates. A recent MDH survey indicates that a large percentage of private well owners do not test their well at the frequency recommended by MDH. In addition, a recent vulnerability assessment conducted by MDH has found that hundreds of private wells within Washington County are located in areas that may be vulnerable to flooding during extreme precipitation events. This will become important as the county plans for changing climate and weather patterns and demonstrates the continued need to educate and support private well owners.

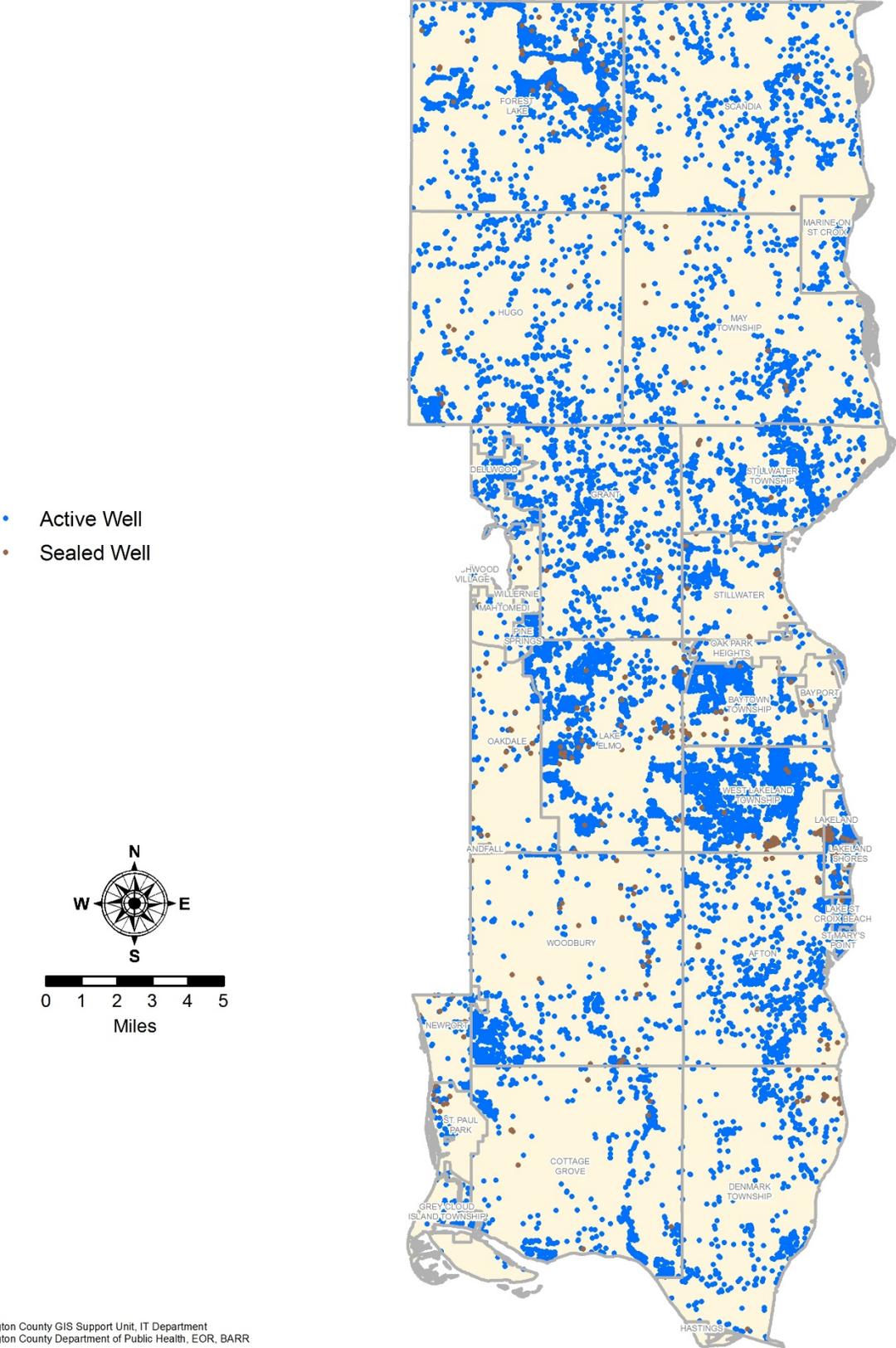


Figure 9: Drinking Water Supply Management Areas



Prepared By: Washington County GIS Support Unit, IT Department  
Data Source: Washington County Department of Public Health, EOR, BARR

Figure 10: Private Well Locations



Prepared By: Washington County GIS Support Unit, IT Department  
Data Source: Washington County Department of Public Health, EOR, BARR

## Groundwater Geology

The type and density of land use and the geologic conditions of an area determine the likelihood of the groundwater quality and quantity to be affected by human actions. In 2016, an updated Geologic Atlas Part A was completed for the county by the Minnesota Geological Survey. This data analysis and resulting maps and shapefiles provide valuable geologic information about the county.

The surficial geology of the county is characterized by a thin layer of glacial drift material over extensive bedrock formations. Most of the county has less than 150 feet of drift material, and approximately one-quarter of the county area has less than 50 feet of drift material. The Anoka Sand Plains in the northwest and the karst geology in the south are especially vulnerable to contamination.

Four bedrock aquifer hydrostratigraphic units are found beneath the county. The units vary in thickness, porosity, permeability, and water quality. The principal bedrock groundwater sources used by communities, well owners, and industries are the Prairie du Chien limestone, which is composed of the Shakopee and Oneota formations, and the Jordan sandstone aquifers. Other bedrock aquifers include the St. Peter sandstone, the Tunnel City group and Wonewoc sandstone, and the Mt. Simon-Hinckley sandstone formations. Three bedrock hydrostratigraphic units function as major aquitards.

Figure 11 shows a geologic cross section of the county at three different points. Figure 12 indicates bedrock geology.

Figure 11: Geological cross sections of Washington County

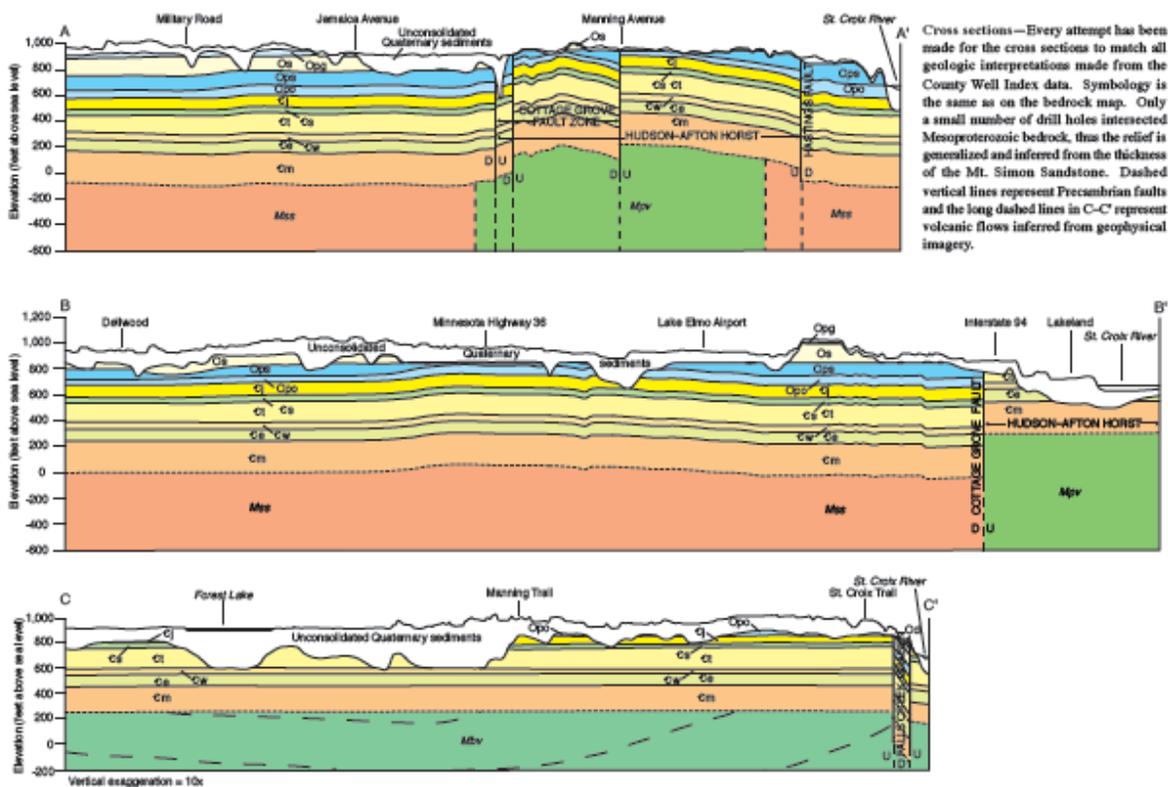
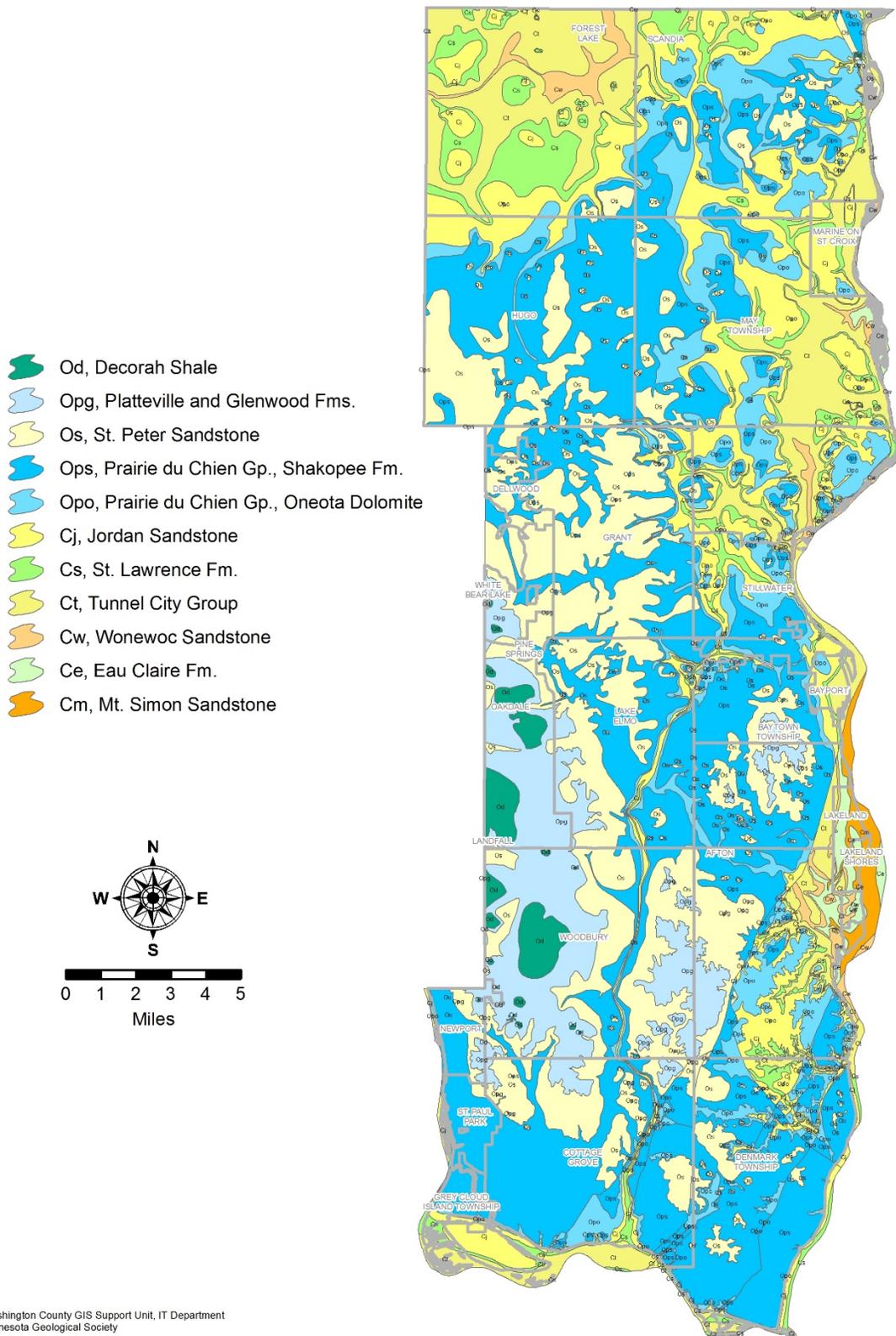


Figure 12: Bedrock geology in Washington County



Prepared By: Washington County GIS Support Unit, IT Department  
 Data Source: Minnesota Geological Society

Figure courtesy of Minnesota Geological Survey, Washington County Geologic Atlas, Bedrock Geology, Plate 2.

## Groundwater Quantity

Historically, the region's aquifers have had abundant water to serve the population. However, the amount of water available in the future may be limited before aquifers are completely depleted. The three main factors affecting groundwater abundance are:

- The volume of replenishment to or recharge of aquifers from rainfall and snow melt
- The volume of groundwater pumped out of aquifers
- The volume of groundwater naturally discharged to lakes, wetlands, and streams

Impervious surfaces associated with land development will impair the natural ability of precipitation to infiltrate into aquifers, thereby reducing recharge water and stream base flow. The volume of groundwater pumped out of aquifers to meet the household, commercial, and industrial needs of a growing population depletes the resource. Groundwater quantity in Washington County is also impacted by contamination (discussed at length in the following section). Given these concerns, it is important for the county and partners to use water in an efficient manner.

Long term projection in water demand for the county shows that at current usage and per capita rates, some areas within the county will see drawdown of the aquifer. In addition, there are a number of water features that are either groundwater dependent or otherwise linked to groundwater. Examples include Valley Creek in Woodbury and Afton, and White Bear Lake, which is along the western border of the county, that could be impacted by groundwater use. White Bear Lake has been the subject of litigation with regards to groundwater withdrawals and their impacts on the lake. The status of that lawsuit and its impact on Washington County communities, particularly those within close proximity to the lake, continues to evolve. In 2017, a Ramsey County judge ordered review of groundwater withdrawal permits within 5 miles in the lake, and ordered the DNR to direct affected communities to explore surface water sources as an alternate water supply. The county continues to monitor this lawsuit and the potential impacts to communities and proposed development. According to Minnesota DNR appropriations data, there were 322 active permits for groundwater withdrawal in 2015, reporting 11.1 billion gallons of groundwater used. The largest permits issued in the county are for pollution containment (see existing groundwater contamination for more information), followed by municipal wells. Looking at just public water suppliers, overall water use was down 376 million gallons, comparing average water use from 2004–2009 and 2010–2015. It's important to acknowledge that the precipitation patterns in a given year can also impact the amount of water used. 2014-2016, for example, have been much wetter. The average over four year periods of millions of gallons drawn by public water supplier is shown in Figure 13. The yellow line represents the average annual gallons drawn in 2015 for all of the thirteen communities. The larger the community, the more water used.

Figure 13: Average Gallons Drawn/Year by Public Water Supplier (1,000 gallons)

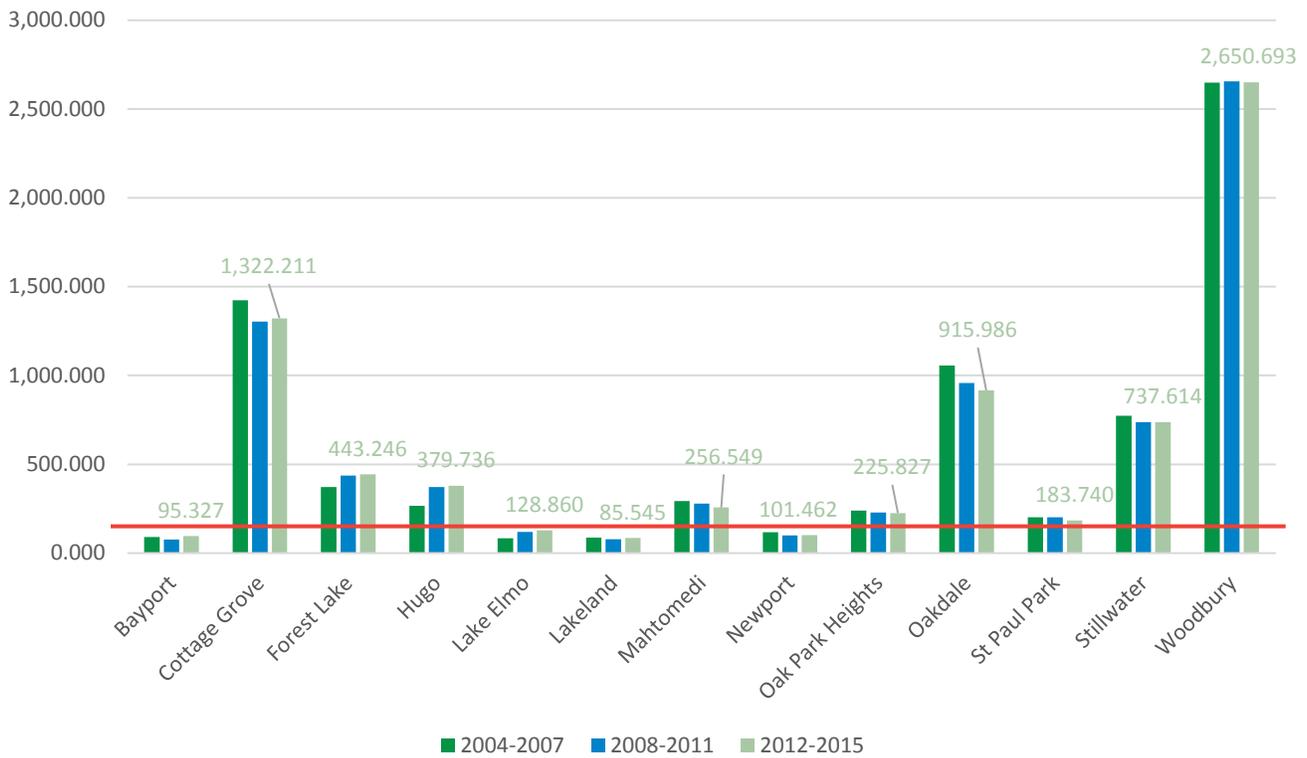


Figure 14 shows overall use for each city from 2009–2015. This number ranges from city to city, and can be impacted by cities who have a large industrial or commercial facility that utilizes a significant amount of water.

Figure 14: Public Water Supplier Draw (gallons per capita per day)

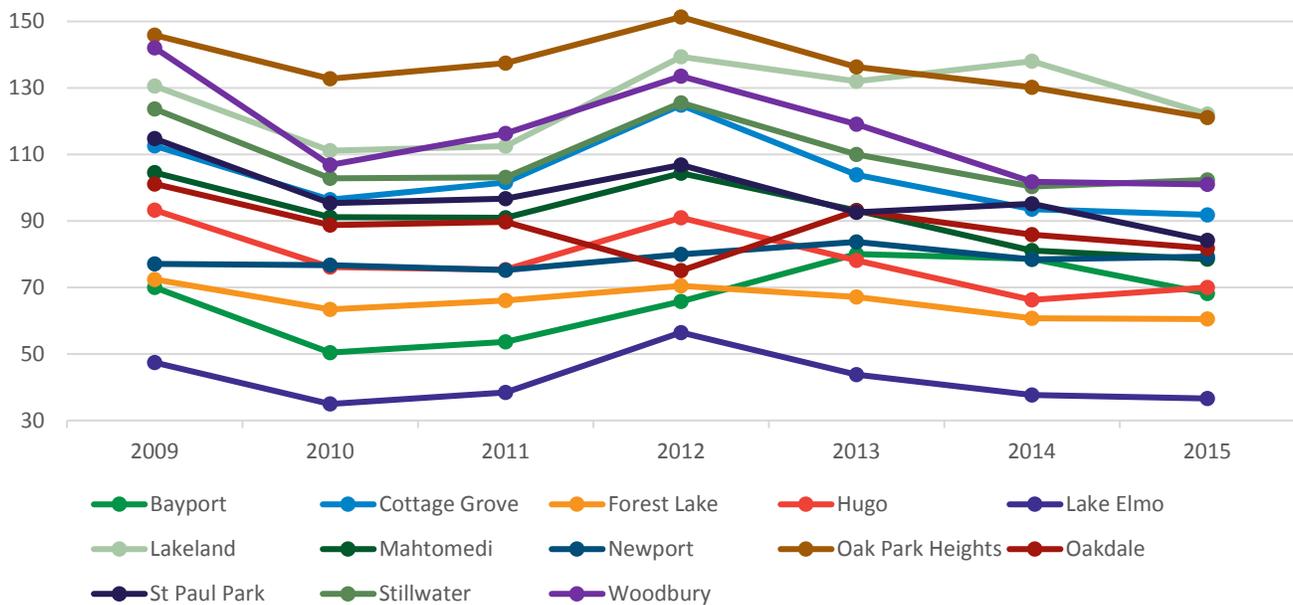
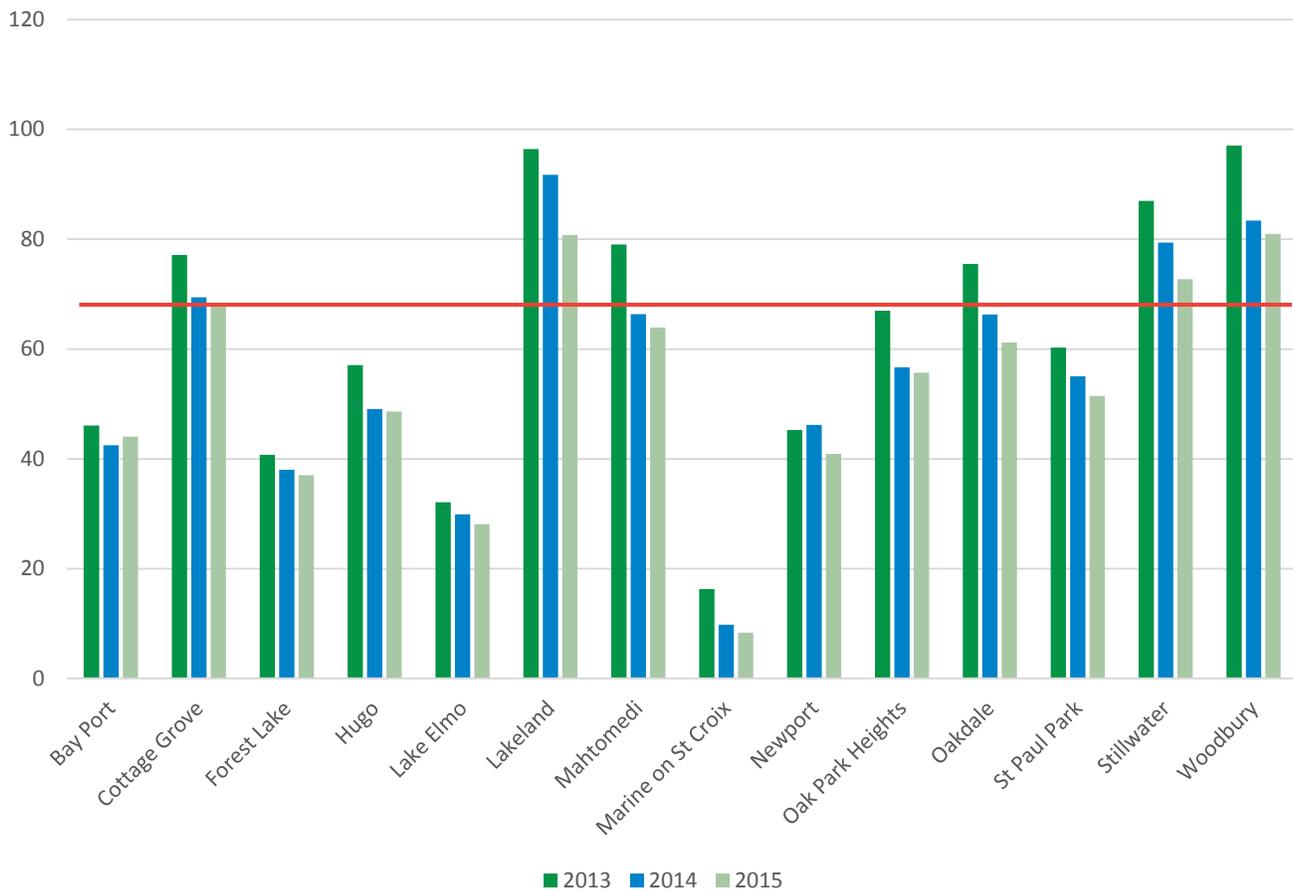


Figure 15 shows residential per capita use among public water suppliers from 2009–2015. The Minnesota DNR recommends 75 gallons per day for residential use, as set in the Groundwater Management Area plan. In general, newer cities that have larger home lots and homes with irrigation systems are more likely to exceed this recommended per capita usage.

**Figure 15: Residential Gallons per Day per Capita**



Many communities within the county are taking active steps to reduce per capita water usage. They are collaborating with each other and with regional and state partners to address regional groundwater issues. This includes studying opportunities for water efficiency and alternative water supplies; promoting water efficiency and conservation efforts through education, rebate programs, and other means; and implementing water reuse projects. The county promotes and supports water efficiency and water conservation efforts through Groundwater Plan implementation.

Multiple communities share the region’s aquifers. It will take a coordinated effort to develop sustainable groundwater management in order to balance the recharges to the resource with discharges from the resource.

## Groundwater Quality

Due to the geologic conditions of the county, most of the county’s groundwater reserves are highly sensitive to contamination. If not protected, they could become unusable as a source of potable water.

The fundamental factor to contaminant movement in groundwater is the hydrogeology of an area. Shallow bedrock, high water tables, and rapid infiltration rates all contribute to groundwater sensitivity and are all commonly found in the county.

The 1990 *Washington County Geologic Atlas* identifies approximately 97 percent of the water-table system and 82 percent of the Prairie du Chien-Jordan aquifer as having a moderately-high to very-high sensitivity to contamination. The term “sensitivity” is commonly used to describe the general potential for an aquifer to become contaminated. The Minnesota Geological Survey measures relative sensitivity as the “time required for a contaminant to move vertically from the land surface to an aquifer.” Shorter travel time means greater sensitivity.

Figure 16 shows the sensitivity of the water table aquifer to contamination. Table 1 defines the time it would take for a contaminant to travel from the surface to the water table aquifer.

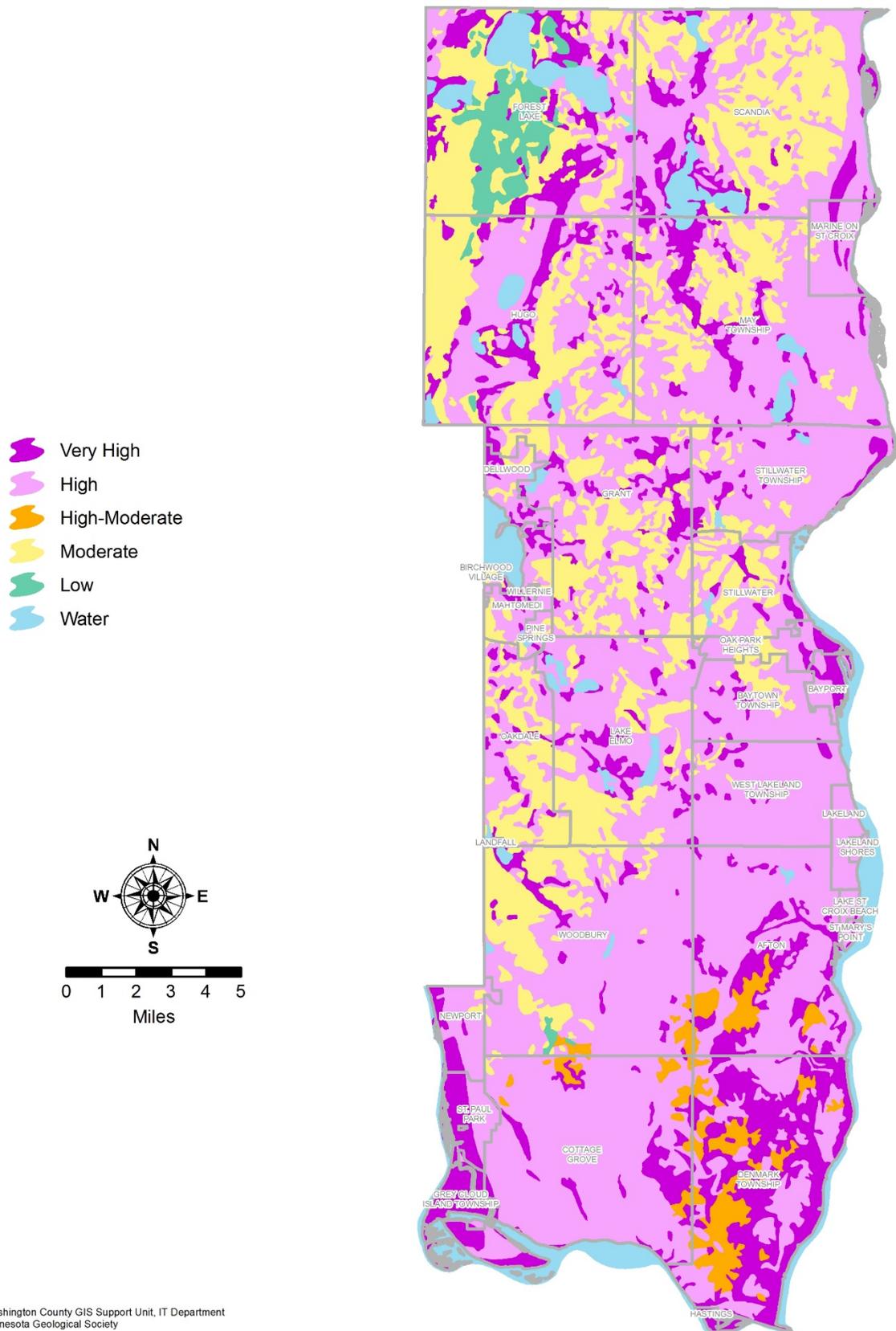
**Table 1: Contaminant Travel Time**

Rating	Time to Reach Groundwater
Very – High	Hours to Months
High	Weeks to Years
High-Moderate	Years to One Decade
Moderate	Years to Decades
Low-Moderate	Not for Decades
Low	Decades to Centuries
Very Low	Centuries

An updated sensitivity analysis, known as Part B of the Geologic Atlas, is currently in progress at the Minnesota DNR.

While groundwater is of high quality throughout the northern half of the county, past land use practices have contaminated groundwater that is used for drinking or other uses. In these areas, there are added financial and social costs to manage the affected water supply. Sources of groundwater contamination include residential, commercial, and industrial waste disposal; landfills; leaking petroleum tanks; non-functioning septic systems; and fertilizer/pesticide inputs.

Figure 16: Water Table Pollution Sensitivity



Prepared By: Washington County GIS Support Unit, IT Department  
 Data Source: Minnesota Geological Society

Washington County has contaminants above the established health risk limits in a number of aquifers. The groundwater contamination is generally of two types:

- Contamination resulting from volatile organic or inorganic chemicals leaching from past legal and illegal waste disposal practices and leaking underground storage tanks.
- Parts of the county where nitrates have been found at levels considered too high for certain sectors of the population due to land use practices and sensitive geologic conditions.

The following sections will describe several groundwater quality issues within Washington County.

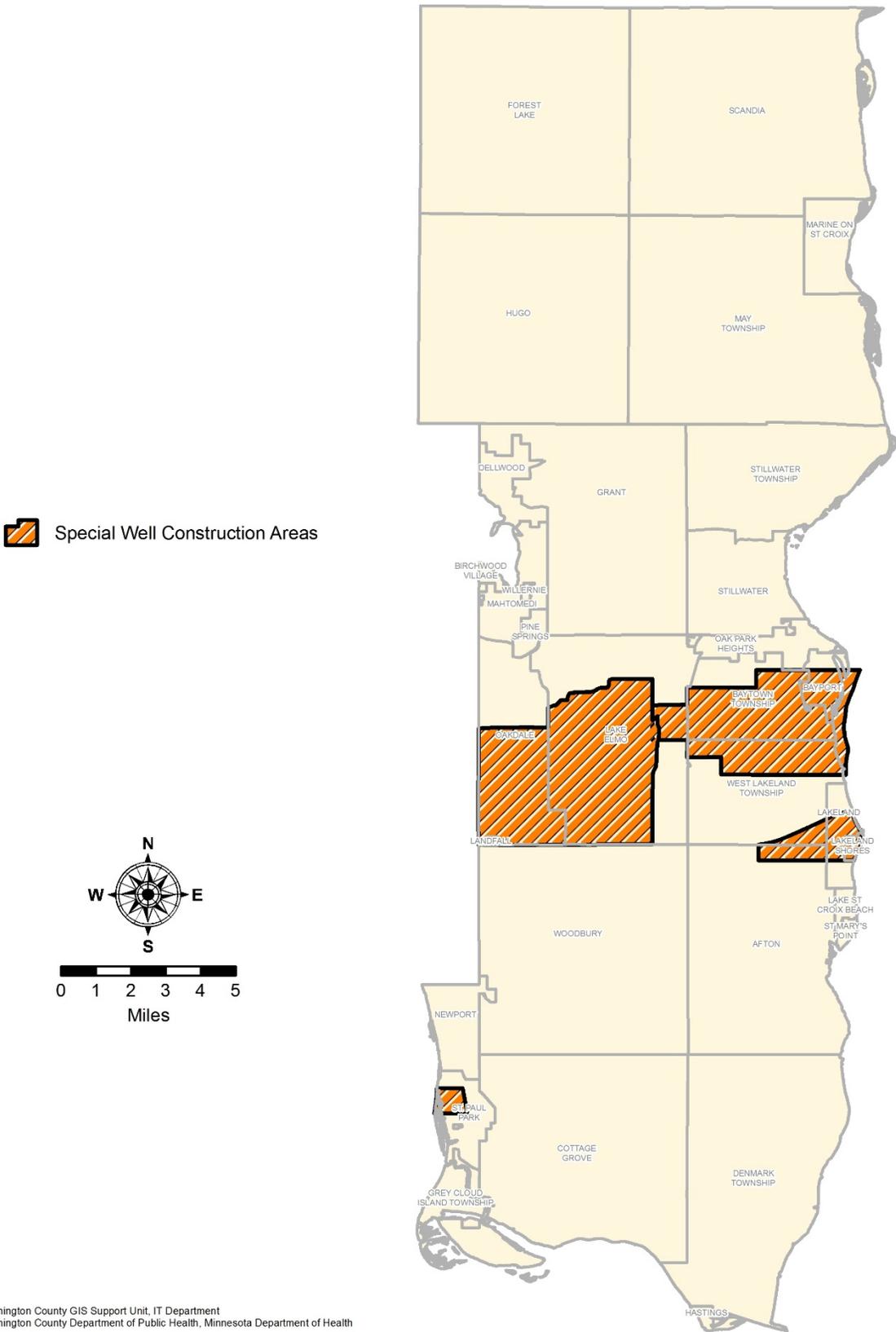
### Special Well and Boring Construction Areas

The MDH declares a Special Well and Boring Construction Area (SWBCA), sometimes called a well advisory, for areas where contaminants are found at a level that poses public health risks. The purpose of a SWBCA is to inform the public of potential health risks in areas of groundwater contamination, provide for the construction of safe water supplies, and prevent the spread of contamination due to the improper drilling of wells or borings. The SWBCA designation provides for controls on the drilling or alteration of public and private water supply wells, and monitoring of wells in an area where groundwater contamination has, or may, result in risks to the public health.

Washington County has four SWBCAs (see Figure 17). A brief description is provided below, and more information on the SWBCAs is available in the county Groundwater Plan, as well as on the MDH website.

- **Lake Elmo/Oakdale:** The Lake Elmo/Oakdale SWBCA was established in 1993 due to Volatile Organic Compound (VOC) at the Washington County Landfill near Lake Jane in Lake Elmo. Perfluoroalkyl substances (PFAS) contamination was also discovered at the landfill site and downstream wells. PFAS is described further below. Municipal water supply and private wells are impacted.
- **Lakeland/Lakeland Shores:** On December 16, 1987, the MDH issued a SWBCA for portions of Lakeland and Lakeland Shores due to VOCs. Many residents with affected private wells have been connected to the Lakeland municipal water system.
- **Baytown/West Lakeland Townships:** The Baytown SWBCA is due to Trichloroethylene, also known as trichloroethene or TCE, and impacts hundreds of private wells and one municipal supply. Several hundred private well owners are on treatment systems provided by the state.
- **St. Paul Park/Newport:** Designated in 1997, this VOC plume is related to activities from several industrial sites including the Ashland Refinery. There are no private well impacts by this SWBCA, as it is in a fairly developed area.

Figure 17: Special Well and Boring Construction Areas in Washington County



## Perfluoroalkyl Substances

In addition to the SWBCAs within the county, there is widespread contamination in the southern half of the county from perfluoroalkyl substances (PFAS), otherwise known as perfluorochemicals or PFCs. Figure 18 shows the extent of the PFAS plume, as of September 2017. PFAS contamination originates primarily from three sources in the county: the Lake Jane Landfill in Lake Elmo, 3M Oakdale disposal site, and 3M Woodbury disposal site. Remediation efforts are underway by 3M, and are led by the Minnesota Pollution Control Agency (MPCA), who also work very closely with the MDH regarding testing of private and public wells. The 3M remediation site in Woodbury maintains the single largest withdrawal permit in the county, where 1.25 billion gallons of water is pumped annually to a treatment plant, where it is used and discharged into the Mississippi River.

After PFAS contamination was initially discovered, a number of private wells were issued well advisories, and a treatment plan was constructed to treat the City of Oakdale's water supply. In August 2016, the Federal Environmental Protection Agency (EPA) issued new health advice which triggered additional testing of private and public wells. In the spring of 2017, MDH updated their own Health Based Values (HBVs) for PFAS compounds. The new HBVs are significantly lower than previous levels, in order to be protective of the most vulnerable populations. As a result of the new EPA and MDH health advice, as of September 2017, a total of 659 well advisories have been issued for PFAS. 450 of those advisories were issued since August 2016, after the new EPA and MDH advice. These private wells are located in the communities of Lake Elmo, West Lakeland Township, Cottage Grove, St Paul Park, Woodbury, Afton, Denmark Township, Grey Cloud Island Township, and Maplewood. Of the well advisories issued, over 200 homes in Lake Elmo have been connected to city water, with the remaining well owners issued bottled water and/or a carbon filter to remove the chemicals. All of these wells are undergoing treatment to make water supplies safe for residents. Figure 19 shows well advisories for private wells, related to PFAS contamination.

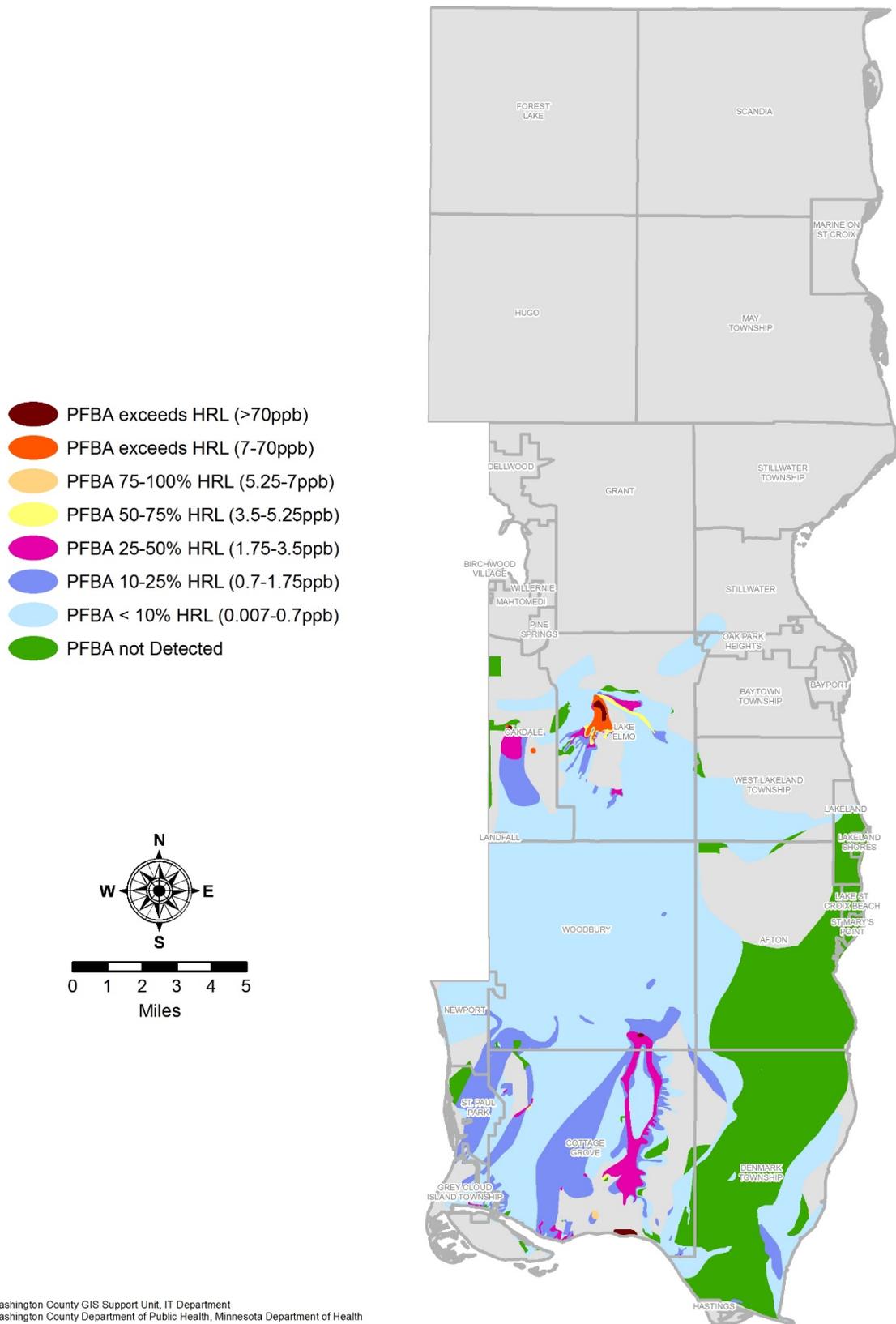
In addition to private wells, the updated MDH advice for PFAS has triggered additional actions for some public water suppliers within the county. There are currently four community public water supplies that have individual wells above the new MDH health-based guidance: Oakdale, Woodbury, Cottage Grove, and St. Paul Park. All of these cities put in place interim measures to manage their public water supply systems to provide drinking water at or below the new MDH health-based guidance. These measures included shutting off the most highly contaminated wells and relying on wells that are clean or have lower levels of PFCs. Cottage Grove wells were impacted the most, and in the summer of 2017, the city instituted a temporary watering ban in order to construct treatment systems that would bring their supply system back under the MDH advice. MDH continues to work with the MPCA to sample both public and private wells, and provides regular updates to county staff on testing results, well advisories, and other pertinent information.

The State of Minnesota sued 3M for natural resources damages in 2010. The case was settled in Hennepin County court on February 20, 2018. The settlement amount of \$850 million will be used to enhance the quality, quantity and sustainability of the drinking water in the east metro, in order to ensure clean drinking water supply to residents and business in the east metro to meet current and future needs. This may include alternative drinking water supplies (including new or relocated wells), water treatment (both public and private), water conservation, open space acquisition, and groundwater recharge. A second priority for the settlement money is "projects that restore and enhance aquatic resources, wildlife, habitat, fishing, resource improvement, and recreational opportunities in the east metro." The county will continue to monitor and participate in discussions related to use of these funds in our communities.

**Nitrates**

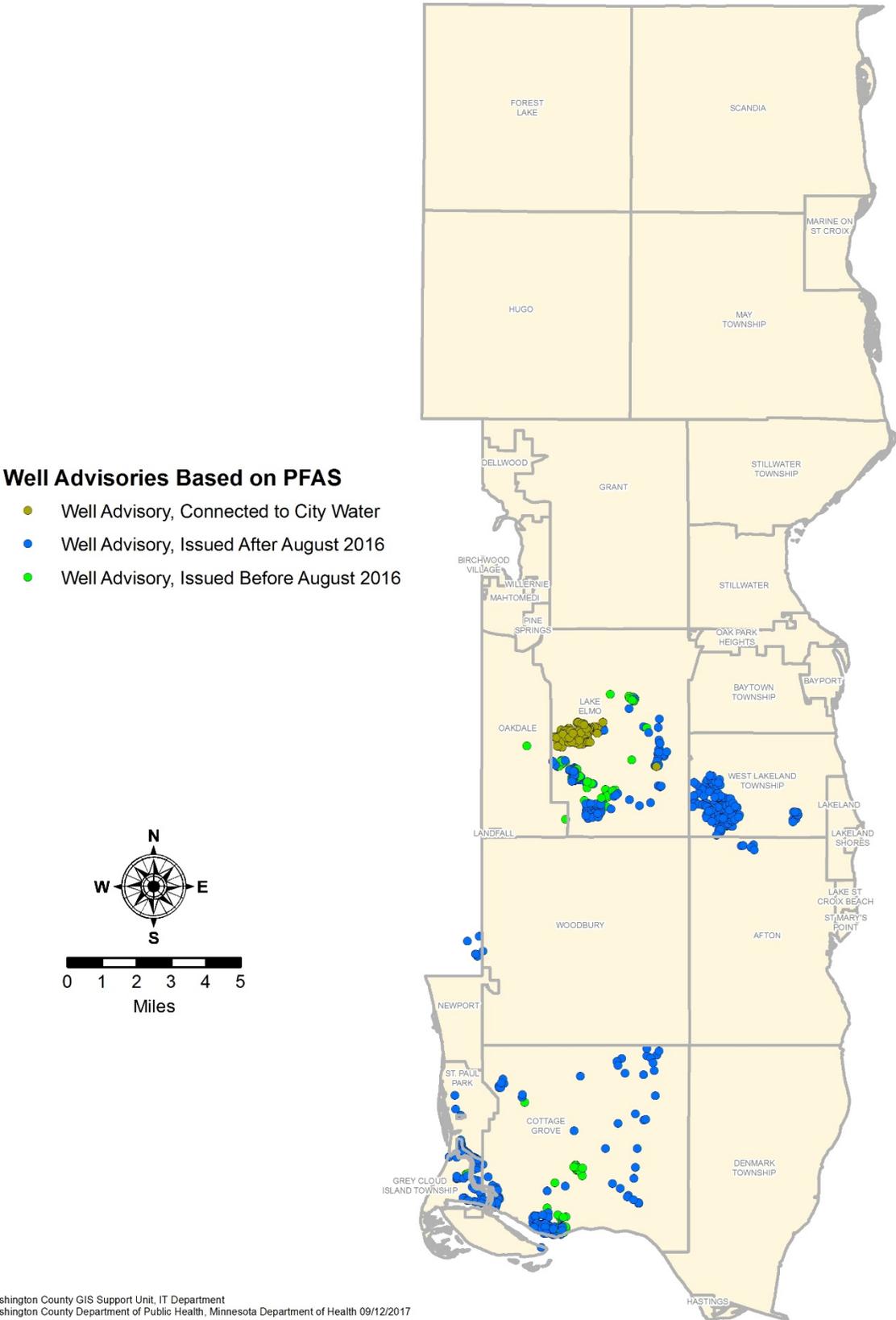
In addition to contamination from VOCs and PFAS, some areas in the county have high concentrations of nitrates in groundwater. Nitrates are a public health concern for babies under the age of 6 months and those with compromised immune systems. Nitrate pollution is primarily a result of current or past agricultural practices (from application of nitrogen fertilizers), animal operations, or non-compliant septic systems. Both Denmark Township and Cottage Grove have high concentrations of nitrates in private wells – where over 10 percent of private wells exceed the current health risk level of 10mg/L. The county continues to work with the Washington Conservation District and the Minnesota Department of Agriculture to promote best practices that will reduce future nitrate pollution, as well as educating private well owners about the importance of testing for nitrates.

Figure 18: Extent of PFAS Plume in Washington County



Prepared By: Washington County GIS Support Unit, IT Department  
 Data Source: Washington County Department of Public Health, Minnesota Department of Health

Figure 19: Well Advisories Related to PFAS Contamination in Washington County



Prepared By: Washington County GIS Support Unit, IT Department  
Data Source: Washington County Department of Public Health, Minnesota Department of Health 09/12/2017

## Wastewater

Proper treatment and management of wastewater reduces health risks to humans and animals and reduces the threat of contamination to surface and groundwater. In urban areas of the Twin Cities, including Washington County, homes and buildings are connected to the Metropolitan Urban Service Area (MUSA) sewer system and wastewater treatment plants (WWTP). Figure 20 shows the projected areas for the MUSA within Washington County, which serves about 80 percent of county residents. Table 2 shows adopted community forecasts for Households and Employment. In lower density, rural settings, where the MUSA does not extend, homes and businesses must rely on subsurface sewage treatment systems (SSTS), commonly called septic systems, to manage and treat wastewater. In Washington County there are approximately 17,000 SSTS, spread out over a large geographic area. A properly designed, installed, and functioning SSTS effectively treats wastewater and decreases introduction of bacteria, viruses, and other disease causing organisms into groundwater. As an added benefit SSTS also take groundwater pumped for human uses and recharge it directly to the local water table.



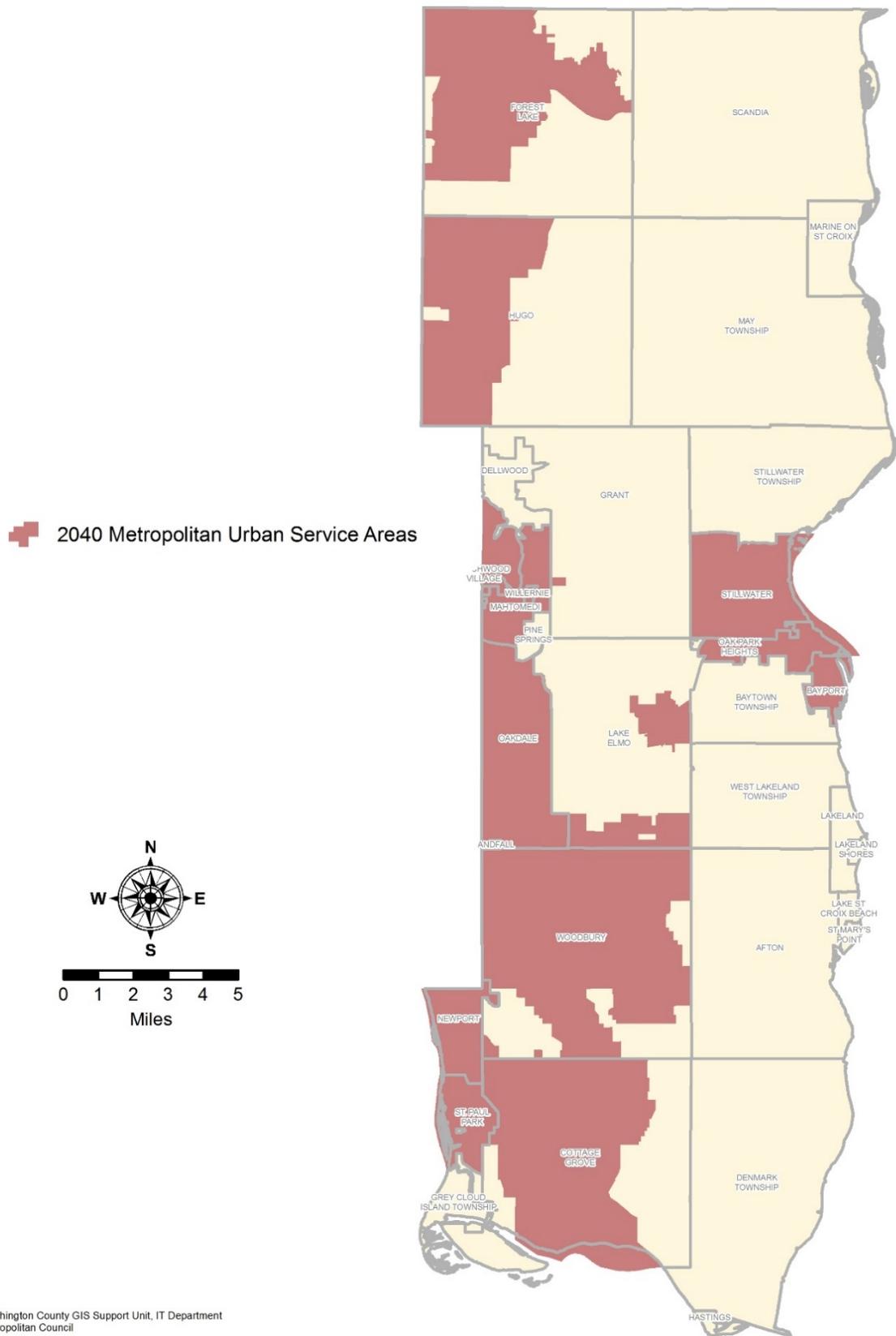
While an SSTS can be an efficient means of treating wastewater in rural areas, a failing or poorly maintained SSTS has the potential to contaminate groundwater and surface water with a variety of contaminants, including nitrates, coliform bacteria (E Coli), and phosphorus. A failing SSTS system often does not have the required vertical separation distance from the point it is discharging wastewater and the water table, bedrock, or another limiting feature. These systems do not adequately treat wastewater and must be upgraded or replaced.

Subsurface sewage treatment systems serve approximately 48,000 county residents, and treat an average of 3.6 million gallons of wastewater a day. This is equivalent to the amount of wastewater created by the communities of Stillwater, Oak Park Heights, and Bayport, which are served by a central wastewater treatment plant where treated water is discharged from one point. In contrast, with decentralized, individual SSTS use there are thousands of discharge points each having the potential to contribute pollution and groundwater contamination. Just as a WWTP can and must be operated and maintained to prevent surface water contamination, the thousands of SSTS in the county must be properly maintained and operated to prevent surface and groundwater contamination.

To ensure proper installation, operation, and maintenance of subsurface sewage treatment systems Washington County administers Ordinance #XXX, last revised in June 2018. The SSTS Ordinance is codified in the county's Development Code as Chapter 4. The ordinance has been reviewed by MPCA and is compliant with State Rules 7080-7083. This ordinance provides the basis for the county's SSTS program including requirements for: compliance inspections of existing systems, permitting and inspection of new systems, site review, maintenance requirements, and operating permits for advanced treatment systems (Type IV). The county is responsible for implementing the ordinance in all but one city. In addition to compliance with state rules, the county's ordinance and SSTS program has the following components which are stricter than state rules:

- At least every three years, SSTS owners must have the tank maintained, which includes inspection for leaks and pumping.
- Prior to sale of a property the septic system must be inspected for compliance with county requirements to treat wastewater and protect groundwater, public health, and the environment.
- A system that fails compliance inspection is required to be replaced or brought into compliance within six months.

Figure 20: Projected Areas for the Metropolitan Urban Service Area in Washington County



Prepared By: Washington County GIS Support Unit, IT Department  
 Data Source: Metropolitan Council

- When a system is found to be an imminent public health threat, the health threat must be abated within 10 days and the system shall be replaced or brought into compliance within 90 days.
- Septage pumped from SSTs is disposed of in a municipal WWTP, or by land spreading under an approved permit, which is regulated under the ordinance.
- All SSTs regulated under the county ordinance include a system management plan.

**Table 2: Washington County Population, Household and Employment Forecasts**

	2010	2020	2030	2040
	238,136	268,410	299,130	330,200
Percent Increase*	--	7%	11%	10%
	87,859	102,280	116,210	130,090
Percent Increase*	--	10%	14%	12%
<b>Employment</b>	87,859	102,280	116,210	130,090
Percent Increase*	--	16%	6%	12%

\*Percentages rounded to the nearest whole number.

Source: U.S. Census Data for 1970-2010, Metropolitan Council estimates for 2010, 2015, 2020, 2030 and 2040.

The county uses a central database to track maintenance, permitting, and compliance inspections of SSTs. Figure 21 shows the location of all the SSTs systems in the county. This dataset comes from maintenance records for SSTs, not permitted systems, and is the best data available.

In unsewered areas, the county ensures that 10,000 square feet of suitable soil treatment area exists on each new lot. Beyond that requirement, the county does not regulate land use except in shoreland and floodplain areas of townships (see Land Use chapter). With regards to conditions under which private community treatment systems (package plants) would be allowed, the county does not have land use authority and therefore does not regulate allowable land uses and residential densities. Private community systems may be developed and overseen by the county, provided they meet the conditions of the county’s ordinance for midsize sewage treatment systems (MSTS). Systems larger than 10,000 gallons per day (large sewage treatment systems or “LSTS”) are permitted by the MPCA, and the county does not have any regulatory oversight of those systems. Figure 22 shows the location of MSTS and LSTS systems within the county, regulated by either the county or the MPCA.

In terms of “nonconforming systems or systems with problems,” the county’s Ordinance requires compliance inspections at the time of property transfer. SSTs are inspected by third party licensed inspectors, and compliance reports are then verified by county staff, who ultimately determine the timeframe for upgrading non-compliant systems. Figure 23 shows orders for non-compliance that have been issued from 2012-2017. It is important to note that all of these systems have been ordered replaced, in which case they have already been replaced or are in the process thereof, following timelines in county ordinance. In 2017, the county launched a multi-year effort to conduct a countywide risk assessment for SSTs. This includes both gathering older permit

records from cities who may have permitted SSTS in the past, as well as analyzing available SSTS and groundwater data to determine risk levels throughout the county. The risk assessment will be a tool for the county, cities, and townships to make decisions with regards to SSTS and sewer.

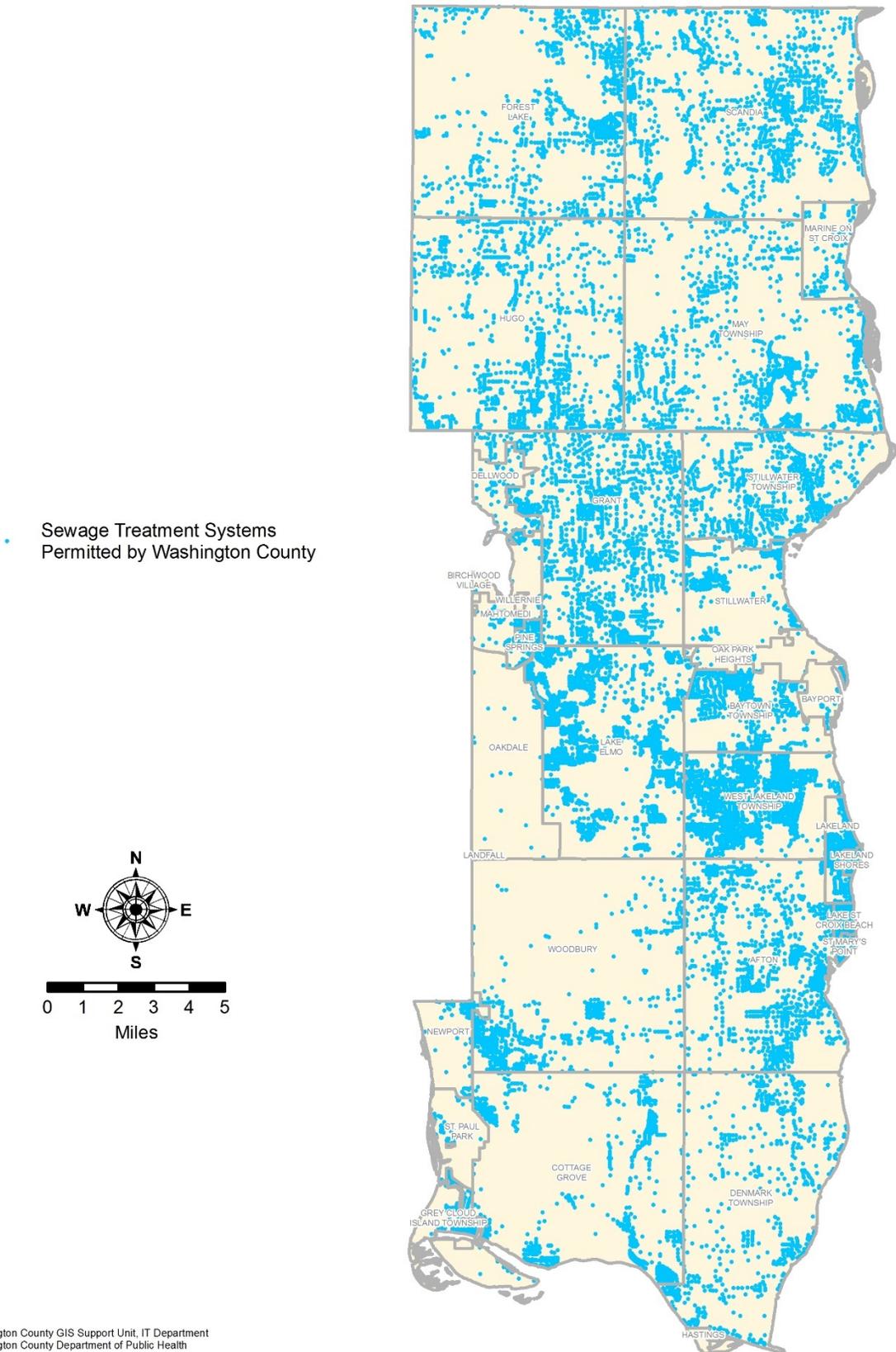
Areas with bedrock near the surface, steep slopes, wet or periodically flooded areas, or soils with slow percolation rate have severe limitations for the installation of subsurface sewage treatment systems. These soils are present throughout the county. Bedrock within three feet of the surface can be encountered along the St. Croix River and in other scattered areas of the county. Soil treatment systems which are placed too close to fractured bedrock do not adequately treat sewage effluent. In these areas, sewage may move through the rock and enter wells without receiving sufficient filtration to remove the chemical and bacteriological contamination.

Wet soils are in abundance throughout the northern half of the county. These soils are periodically flooded or have a high-water table. Ponding after heavy rains may persist for several weeks or longer in the spring. These soils generally have a high seasonal water table. SSTS can be problematic in these areas because the sewage effluent is unable to move into the saturated soil. The sewage will either back-up into the residence or seep to the surface of the ground.

Steep slopes are common in the county, especially in the St. Croix River Valley. Slope is a soil property that affects the difficulty in layout and construction as well as the risk of erosion, lateral seepage, and the down slope flow of effluent. Washington County restricts the types of SSTS on land with slopes exceeding 12 percent.

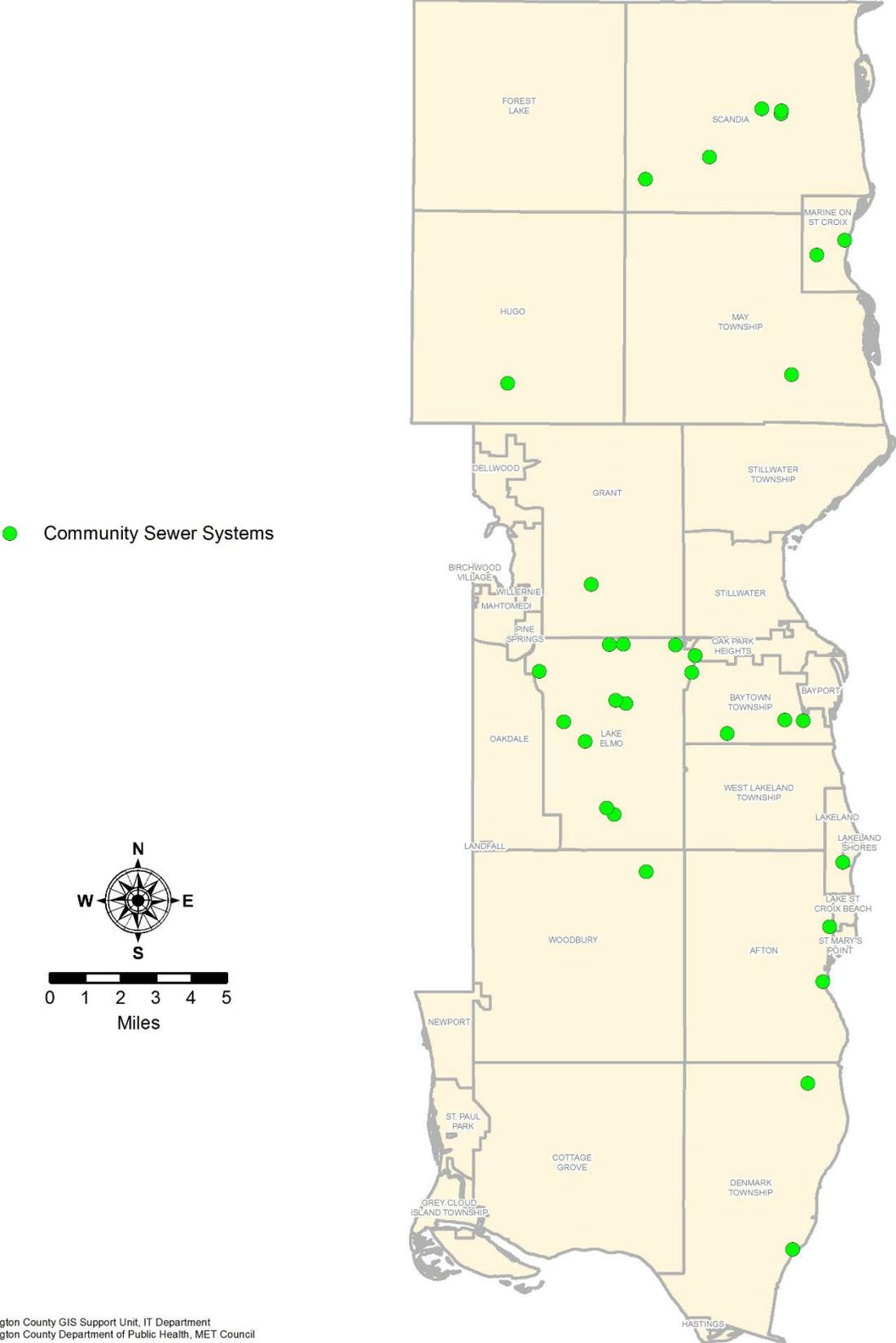
Soils with slow percolation rates are prevalent in the northern half of the county. Slow percolation rates indicate soils that require careful attention to ensure the system is adequately sized to accept the required design flow and not exceed the maximum soil loading rate.

Figure 21: SSTS System Locations in Washington County



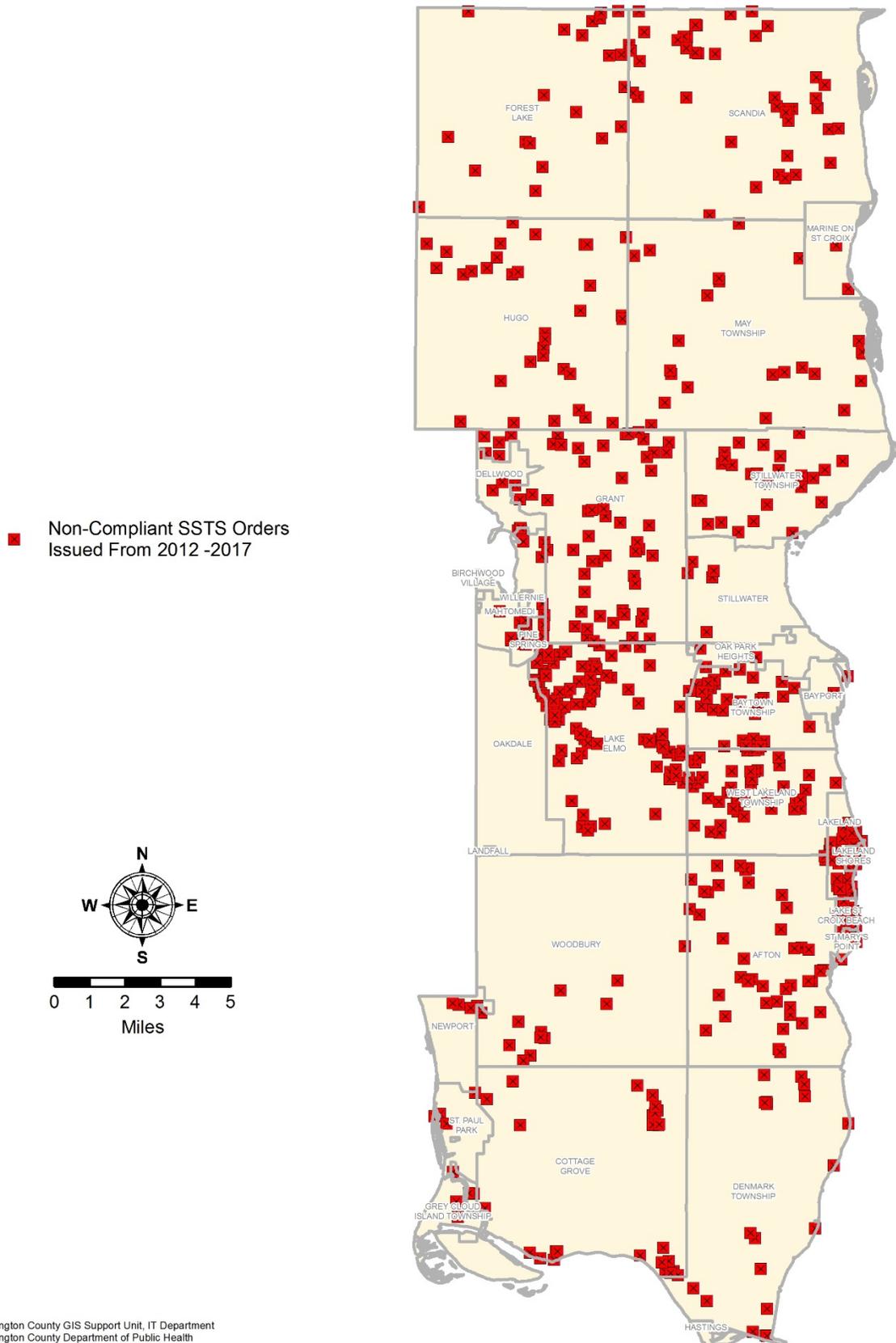
Prepared By: Washington County GIS Support Unit, IT Department  
Data Source: Washington County Department of Public Health

Figure 22: Community Sewer Systems in Washington County



Prepared By: Washington County GIS Support Unit, IT Department  
Data Source: Washington County Department of Public Health, MET Council

Figure 23: Non-compliance SSTS Orders Issued from 2012 - 2017



Prepared By: Washington County GIS Support Unit, IT Department  
 Data Source: Washington County Department of Public Health

## Water Management

### Washington County Groundwater Plan

Washington County, through the Department of Public Health and Environment (PHE), implements a state approved Groundwater Plan (Plan). Authorized in Minnesota Statute 103.255, groundwater planning authority was granted to metro counties in 1987. First adopted in 2003, the county board of commissioners approved an updated Plan in September 2014. The updated Plan is organized around various issues related to groundwater quality and quantity, and goes into much greater detail than is provided in this comprehensive plan, both in terms of existing conditions, and implementation strategies. The Groundwater Plan can be found at: <https://www.co.washington.mn.us/DocumentCenter/View/794>.

### Watershed Management Organizations

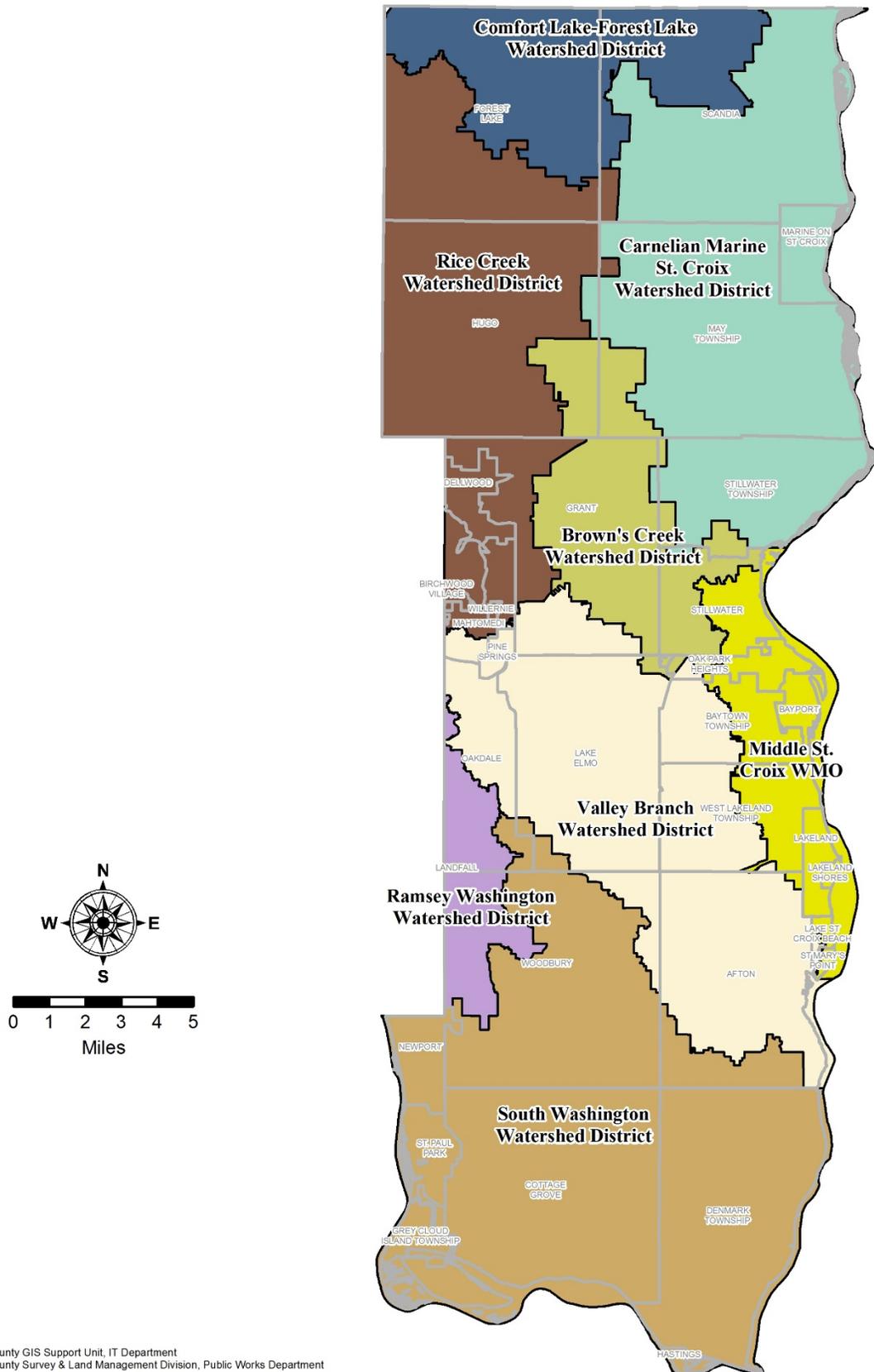
In the Twin Cities Metropolitan Area, the watershed management organizations (WMOs) are responsible for surface water management planning, implementation, and enforcement. Washington County has defined its role in surface water management as one of providing leadership and oversight, including appointing watershed district board members, providing fiscal oversight and accountability, facilitating cross-jurisdictional coordination on common issues, managing special projects, and staffing the Washington County Water Consortium.

The county currently has eight watershed organizations that cover the entire county. Seven are watershed districts (WDs), whose managers are appointed by the county board of commissioners. One is a joint powers watershed management organization (WMO). See Figure 24 for a map of watersheds in the county, and Appendix O for a short description of each. The watersheds provide long-term protection for surface and groundwater resources.

The broad statutory goals and objectives of these organizations are to:

- Preserve and improve the quality and quantity of water and natural resources.
- Educate residents about the value of water resources and their potential impacts on its functions and values.
- Use sound scientific water management approaches, technologies, and methods to develop a uniform, integrated approach to water management within a rapidly changing and urbanizing area.
- Maximize groundwater recharge as a means of maintaining drinking water supplies, preserving base flows in groundwater-dependent natural resources, and limiting discharges of stormwater to downstream receiving waters.
- Maintain, enhance, and restore, where possible, the functions and values of existing areas and wetlands.
- Provide water level and floodplain management.
- Assure that the integrity of the watershed is preserved for future generations.

Figure 24: Watershed Organizations in Washington County



Prepared By: Washington County GIS Support Unit, IT Department  
 Data Source: Washington County Survey & Land Management Division, Public Works Department

**Washington Conservation District**

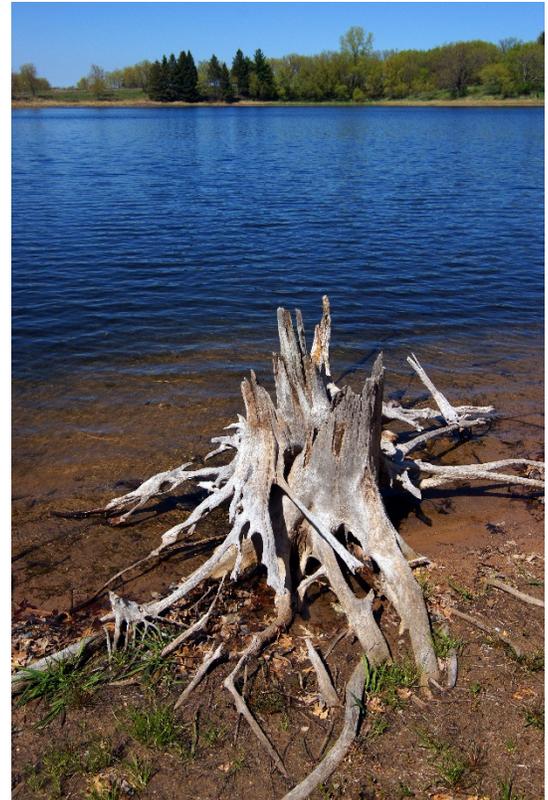


The Washington Conservation District (WCD) is a special purpose local unit of government dedicated to managing soil and water resources in Washington County under the direction of a five-member elected board. The mission of the organization is to enhance, protect, and preserve the natural resources of Washington County through conservation projects, technical guidance, and educational services to citizens and local governments.

The state’s soil and water conservation policy (MN State Statute 103C.005) encourages land occupiers to conserve soil, water, and natural resources through partnerships with the state and others, including such things as controlling erosion and reducing damage caused by floods.

The WCD implements the following programs through funding from the state and partnerships with Washington County, watershed management organizations, and other agencies:

- Water monitoring and other resource assessments, including implementing a County Baseline Monitoring Program and supporting multiple total maximum daily load (TMDL) projects.
- Wetland Conservation Act (WCA) technical assistance.
- Education and outreach, including providing staff support for the East Metro Water Resource Education Program.
- Best management practice technical assistance, including administering the State Cost-Share Grant Program and working with watershed organizations to plan, design, and install water quality erosion control and habitat improvement projects in urban and rural portions of the county.



**Washington County Water Consortium**

The county convened the Washington County Water Consortium to work on surface and ground water issues that cross local governmental boundaries. The consortium, which has been meeting since 2001, was a result of a Water Governance Study completed in 1999. The consortium is an ad hoc organization of representatives from watershed districts, joint powers agreement water management organizations, cities and townships, the Washington Conservation District, county departments, and state and regional natural resource agencies. It serves as a forum to exchange information and to work on projects that increase the efficiency and effectiveness of water management in the county. The Water Consortium has completed projects such as a standardized chart of accounts, guidelines for standardizing watershed district rules, adjustments to watershed district boundaries, a countywide ground water monitoring network, groundwater studies, and a countywide water resource education program.

### Groundwater Management Area

Washington County is fully within the North and East Metro Groundwater Management Area (GWMA), designated by the Minnesota DNR. The North and East Metro GWMA includes all of Washington County, all of Ramsey County, and a portion of Anoka and Hennepin Counties. The GWMA Plan will guide the DNR's efforts to manage groundwater appropriations sustainably in this area over the next five years. The Plan establishes sustainability goals to help appropriation permit holders plan for their future water use. Washington County participates on the advisory team for the GWMA.

### One Watershed One Plan and Watershed-Based Funding

In 2017, the Lower St. Croix Watershed, which covers approximately two-thirds of the county, began a collaborative planning effort under the Board of Water and Soil Resources (BWSR) One Watershed One Plan initiative. The goal of this planning process is to organize and develop focused implementation plans on watershed boundaries in non-metro areas of the state. For the Lower St. Croix Watershed, which covers both metro and non-metro areas, this effort includes 17 local units of government including counties, soil and water conservation districts, and watersheds. In addition, in 2017 BWSR also announced a pilot program for Watershed-Based funding, which will shift funding for water quality projects away from competitive Clean Water Fund grant funds to an allocation based formula that follows county boundaries in the metro, and One Watershed One Plan boundaries in the non-metro. The county is tracking on both of these funding efforts.

### Land and Water Legacy Program

Through its Land and Water Legacy Program, Washington County has continued preserving some of the county's most precious remaining natural resources. The LWLP acquires land and interests in land to improve water quality of rivers, lakes, and streams; protect drinking water sources; purchase parkland; preserve wetlands and woodlands; and help protect land along water bodies from development. More information on this program is available in the Parks, Trails and Open Space chapter.



## Goals, Policies, and Strategies

To guide future decision making and county actions, goals, policies and strategies have been developed specific to the water resources element. The following pages outline two goals with corresponding policies and strategies that set the course for the county’s future. Chapter 3, Goals, Polices, and Strategies, also provides the information contained within this section, along with the goals for the other plan elements. Chapter 11, Implementation, provides tools that can be utilized while working to achieve these goals.

Water Resources Goal 1: Manage the quality and quantity of water resources to protect human health and ensure sufficient supplies of clean water to support human uses and natural ecosystems for current and future generations.	
Water Resources Policy	Water Resources Strategy
<b>Lead by example in county operations with regards to water management.</b>	Identify opportunities for water conservation, efficiency and/ or reuse in county facilities, grounds and operations.
	Support development and implementation of a county Energy Plan which includes water efficiency/conservation.
	Continue to review alternatives to using and storing salt for de-icing operations that are protective of public safety and the environment.
	Incorporate Low Impact Development practices and green infrastructure into county led projects and at county facilities.
	Demonstrate nutrient load reduction practices on county properties (i.e., volume control best management practices, reduced fertilizer use, minimized turf areas, use of native vegetation, etc).
<b>Prevent future groundwater contamination by ensuring sound management of solid and hazardous waste within the county.</b>	Maintain solid and hazardous waste regulation through local ordinances.
	Promote best practices for solid waste management through the waste hierarchy. This includes reuse, recycling, organics, and yard waste. See the Resilience chapter for more information.
	Continue to strengthen outreach and education on household hazardous waste disposal options through the use of county environmental center and other facilities/events that are available.

<p><b>Ensure no-net-loss of the quantity and quality of wetlands in accordance with the Minnesota Wetland Conservation Act.</b></p>	<p>Avoid wetland impacts, where feasible, in accordance with the Minnesota Wetland Conservation Act and watershed management organization rules.</p>
	<p>Where avoidance is not possible, mitigate wetland impacts in accordance with the Minnesota Wetland Conservation Act and watershed management organization rules, replacing the key functions as determined by local values.</p>
	<p>Restore degraded wetlands to a higher functional level where feasible.</p>
	<p>Work with the Washington Conservation District on implementing the Wetland Conservation Act and Best Management Practices for shoreland and wetland areas during the development process.</p>
<p><b>Encourage activities to reduce pollutant loading (e.g. nutrients, sediment, and thermal) to lakes, streams, and the St. Croix and Mississippi river basins.</b></p>	<p>Promote the use of volume control practices for annual pollutant load reduction.</p>
	<p>Support baseline monitoring to assess condition of water bodies in the county.</p>
	<p>Incorporate Total Maximum Daily Load (TMDL) requirements, as applicable, into county planning and construction projects.</p>
<p><b>Support a coordinated, multifaceted approach to managing subsurface sewage treatment systems (SSTS); including research, education, and regulation in accordance with state rules.</b></p>	<p>Continue implementing SSTS ordinance in accordance with Minnesota Rules 7080-7083. Update the local ordinance to be consistent with changes in state rules, as needed.</p>
	<p>Locate all new systems where soil capabilities are adequate to provide for proper treatment system installation.</p>
	<p>Conduct a countywide assessment for SSTS to determine levels of risk and inform future decision-making.</p>
	<p>Continue to provide financial assistance for SSTS replacement through the SSTS loan program. Explore additional financial assistance options for residents including local and state grants.</p>
	<p>Strengthen education efforts related to SSTS for homeowners, realtors, and other stakeholders.</p>
	<p>Promote development of community sewer systems in areas with high rates of noncompliant SSTS or where small groups of homes make such systems feasible.</p>
	<p>Promote the reuse of treated wastewater at metropolitan treatment plants for beneficial purposes.</p>

<b>Protect shoreland areas in order to maintain natural habitat and water quality.</b>	Amend the Shoreland Ordinance in accordance with the state shoreland rules. See Land Use chapter for more information.
	Implement and enforce the Buffer Law in accordance with state law.
<b>Implement and enforce a Storm Water Pollution Prevention Program (SWPPP) to reduce pollution created by stormwater runoff in order to protect water quality in the county.</b>	Participate in the East Metro Water Resource Education Program to increase public awareness and understanding of stormwater issues and the impacts of stormwater runoff on water quality.
	Provide training opportunities for county staff in erosion control, best management practices, good housekeeping, and pollution prevention at construction sites.
	Coordinate with other Municipal Separate Storm Sewer (MS4s) to improve implementation efficiency and effectiveness.
<b>Protect land, structures, and natural communities from flooding that exceeds natural water level fluctuations.</b>	Regulate flood- hazard areas subject to periodic inundation causing hazard to life and property, disruption of commerce and governmental services, unsanitary conditions, and interruption of transportation and communication.
	Prevent new building and limit expanding existing structures located in floodplains.
	Amend Floodplain Management Regulations as required by the Federal Emergency Management Agency (FEMA) and MN Rules 6120.5500.
	Participate in the Flood Insurance Program.
	Collaborate with local watershed organizations, local governments, the Minnesota Department of Natural Resources, and the Federal Emergency Management Agency to update and adopt the flood insurance rate maps. These maps are used by insurance and mortgage companies to determine the need for flood insurance on properties within the county.
<b>Support integrated resource management and projects that provide multiple or co-benefits.</b>	Seek opportunities to enhance water quality protection in related projects such as those that promote and improve pollinator habitat, preserve open space, and encourage alternative agriculture practices including cover crops and emerging markets.

<b>Support efforts to slow the spread of Aquatic Invasive Species (AIS).</b>	Continue Local AIS Prevention Aid program (as funds remain available from the State).
	Evaluate results of Local AIS Prevention Aid grant activities annually and encourage grantees to modify their approach, where needed, to most effectively slow the spread of AIS.
	Monitor the latest state and national AIS research, and encourage prospective grantees to implement best management practices to effectively slow the spread of AIS.
<b>Water Resources Goal 2: Protect groundwater and surface water resources through coordination and collaboration with state and local water resource organizations.</b>	
<b>Water Resources Policy</b>	<b>Water Resources Strategy</b>
<b>Facilitate the sharing of groundwater and surface water information and resources through interdisciplinary and intergovernmental work.</b>	Initiate shared projects and conduct joint studies and research initiatives related to water management as funding opportunities arise.
	Provide leadership for the Water Consortium to improve the efficiency and effectiveness of water management within the county.
	Develop collaborative strategies and actions to implement the Washington County Groundwater Plan and annual work plan.
	Support inter-governmental coordination and cooperation in implementing existing and developing new groundwater, surface water, and wetland rules, policies, and programs.
	Implement sound watershed management practices in cooperation and conjunction with state and local government entities engaged in water management programs.
<b>Encourage local governments to consider groundwater and surface water protection when adopting land use plans and zoning ordinances and making land use decisions.</b>	Encourage communities to regulate the siting and permitting of new land development to protect groundwater quality and quantity from degradation and depletion.
	Share technical information with communities so that they may develop effective groundwater policies and plans.
	Encourage use of sound scientific data and understanding in planning, zoning, and land use decisions.
	Encourage communities to develop groundwater protection policies related to the siting and permitting of new commercial and industrial development.

<p><b>Encourage local governments to consider groundwater and surface water protection when adopting land use plans and zoning ordinances and making land use decisions.</b> <b>(Continued)</b></p>	<p>Encourage communities to establish and enforce standards that prevent ground and surface water contamination.</p>
	<p>Establish and enforce more stringent standards to protect areas of significant groundwater recharge.</p>
<p><b>Collaborate with state agencies and local communities to promote and support the efficient use of groundwater resources to ensure that drinking water supplies are adequate for projected growth in the county.</b></p>	<p>Promote local planning and land use patterns that protect groundwater quality and quantity.</p>
	<p>Promote research and water supply planning to provide for sustainable water supplies and, to the extent possible, minimize the loss of flow to surface water features and groundwater dependent natural resources.</p>
	<p>Encourage local units of government to develop and implement water conservation and efficiency plans.</p>
	<p>Support local partners to implement water conservation and efficiency practices and programs.</p>
	<p>Continue to track on local and regional groundwater-surface water interaction issues.</p>
<p><b>Collaborate with partners including the Minnesota Department of Natural Resources, Minnesota Aquatic Invasive Species Research Center, Washington Conservation District, watershed districts and management organizations, lake associations, and others on AIS activities.</b></p>	<p>Encourage organizations with similar or overlapping AIS management goals to work together to leverage resources.</p>
	<p>Convene organizations working on AIS education and management efforts annually to highlight the latest research and most effective practices.</p>
<p><b>Collaborate with partners to build climate resilience through integrated surface and groundwater management. See Resilience chapter for more information.</b></p>	<p>Promote green infrastructure practices that support resiliency and adaptability to climate events.</p>
	<p>Coordinate with other resilience efforts as described in the resilience chapter.</p>

<b>Collaborate with state and local agencies to involve and educate the public in water resource management.</b>	Participate in the East Metro Water Resource Education Program to increase public awareness and understanding of water issues.
	Support regional education efforts, where feasible, including the Metro Children’s Water Festival, Watershed Partners, and others.
<b>Facilitate the sharing of groundwater and surface water information and resources through interdisciplinary and intergovernmental work.</b>	Support regional education efforts, where feasible, including the Metro Children’s Water Festival, Watershed Partners, and others.
	Initiate shared projects and conduct joint studies and research initiatives related to water management as funding opportunities arise.