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## The Watershed and Its Operational Environment

### Goal

1. To identify and analyze those variables that provide for sustained performance of the water resources of the District.
2. To identify and analyze the significant characteristics and activities influencing water resource management and the subject of problems, issues, and concerns to clearly define those characteristics most influential on water management.

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### Outcomes

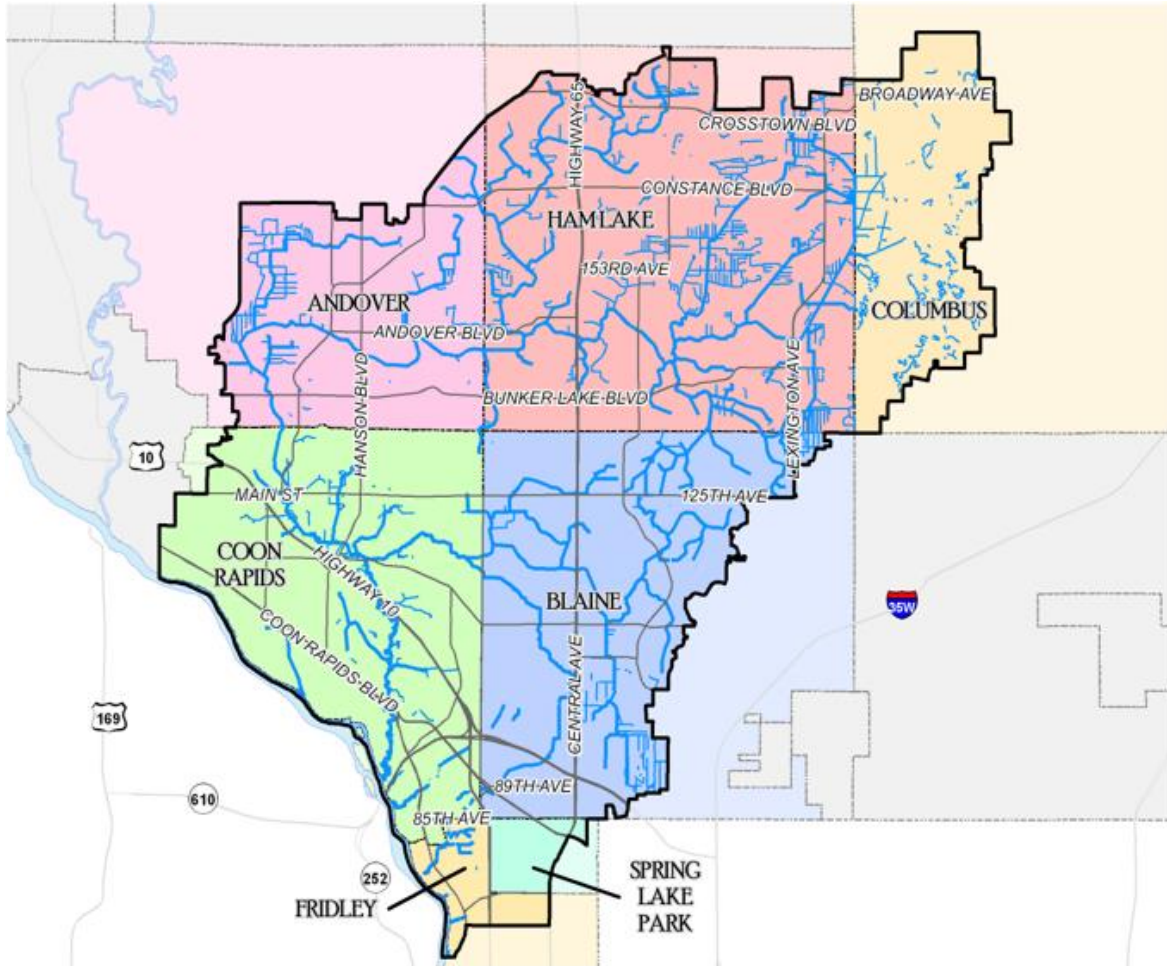
- Clarification of the geographic limits of District authority
- Identification for potential change, in District interests
- Significant physical, social, and man-made features, factors, and considerations

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## Introduction to Coon Creek Watershed and its Area of Operation

The Coon Creek Watershed District is approximately 107 square miles in size and is located on the norther edge of the Minneapolis-St. Paul metropolitan area in Anoka County, Minnesota.

The geographic extent of District authorities was established in the 1959 order establishing the district. That area was changed through subsequent boundary amendments in 2005, 2007, 2010, 2011, 2013 and 2020. At present the District boundary encompasses 107 square miles and includes parts or all of seven cities.



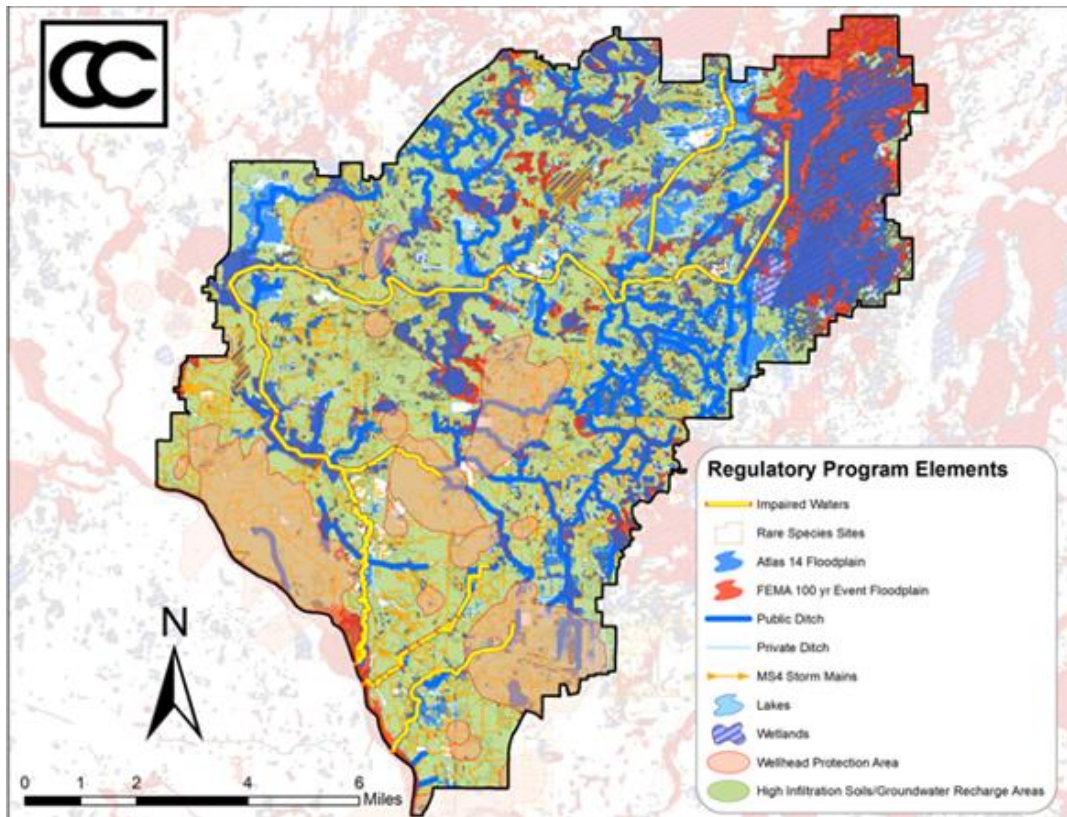
City	Sq Miles	Pct of District	% of City in CCWD
Andover	15	14%	43%
Blaine	22	21%	64%
Columbus	11	10%	23%
Coon Rapids	22	21%	100%
Fridley	2	2%	21%
Ham Lake	33	30%	90%
Spring Lake Park	2	2%	68%
<b>Total</b>	<b>107</b>	<b>100%</b>	

## Water Resource Management Interests

As a special purpose unit of government, the interests of the District are defined by and limited to the water and related resources and concerns identified in MS 103, MS 114 and the Federal Clean Water Act. Those interests are complex, and their relative priority is highly subject to change and evolution over time as knowledge is acquired and/or social tastes and preferences change. Consequently, application of the District's powers and authorities to tax, regulate and fund are limited, and their employment must:

- Possess a rational and reasonable connection to those legislated mandates pertaining to
  - Groundwater
  - Public Drainage
  - Water quantity
  - Water quality
  - Wetlands
- Pose a threat to successfully addressing those mandates.
- Protect the public health, safety, and welfare.
- Be essential to the ongoing provision of the beneficial uses provided by the watershed.

## Area of Interest



# Significant Characteristics of the Area of Operation

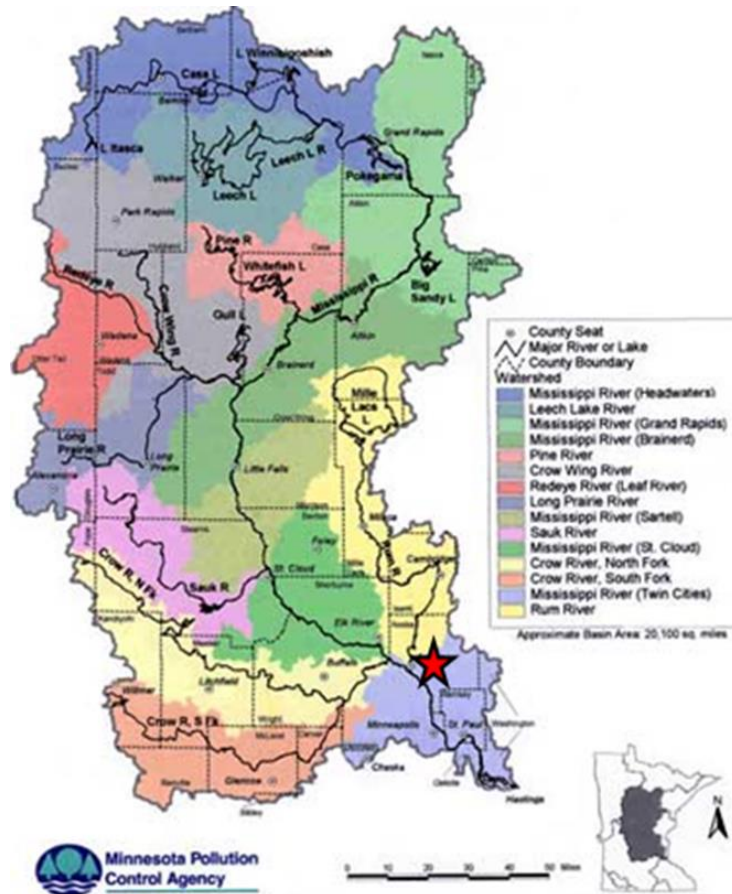
## Summary

The watershed plus other tributaries discharging directly to the Mississippi River encompass 107 square miles. The area is a glacial lakebed whose surficial geology is characterized by fine sand, and sandy silty tills overlaying 150 feet of coarser sands and tills interspersed with gravel and deposits of silt and clay. Groundwater is found at or near the surface. The upper 75% of the watershed is flat to gently rolling with drainage slopes of less than 1%. Approximately 60% of the watershed is developed and approximately 75% of that development occurred prior to 2009 and the water quality era. The following includes the variables required in M.R. 8410.0060.

## Landscape and Terrain

### Upper Mississippi River Watershed

The Coon Creek watershed is part of the Twin Cities portion of the Upper Mississippi River Watershed (UMRW). The UMRW includes the headwaters of the Mississippi River, and its outlet is at its confluence with the Minnesota River. The Coon Creek Watershed outlets to the Mississippi River approximately 21 miles upstream from where those rivers join.

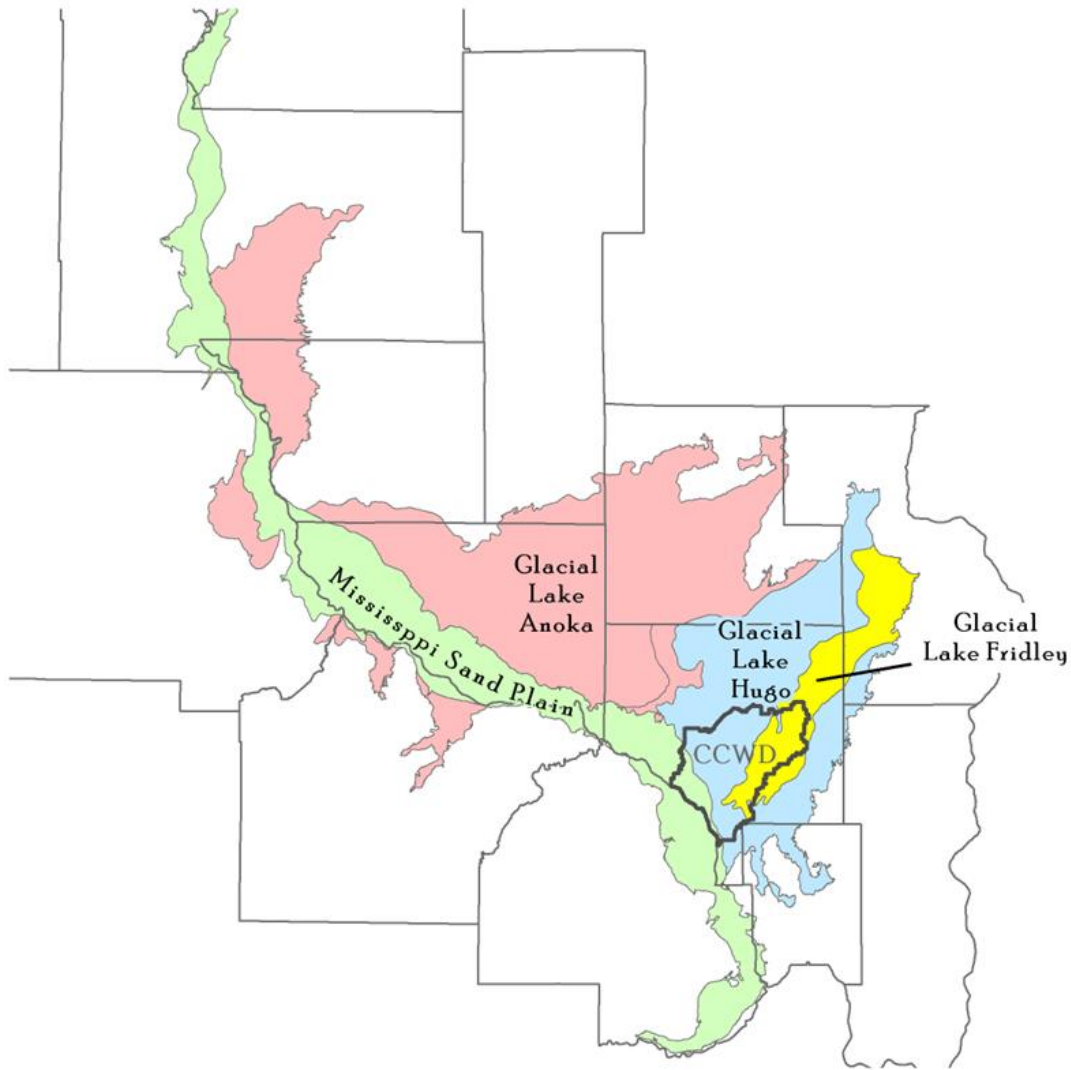




### **Ecological Setting: Anoka Sand Plain – Anoka Lake Plain**

The watershed is part of the Anoka Lake Plain land type association characterized by nearly level to gently rolling lake plain formed by melt water from the Grantsburg Sublobe. Some areas of the lake plain have been reworked by wind to form dunes.

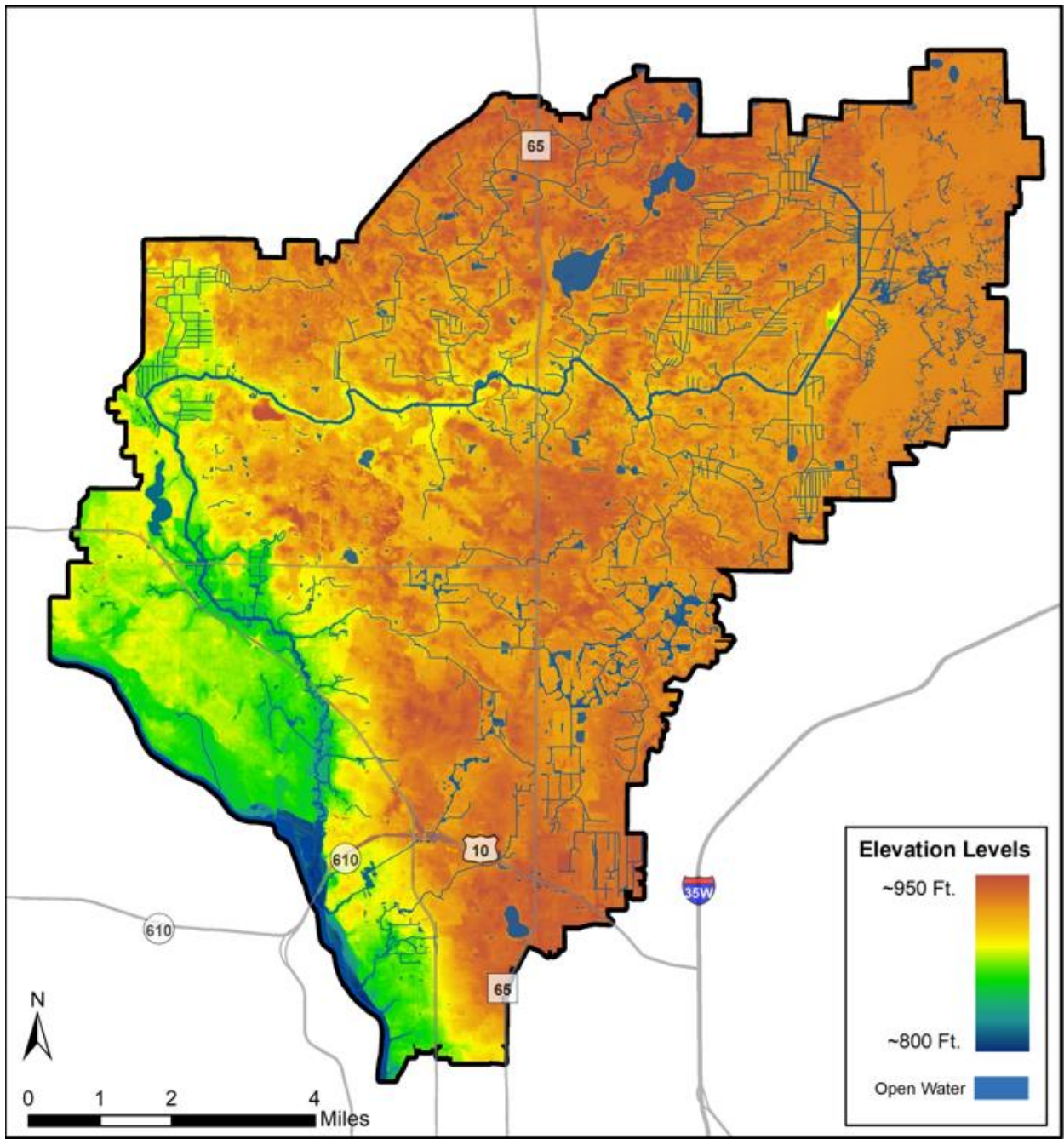
The soils are primarily fine sands with organic and loamy and hemic hydric soils in depressions. The regional water table is very shallow, usually less than 17 feet below the surface with much of it exposed in the form of wetlands, lakes, and streams.



## Topography

The topography of the watershed varies from 950 feet in the upper, northeastern part of the watershed to a low of approximately 800 feet at the Mississippi River.

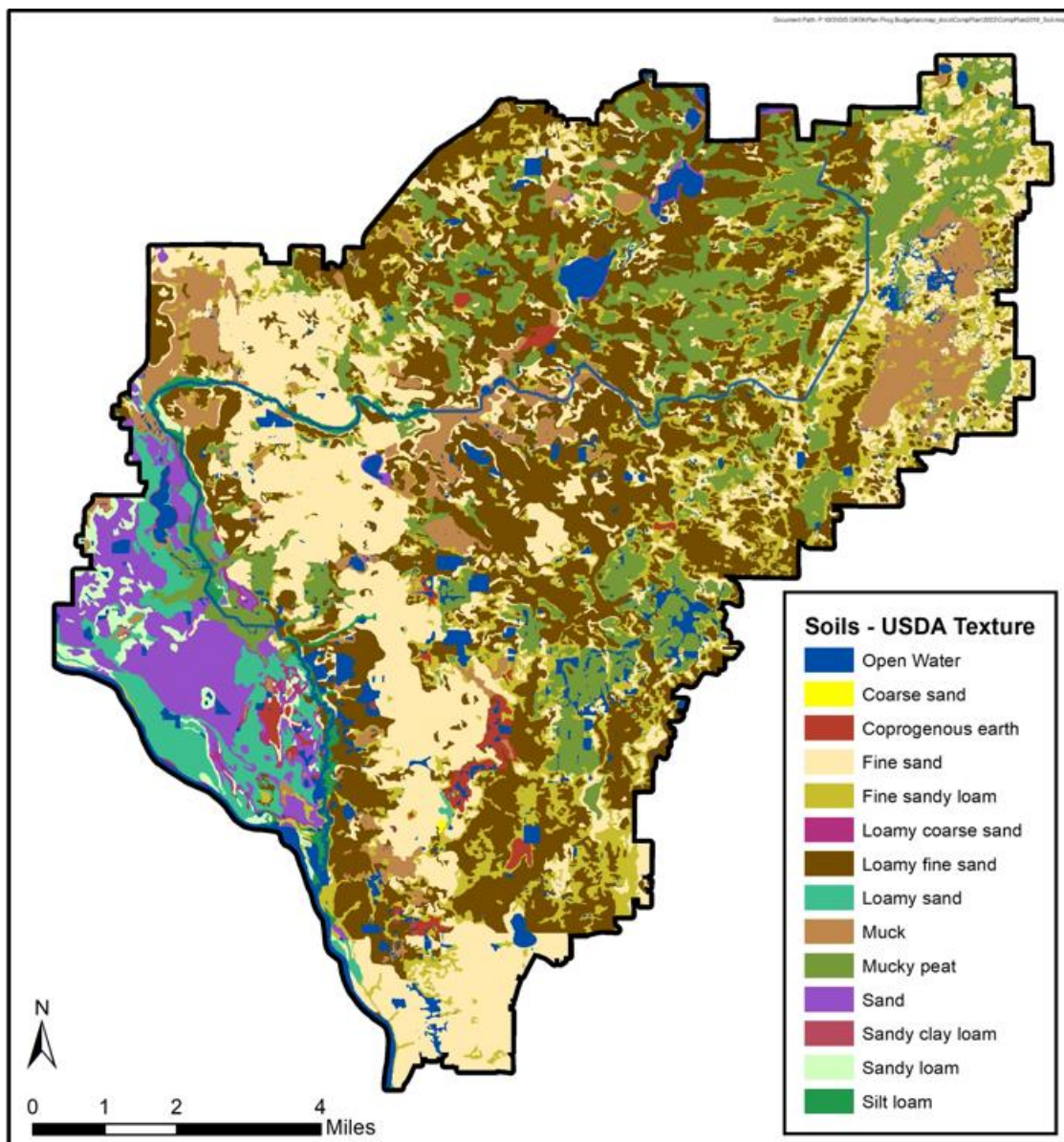
Lower elevations lie along the Mississippi River sand plain in the cities of Coon Rapids and Fridley. This area lies just below the Mississippi River bluffs and the lakes plain of glacial lake Hugo and Fridley where there is minimal topographic relief.



## Soils

Soils within the watershed are predominantly sands. In the western third of the watershed, along and within the Mississippi River terraces the sands become loamier and coarser.

The eastern two thirds, which lie within the glacial lake basins tend to be fine sands mixed with sand loams and tills and interspersed with extensive areas of peat and muck. The areas of organic soils become dominant features in the eastern third and head waters of the watershed where groundwater is at or near the surface of the land. These areas occur most commonly in ice-block melt-outs and in former melt-water channels and can be associated with silts and clays depending on the quiescence of the water resource.





## General Geology

The surficial geology of the watershed is dominated by unconsolidated sediments laid down by glacial ice and meltwater during the Wisconsin episode. The land was later modified by the Hudsonian episode.

Most of the watershed is defined as Sand Facies. These areas are characterized by very fine to medium grain sands that also contain silty deposits. Following the drainage of Glacial Lake Anoka, then Hugo and finally Fridley, these areas became pitted primarily from the melting of buried ice stagnant ice and, in places, wind erosion.

The far western portion of the watershed, between Coon Creek and the Mississippi River, is a series of terraces, which cut through and expose more coarse sand and gravels that underlie the fine sands.

## Precipitation

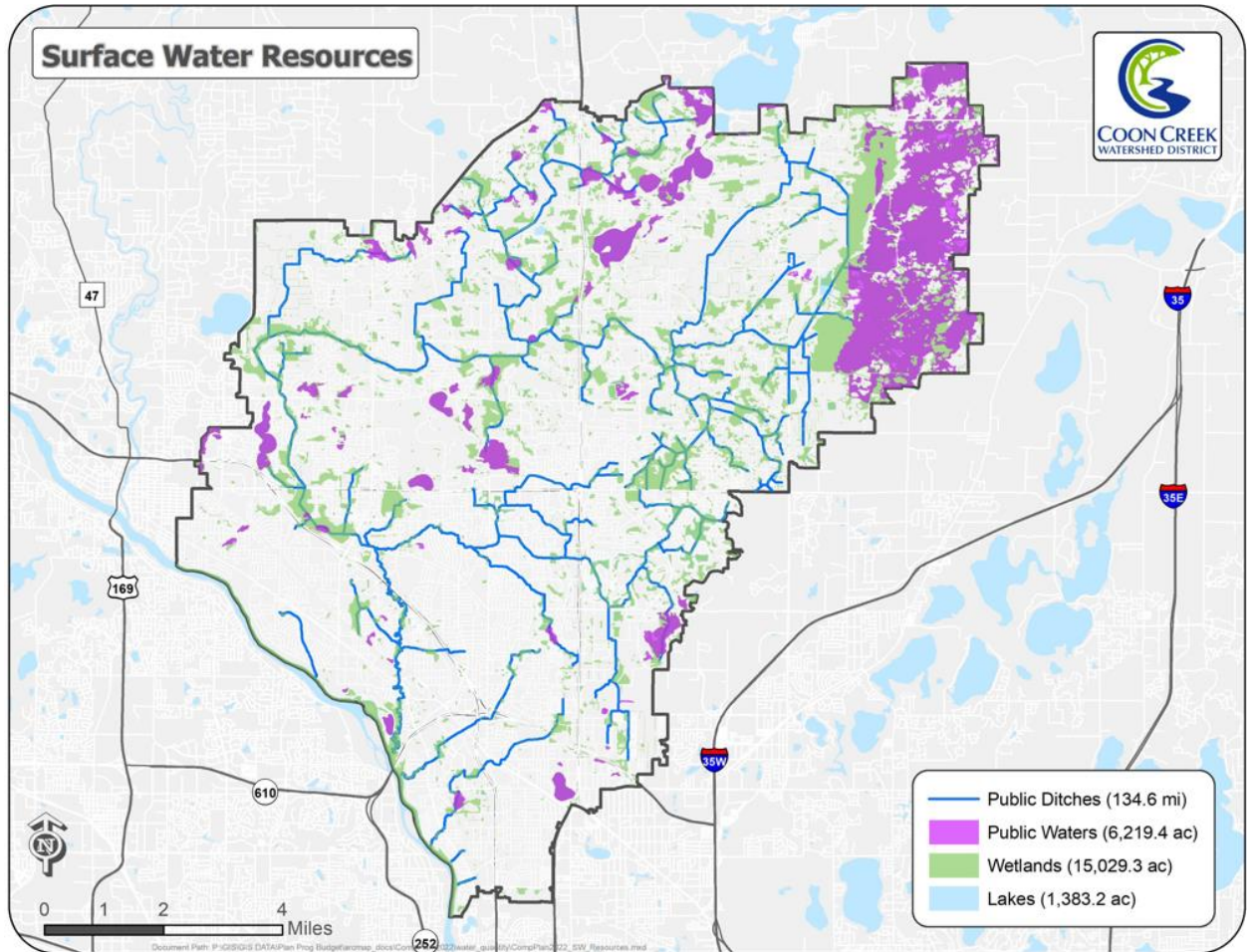
The watershed receives approximately 28 to 34 inches per year. About 70 percent of the annual precipitation (22 inches) falls between April and September. About six inches of precipitation occurs during the spring groundwater recharge period of April and May.

Month	Monthly Average (in)	3 years in 10 Less Than (in)	3 years in 10 More Than (in)
January	1.13	0.75	1.50
February	0.81	0.51	1.05
March	1.73	1.32	2.30
April	2.62	1.82	3.48
May	3.57	2.85	4.39
June	4.29	3.46	5.13
July	3.99	3.28	4.97
August	4.04	3.51	4.99
September	3.04	2.40	3.73
October	2.38	1.49	3.28
November	1.92	1.46	2.48
December	1.06	0.53	1.32
<b>Annual</b>	<b>30.60</b>	<b>28.26</b>	<b>34.11</b>

## Surface Water Resources

Within the watershed there are approximately 180 miles of open channel comprising approximately 7,700 acres. Approximately 134 (74%) miles were improved between 1890 and 1920 and are maintained as part of the public drainage system.

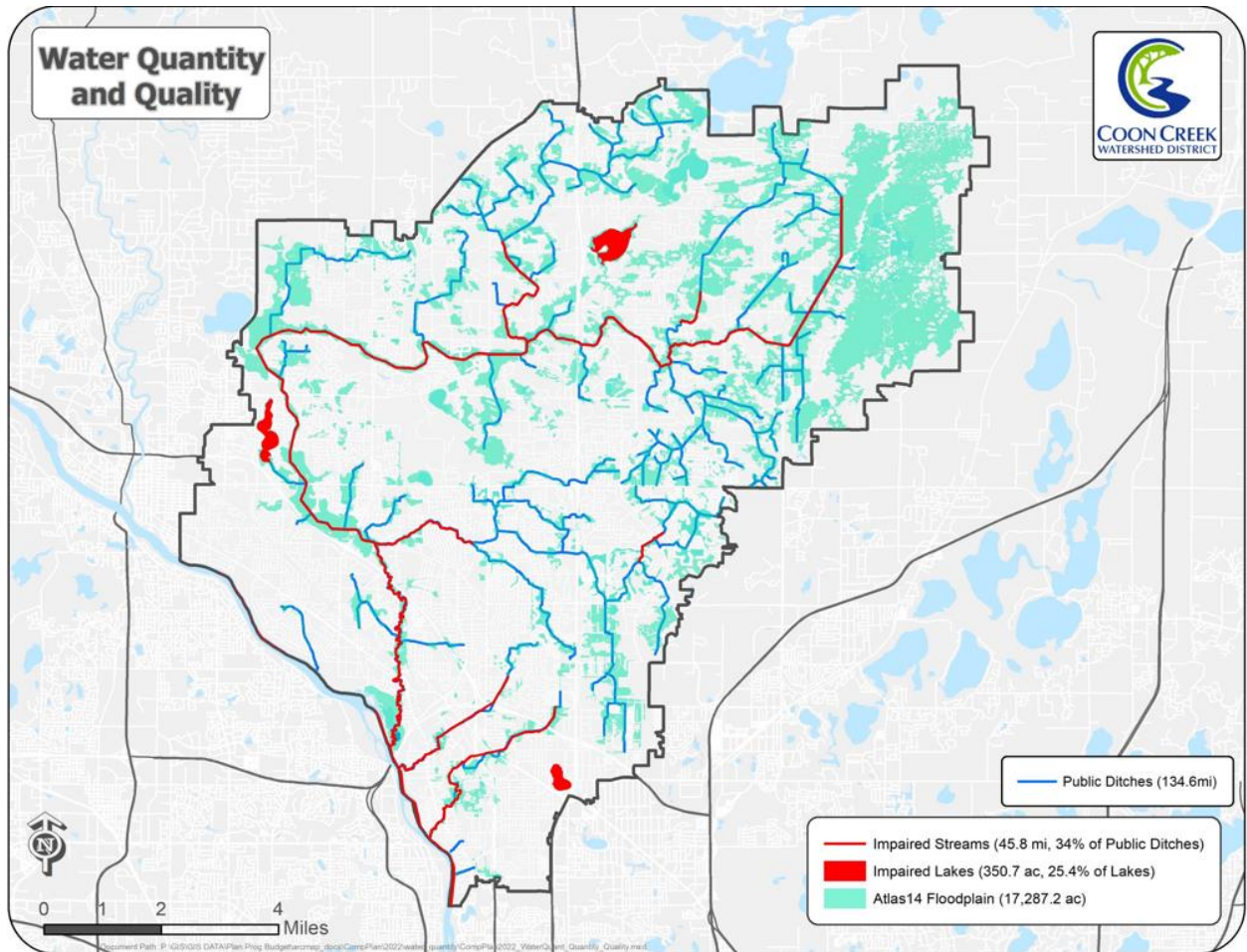
There are 10 natural and manmade lakes within the watershed. The natural lakes are shallow lakes usually associated with type 4 and 5 wetlands.



## Water Quality and Quantity

**Flooding:** The watershed contains approximately 17,287 acres of floodplain (25% of the watershed). The 100-year event (1% annual probability) is 7.3 inches in 24 hours. That event would adversely affect an estimated 41,334 people, 9,458 parcels of land and result in an estimated \$5.1 billion in damages. There are also approximately 4,228 parcel that can be adversely affected by flooding from high ground water at an estimated damage of \$1.6 billion.

**Water Quality:** The District contains 11 impaired waters comprising approximately 46.1 miles of impaired stream and 1,383 acres of lake. Stream impairments are for aquatic life and recreation. Two of the lakes are impaired for aquatic consumption due to high mercury levels in fish tissue. The impairments directly affect approximately 6,868 people and 996 parcels of land valued at \$622 million.

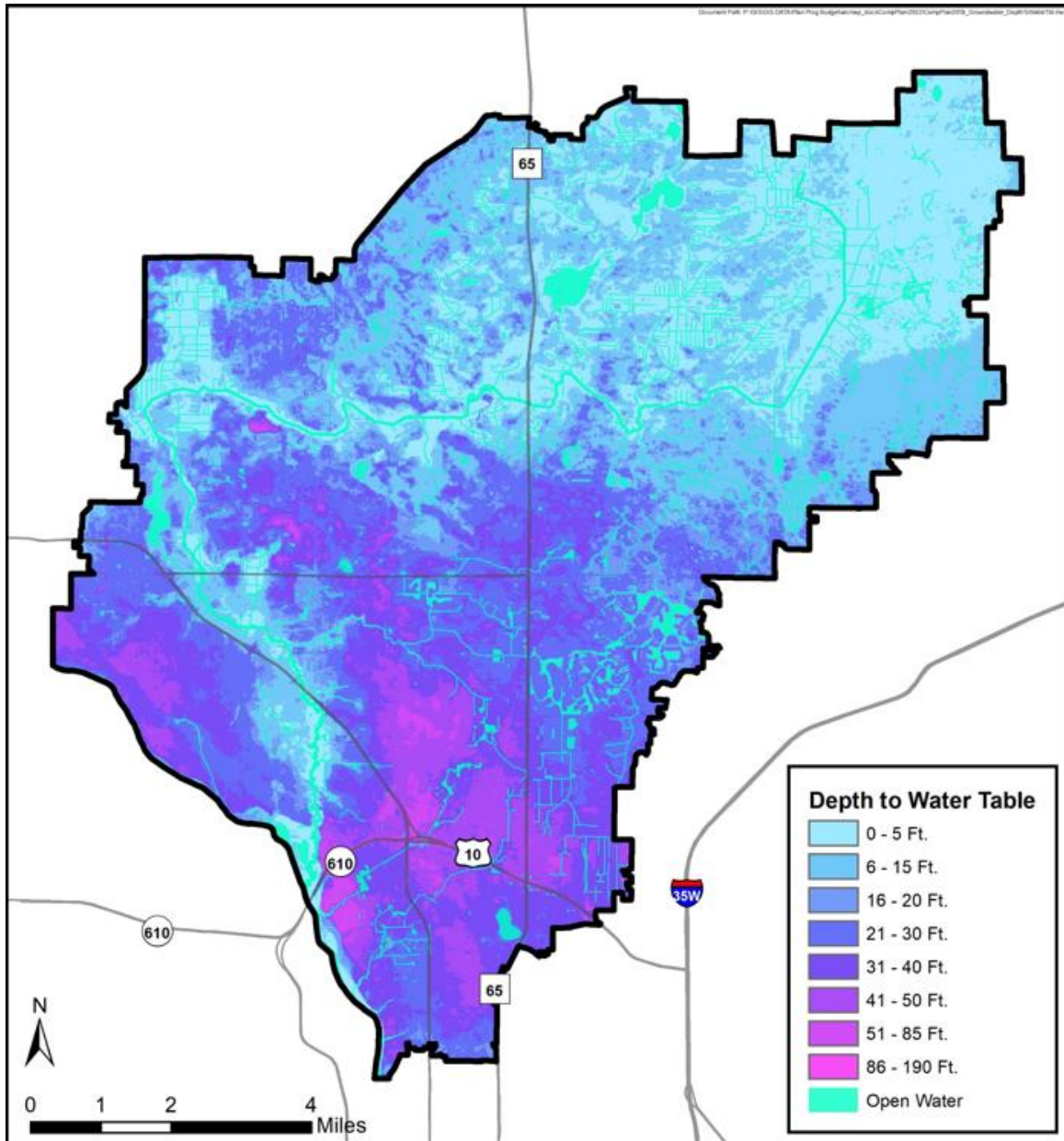


## Groundwater Resources

Groundwater is at or within five feet of the lands surface over approximately 40% of the watershed. These areas are found in the upper part (farthest away from the Mississippi River). Groundwater is deepest (190 feet) in the south-central portion of the District near the Mississippi River.

Vertical fluctuations in groundwater elevation can easily vary from 3 to 12 feet and appear to be tightly correlated with rooting depth of cover vegetation and driven by evapotranspiration levels. Horizontal movement, towards the Mississippi River, has been calculated to average 12.5 feet per day in many places. Both fluctuations are facilitated by the predominantly sandy texture of the soils.





### Storm Water Systems

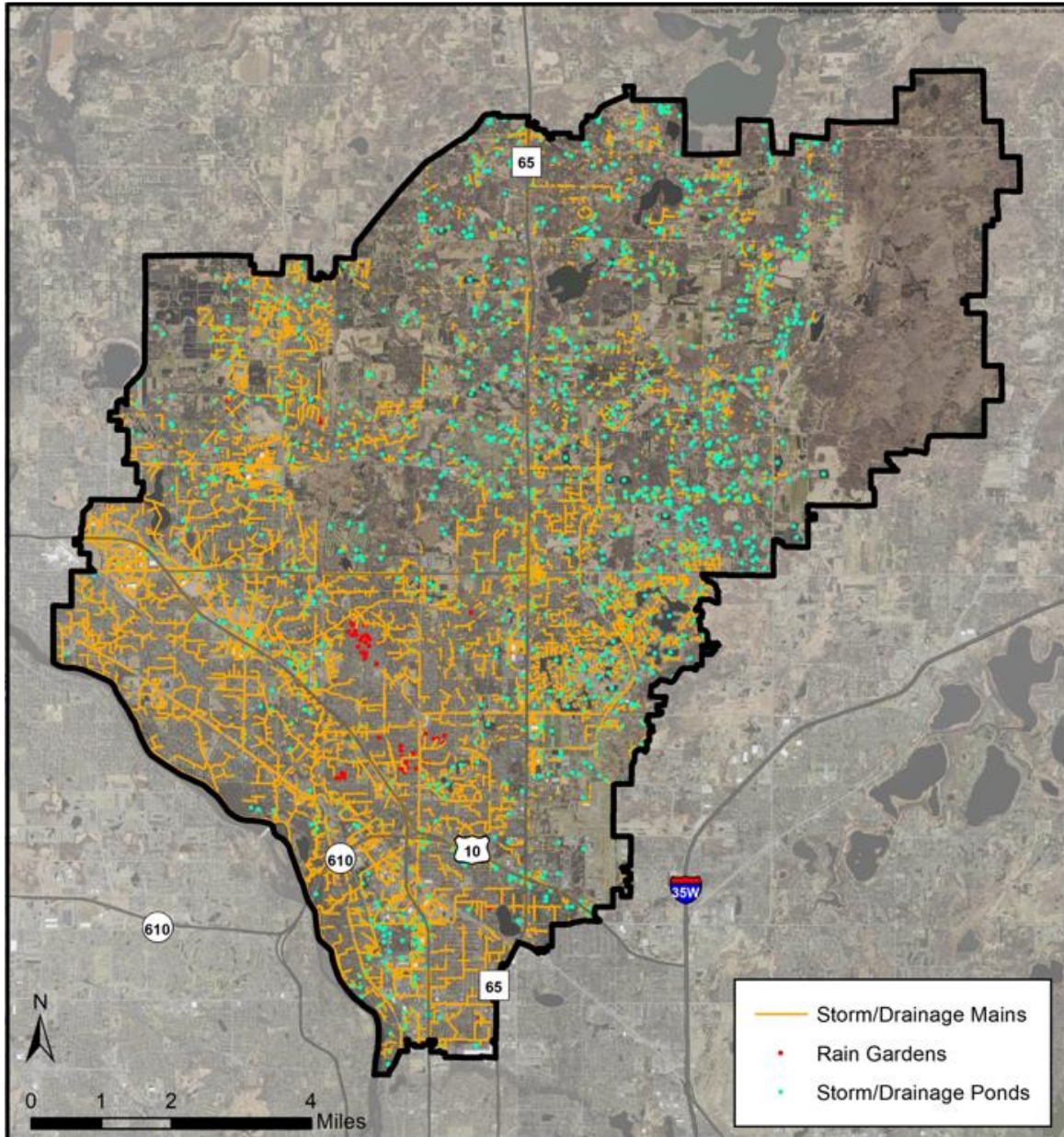
The District contains approximately 500 miles of storm sewer and open channels that convey runoff to the public ditch system. These systems are ostensibly maintained by the cities in they are located.

There is also approximately 1,700 retention and detention ponds. While most of these are maintained by the cities, some are maintained by Homeowner Associations. 263 of these ponds are designed to retain water to reduce the volume of discharge and pollutants and/or



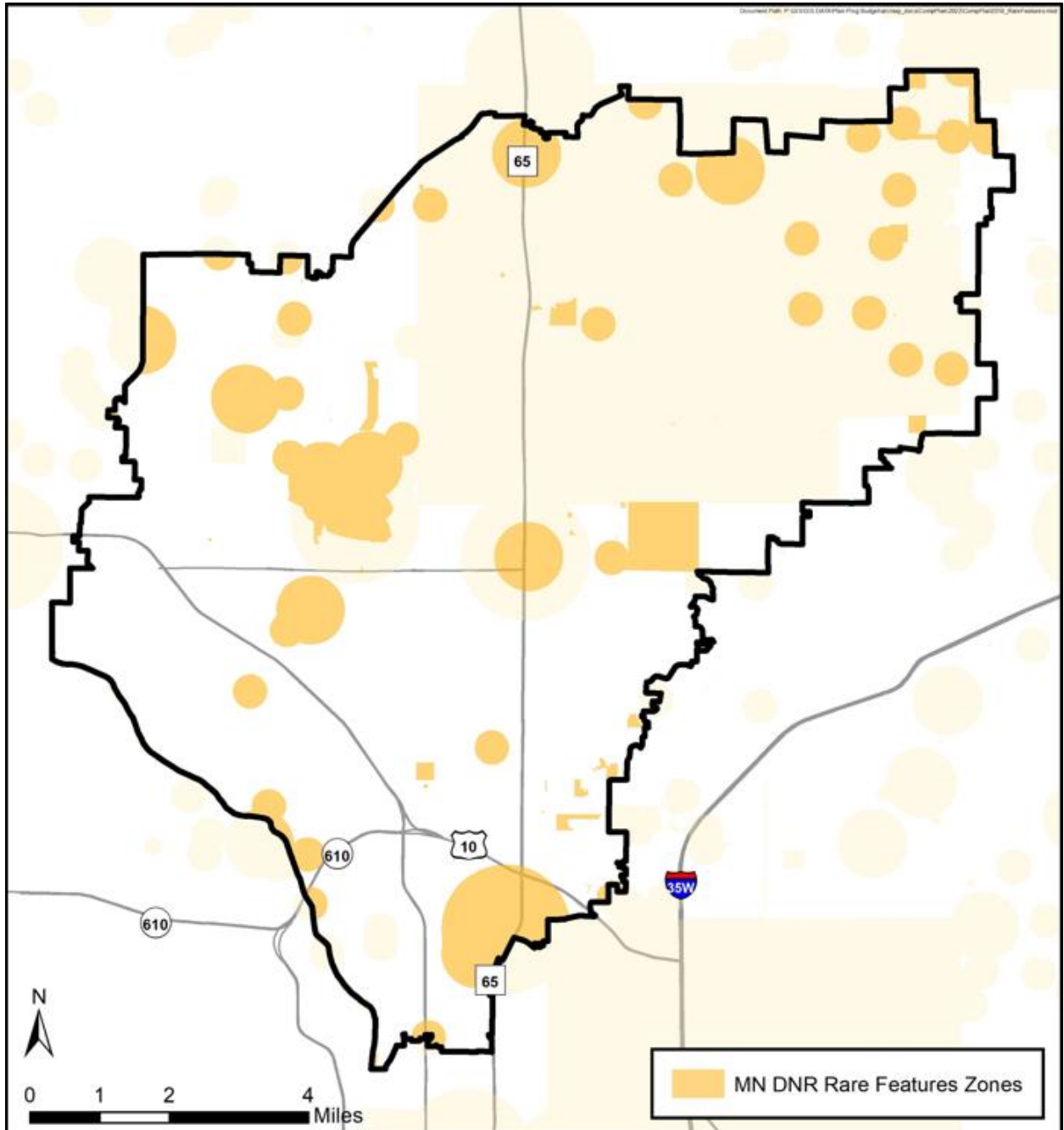
encourage infiltration to groundwater. 293 ponds are designed to detain water in order to delay or alter the timing and volume of flows in select areas.

The District also includes 55 raingardens. These exist predominantly on private property and in select areas have proven to provide efficient and effective treatment and pollutant reduction prior to discharge into lakes.



## Fish and Wildlife Resources

The watershed contains 53 species classified as rare, threatened, or endangered. These “occurrences” are generally located in approximately 147 individual settings comprising 36,000 acres 52% of the total watershed.

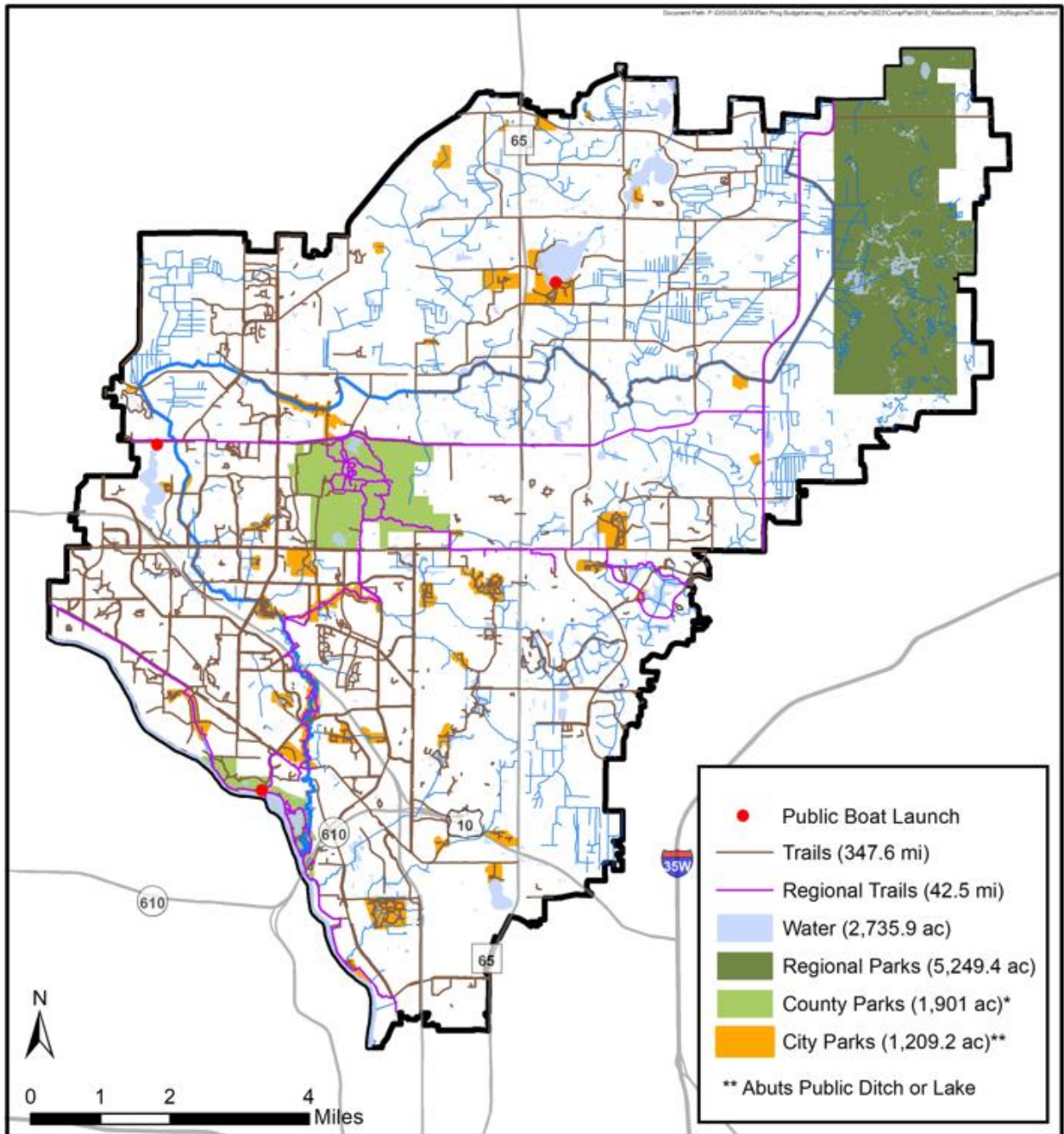




## Parks and Open Space

In addition to Carlos Avery State Wildlife Management Area, the watershed contains two regional parks (Bunker Hills and Coon Rapids Dam). There are approximately 50 city parks and two public boat ramps located on Ham Lake and on Crooked Lake. Fishing piers exist on Crooked Lake and on Lake Cenaiko in the Coon Rapids Dam Regional Park.

Springbrook Nature Center in northern Fridley and Carlos Avery Wildlife Management Area (WMA) are both wetland oriented recreational resources. Sunrise Lake in Blaine provides swimming opportunities.

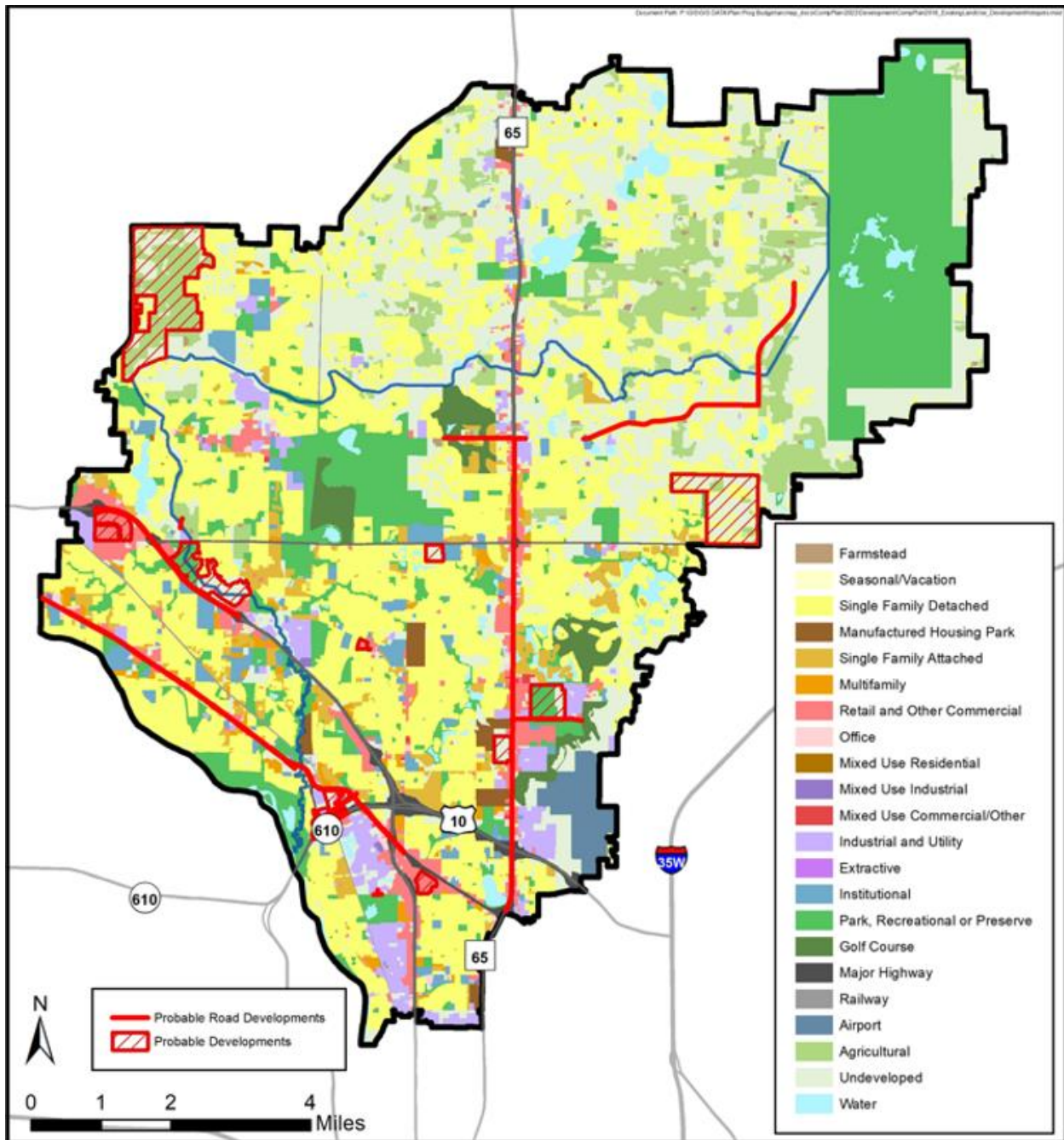


## **Land Use and Proposed Development**

The predominant land use within the watershed is single family and multi-family residential (37% of the watershed). 2,100 acres make up retail and mixed use and another 2,000 acres are industrial, comprising 6% of the watershed.

There are approximately 2,296.4 acres of highly visible land that will, in all probability, be developed or redeveloped within the next 10 years.

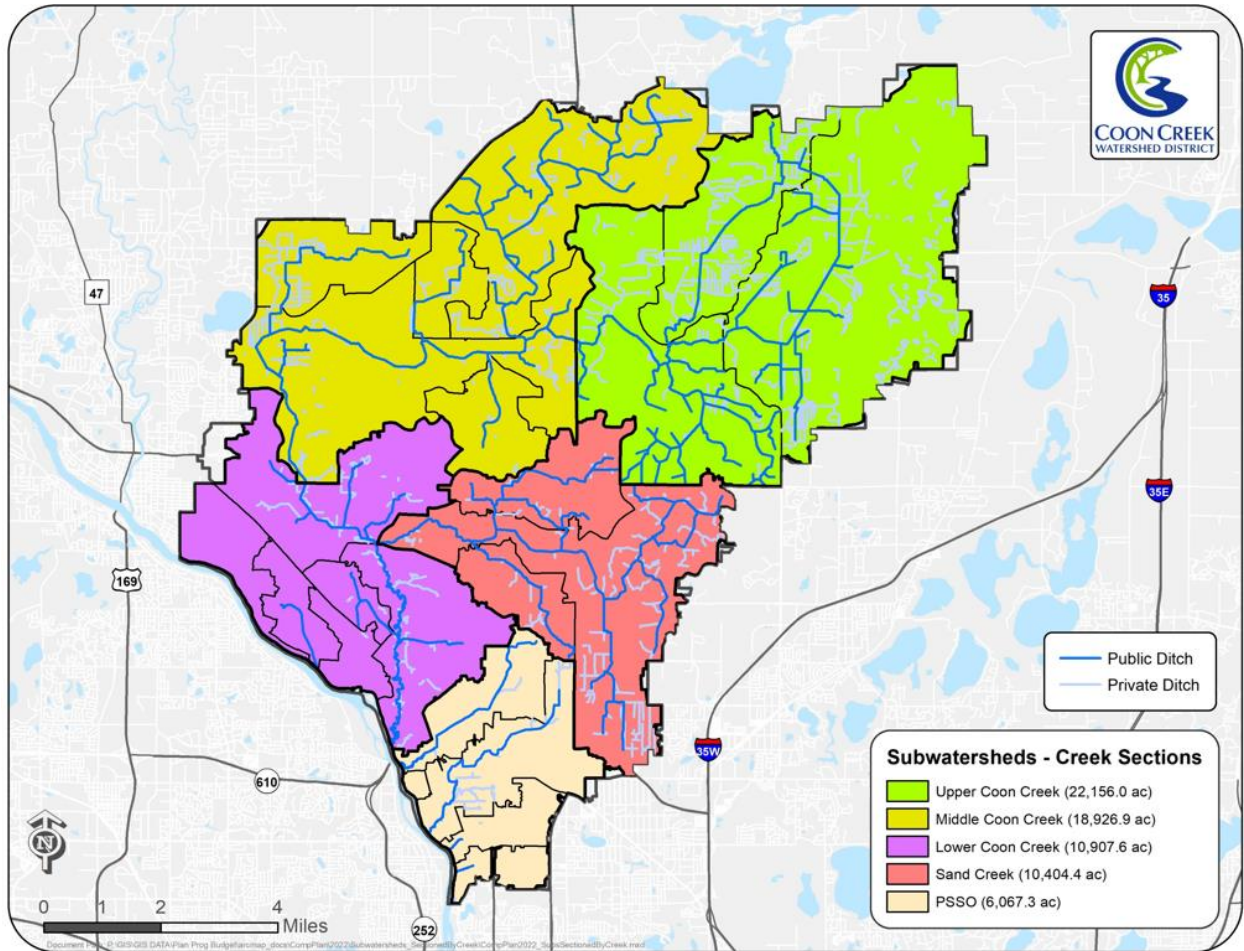




## Water Resource Assets and Infrastructure

Given the above information plus information registered by the cities and the District on storm water and natural infrastructure, water resource assets are grouped based on asset type and organized hierarchically. The water resources, storm water infrastructure and required programs have been organized and categorized into three groups (asset types):

- Natural Assets
- Hard Assets
- Soft Assets



**Natural Assets**

Natural Assets are e those natural features or processes that require management to either protect the public health, safety and welfare or their function provides some utility. The major asset classes of this effort are:

<b>Asset Class</b>	<b>Asset Description</b>	<b>Subwatersheds</b>	<b>Quantity</b>
Groundwater	Groundwater less than 10 feet from the surface	Lower Coon Creek (Coon Rapids)	1,790.0
		Middle Coon Creek (Andover)	8,936.2
		Upper Coon Creek (Ham Lake)	15,960.6
		Sand Creek (Blaine/Coon Rapids)	43.3
		PSSO <sup>1</sup> (Blaine, Coon Rapids, Fridley, SLP)	124.6
		<b>Total</b>	<b>26,854.7</b>
	Wells in Unconfined Aquifer	Lower Coon Creek (Coon Rapids)	93
		Middle Coon Creek (Andover)	1,747
		Upper Coon Creek (Ham Lake)	1,775
		Sand Creek (Blaine/Coon Rapids)	223
		PSSO <sup>1</sup> (Blaine, Coon Rapids, Fridley, SLP)	14
		<b>Total</b>	<b>3,852</b>
Public Drainage	Public Ditches	Lower Coon Creek (Coon Rapids)	16.2
		Middle Coon Creek (Andover)	40.1
		Upper Coon Creek (Ham Lake)	41.5
		Sand Creek (Blaine/Coon Rapids)	27.5
		PSSO <sup>1</sup> (Blaine, Coon Rapids, Fridley, SLP)	9.3
		<b>Total</b>	<b>134.6</b>
Water Quality	Impaired Waters	Lower Coon Creek	7.6

Asset Class	Asset Description	Subwatersheds	Quantity
		(Coon Rapids)	
		Middle Coon Creek (Andover)	12.1
		Upper Coon Creek (Ham Lake)	8.5
		Sand Creek (Blaine/Coon Rapids)	2.7
		PSSO <sup>1</sup> (Blaine, Coon Rapids, Fridley, SLP)	6.7
		<b>Total</b>	37.6
Water Quantity	Floodplain	Lower Coon Creek (Coon Rapids)	1,353.9
		Middle Coon Creek (Andover)	4,818.3
		Upper Coon Creek (Ham Lake)	8,815.5
		Sand Creek (Blaine/Coon Rapids)	1,729.8
		PSSO <sup>1</sup> (Blaine, Coon Rapids, Fridley, SLP)	516.4
		<b>Total</b>	17,233.8
Wetlands	National Wetland Inventory (NWI)	Lower Coon Creek (Coon Rapids)	1,085.3
		Middle Coon Creek (Andover)	3,718.2
		Upper Coon Creek (Ham Lake)	8,301.0
		Sand Creek (Blaine/Coon Rapids)	1,083.8
		PSSO <sup>1</sup> (Blaine, Coon Rapids, Fridley, SLP)	395.2
		<b>Total</b>	14,583.6
	Hydric soils not on the NWI with groundwater less than 5 feet	Lower Coon Creek (Coon Rapids)	377.6
		Middle Coon Creek (Andover)	2,040.4
		Upper Coon Creek (Ham Lake)	3,712.2
		Sand Creek (Blaine/Coon Rapids)	4.0



Asset Class	Asset Description	Subwatersheds	Quantity
		PSSO <sup>1</sup> (Blaine, Coon Rapids, Fridley, SLP)	4.1
		<b>Total</b>	6,138.3

1 PSSO: Pleasure Creek, Springbrook Creek, Stonybrook Creek, Oak-Glen Creek Subwatersheds

- Appendix C: Ground Water
- Appendix D: Public Drainage
- Appendix E: Water Quality
- Appendix F: Water Quantity
- Appendix G: Wetlands

**Hard Assets:**

Hard Assets are Are brickand mortar type assets associated with functioning of the water management system. These assets are generally purchased or constructed, cost more than \$5,000, have defined lives, and can be replaced. The \$5,000 or greater replacement cost requirement for equipment is a simplification step for tracking and managing hard assets that can have significant budgetary impact. Smaller items are generally not managed as individual assets.

Asset Class	Asset Type	Subwatersheds	Quantity
Conveyance	Open Channel – Public and Private (Miles)	Lower Coon Creek (Coon Rapids)	15.0
		Middle Coon Creek (Andover)	62.8
		Upper Coon Creek (Ham Lake)	125.9
		Sand Creek (Blaine/Coon Rapids)	51.9
		PSSO <sup>1</sup> (Blaine, Coon Rapids, Fridley, SLP)	6.3
		<b>Total</b>	<b>261.9</b>
	Pipe – Storm Sewer (Miles)	Lower Coon Creek (Coon Rapids)	147.8
		Middle Coon Creek (Andover)	113.5
		Upper Coon Creek (Ham Lake)	67.4
		Sand Creek (Blaine/Coon Rapids)	120.8
		PSSO <sup>1</sup> (Blaine, Coon Rapids, Fridley, SLP)	87.6

Asset Class	Asset Type	Subwatersheds	Quantity
	Culverts – Concrete and Metal (Number)	<b>Total</b>	<b>537.1</b>
		Lower Coon Creek (Coon Rapids)	62
		Middle Coon Creek (Andover)	101
		Upper Coon Creek (Ham Lake)	142
		Sand Creek (Blaine/Coon Rapids)	112
		PSSO <sup>1</sup> (Blaine, Coon Rapids, Fridley, SLP)	57
		<b>Total</b>	<b>474</b>
	Bridges (Number)	Lower Coon Creek (Coon Rapids)	3
		Middle Coon Creek (Andover)	1
		Upper Coon Creek (Ham Lake)	13
		Sand Creek (Blaine/Coon Rapids)	6
		PSSO <sup>1</sup> (Blaine, Coon Rapids, Fridley, SLP)	11
		<b>Total</b>	<b>34</b>
	Ponding	Detention Ponds (Number)	Lower Coon Creek (Coon Rapids)
Middle Coon Creek (Andover)			156
Upper Coon Creek (Ham Lake)			0
Sand Creek (Blaine/Coon Rapids)			7
PSSO <sup>1</sup> (Blaine, Coon Rapids, Fridley, SLP)			2
<b>Total</b>		<b>166</b>	
Retention Pond – No outlet (Number)		Lower Coon Creek (Coon Rapids)	1
		Middle Coon Creek (Andover)	113
		Upper Coon Creek (Ham Lake)	0
		Sand Creek	7

Asset Class	Asset Type	Subwatersheds	Quantity	
		(Blaine/Coon Rapids)		
		PSSO <sup>1</sup> (Blaine, Coon Rapids, Fridley, SLP)	2	
		<b>Total</b>	<b>123</b>	
	Infiltration Ponds (Number)	Lower Coon Creek (Coon Rapids)	88	
		Middle Coon Creek (Andover)	69	
		Upper Coon Creek (Ham Lake)	75	
		Sand Creek (Blaine/Coon Rapids)	75	
		PSSO <sup>1</sup> (Blaine, Coon Rapids, Fridley, SLP)	41	
		<b>Total</b>	<b>348</b>	
		Flow-Through Pond (Number)	Lower Coon Creek (Coon Rapids)	25
	Middle Coon Creek (Andover)		22	
	Upper Coon Creek (Ham Lake)		80	
	Sand Creek (Blaine/Coon Rapids)		106	
	PSSO <sup>1</sup> (Blaine, Coon Rapids, Fridley, SLP)		35	
	<b>Total</b>		<b>268</b>	
	Structures		Bank Stabilizations (Number)	Lower Coon Creek (Coon Rapids)
		Middle Coon Creek (Andover)		13
		Upper Coon Creek (Ham Lake)		10
		Sand Creek (Blaine/Coon Rapids)		34
PSSO <sup>1</sup> (Blaine, Coon Rapids, Fridley, SLP)		28		
<b>Total</b>		<b>144</b>		
Catch Basins (Number)		Lower Coon Creek (Coon Rapids)	4,425	
		Middle Coon Creek	2,978	

Asset Class	Asset Type	Subwatersheds	Quantity
		(Andover)	
		Upper Coon Creek (Ham Lake)	1,192
		Sand Creek (Blaine/Coon Rapids)	5,114
		PSSO <sup>1</sup> (Blaine, Coon Rapids, Fridley, SLP)	2,728
		<b>Total</b>	<b>16,437</b>
		Dams and Ditch Plugs (Number)	Lower Coon Creek (Coon Rapids)
	Middle Coon Creek (Andover)		3
	Upper Coon Creek (Ham Lake)		10
	Sand Creek (Blaine/Coon Rapids)		2
	PSSO <sup>1</sup> (Blaine, Coon Rapids, Fridley, SLP)		5
	<b>Total</b>		<b>25</b>
	Filters Including Iron Enhanced Sand Filters and Biochar Filters (Number)	Lower Coon Creek (Coon Rapids)	27
		Middle Coon Creek (Andover)	15
		Upper Coon Creek (Ham Lake)	24
		Sand Creek (Blaine/Coon Rapids)	22
		PSSO <sup>1</sup> (Blaine, Coon Rapids, Fridley, SLP)	32
		<b>Total</b>	<b>120</b>
	Flash Boards (Number)	Lower Coon Creek (Coon Rapids)	0
		Middle Coon Creek (Andover)	6
		Upper Coon Creek (Ham Lake)	24
		Sand Creek (Blaine/Coon Rapids)	22
		PSSO <sup>1</sup> (Blaine, Coon Rapids, Fridley, SLP)	32



Asset Class	Asset Type	Subwatersheds	Quantity
	Pumps (Number)	<b>Total</b>	<b>120</b>
		Lower Coon Creek (Coon Rapids)	2
		Middle Coon Creek (Andover)	1
		Upper Coon Creek (Ham Lake)	3
		Sand Creek (Blaine/Coon Rapids)	1
		PSSO <sup>1</sup> (Blaine, Coon Rapids, Fridley, SLP)	0
		<b>Total</b>	<b>7</b>
	Rain Gardens (Number)	Lower Coon Creek (Coon Rapids)	45
		Middle Coon Creek (Andover)	9
		Upper Coon Creek (Ham Lake)	8
		Sand Creek (Blaine/Coon Rapids)	55
		PSSO <sup>1</sup> (Blaine, Coon Rapids, Fridley, SLP)	11
		<b>Total</b>	<b>128</b>

**Soft Assets:**

Soft Assets are things that require management, are of human origin, but are not constructed or purchased outright. They do not have defined lives, although they can deteriorate to a state that does not provide the required level of service. They do not have a defined replacement cost, but they do have defined costs to build, operate and maintain them. Soft assets include such items as programs, organizational behavior, public behavior, policies, ordinances and rules, requirements, and regulatory relationships.

**Field Operating System**

	<b>Asset Class</b>	<b>Asset Type</b>
Planning	Capital Improvement Plan	Targets, Priorities, Measures
	Comprehensive Plan	Capital Improvement Plan
		Capital Improvements
		Clarification of Problems, Issues and Concerns
		Common Understanding of mission & goal
		Identification of information & Intelligence needs
		Information & Contingencies
		Information & Data collection plan
		Information collection and management adaptation
		Local Water plans
		Roles & Goals
		Rules and Standards
	Storm Water Pollution Prevention Plan	
Subwatershed Planning		
Information & Data Collection pPlan	Identification of information & Intelligence needs	
Local Water plans	Unified Action	
Subwatershed Planning	Operational objectives	
Intelligence	Data Collection & Analysis	Flood Analysis
		High Infiltration Study
		Hydrologic Model Updates
		Monitoring
		Studies
	Water Quality Stressor Analysis	
	Good Housekeeping	Building & Grounds Maintenance
	Illicit Discharge Detection and Elimination	Assessment
		Detection & Inspection
	Operations & Maintenance	Ditch and Channel Inspections
		IDDE Inspections
	Planning	Stressor Studies
	Public Education	Target Audience List
Regulatory	Construction Compliance Inspections	
Water Quality Management	AIS Early Detection	
	AIS Inspections	
Actions	Capital Improvement	Construction

Field Operating System	Asset Class	Asset Type
		Repair
		Waters Restoration/Rehabilitation
	Illicit Discharge Detection and Elimination	Mitigation
	Operations and Maintenance	Access Management
		Bank Repair & Stabilization
		Ditch Repair & Maintenance
		Fish Passage Enhancement
		Litter & Debris Removal
		Nonstructural BMPs
		Routine Maintenance
		Structural BMPs
	Vegetation & Ground Cover Management	
	Public and Governmental Affairs	Animal Waste Reduction
		Water Harvesting & Reuse
		Adopt-A-Drain
	Water Quality Management	AIS Rapid Response
		Lake Management
Information	Information	Leader Engagement
	Planning	Legislative & Governmental Affairs
		Reporting
	Public & Governmental Affairs	Web Site
		Pollution Prevention Material
		Newsletter
	Regulatory	Current map of Development
		Map of the drainage and storm sewer system
Protection	Operations and Maintenance	Non-Routine Maintenance
		Street Sweeping
	Regulatory	Adopt and Administer rules
		Enforcement
		Performance Standards
		Pre-Application Meeting
		Technical Assistance
Public-Private Cooperation	Incentives	Demonstration Grants
		Education Grants
		Water Quality Grants
	Public & Governmental Affairs	Good will with the public
		Good will, relationships and credibility with the public, stakeholders, and collaborators
		Improve quality of life for public
		Increase stability
		Technical Assistance
	Public Involvement	Citizen Advisory Committee: Perspective, insight and

**Field Operating System**

	Asset Class	Asset Type
		Advice Technical Advisory Committee: Technical feedback. Collaboration & coordination
Support	Capital Improvement	Equipment
	Good Housekeeping	Asset Inventory
		Employee Training
	Planning	Policies & Procedures
		Boundary Adjustments
Public and Governmental Affairs	Public credibility with performance	
Regulatory	BMP Maintenance Agreements	
	Encourage Low Impact Development	