Coon Creek Watershed District

Priority Issues
And
Guidance
For Preparation and Development of the
2023 to 2033
Comprehensive Watershed Management Plan

A statement of scope and priority issues as required by M.S. §103B.312 and M.R. 8410.0045

This page left intentionally blank.

Forward

This report is intended to identify the priority water resource issues within the Coon Creek and thereby define the scope of the Watershed District's 4th generation Watershed Management Plan required under Minnesota Statute 103B.231. The report is required under M.S. 103B.312 and M.R. 8410.0045. The legislation and rule requires:

- A list of priority concerns the plan will address and
- A description of how and why the priority concerns were chosen.

The purpose of the report is twofold:

1. To publicly disclose the method used by the watershed district to identify priority water resource problems issues and concerns.
2. To ensure that the comments and concerns raised by the citizens and state agencies that have a stake in the District's activities are heard, fairly evaluated and reasonably considered during the planning and future operations of the watershed district.

Appendix B provides the District's Public Engagement Plan and documentation of the public and agency input provided as required by M.S. 103B.312 (2) (i and ii).

Part 1 - The Introduction to the report includes the list of problems, issues and concerns identified and responses to how select comments will be addressed in the plan.

Part 2 - Reviews and updates the requirements, guidance, and time allotments to which the District is responsible and mandated by state and Federal legislative bodies and agencies.

Part 3 - Identifies and describes the District's area of operation and analyzes the significant characteristics the are the subject of and influence water resource management and are the source of the problems, issues and concerns raised through public and agency input.

Part 4 - Evaluates how significant characteristics of the operating environment effect water management activities. This is done to determine the nature, capability and tendencies of the problems, issues and concerns.

Part 5 - Determines the capabilities and tendencies of the problems, issues and concerns relative to their effect on the public health, safety and welfare and the ability and needs of the watershed to continue to provide unimpaired beneficial use of water in the future.

The result is a priority list of problems issues and concerns, identification high-value targets, and identification of capable threats to the public and the resource.

Final priorities were determined using a Business Risk Evaluation (BRE) method. Risk is the product of probability the probability of failure and the consequence of failure for each problem,

issue and concern. The probability of failure assesses of a resources failure to function and/or provide beneficial uses based on it condition, capacity to function, financial limitations, and the levels of service/function/demand (including statutory requirements such as impairments). The consequence of that failure examines the impact with respect to the triple-bottom-line of economic, social, and environmental factors required to sustain the resource. The evaluations of probability and consequence were also graphed. Final priorities were ranked according to the scheme below.

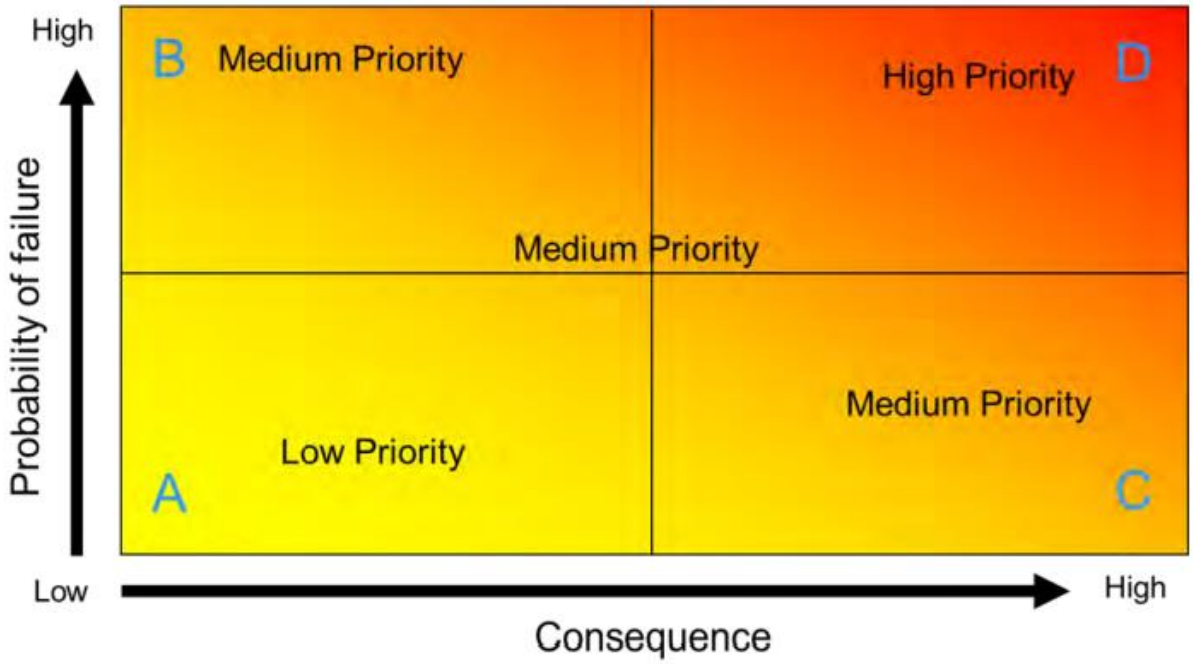


Table of Contents

1
Introduction and
Assessment of Current Circumstances

Introduction

Authorization and Requirement

The Assessment of the Joint Operating Environment, Priority Issues and Planning Guidance is a requirement of Minnesota Statute 103B.231 and Minnesota Rule 8410.0045. The legislation and rule requires' a statement of plan scope and the identification of priority problems, issues and concerns of the citizens, state and local review agencies, collaborators, and District staff.

Purpose and Intent of This Report

Purpose

To gain an enhanced understanding of the operating environment and the problems the District will be facing from 2024 to 2034.

Intent

This greater understanding will require:

- the systematic study of analysis of valid and reliable data about the watershed.
- the judgement of synthesizing information involved in management decisions.

Success will allow the Board of Managers, and key staff to

- visualize future water management activities and
- describe the conceptual approach to management,

Both visualizing and describing provide context for the examination of what must be accomplished, when it must be accomplished, and most importantly, why management objectives must be accomplished.

Outcomes Being Sought

1. A description of the current and desired condition of the watershed.
2. A Broad operational approach.
3. An initial estimate of political and financial supportability.
4. A revised Common Mission Statement for Water Management from 2024 to 2034.
5. A statement of management intent.
6. Guidance for developing alternative management schemes.

Acknowledgements

This report has been prepared on behalf of and with the assistance of the citizens of the District. It is being accomplished with the involvement, support, and leadership of:
Anoka County Highway Department
City of Andover
City of Blaine
City of Coon Rapids
City of Fridley

City of Ham Lake
City of Spring Lake Park
Coon Creek Watershed District Staff

Also assisting were:
Anoka Conservation District
Board of Water and Soil Resources
Department of Natural Resources
Metropolitan Council of the Twin Cities

Evaluation of the 2013 – 2023 Comprehensive Watershed Management Plan

Where We Are At

In August 2023, the current Comprehensive Watershed Management Plan for the Coon Creek Watershed District will expire. Upon conclusion of the 2013 – 2023 Comprehensive Plan, the District will have clearly arrived in the "Water Quality Era". While public drainage and enforcement of the Wetlands Conservation Act remain central themes in management, water quality concerns have taken center stage and dominate discussions, and budgeting.

The District contains 11 impaired waters. Seven of those waters are creeks and ditches impaired for aquatic life and recreation. Three are lakes. Two lakes are impaired for aquatic consumption due to high mercury levels in fish. One Lake, Laddie Lake, is impaired for Aquatic life due to excess chlorides. The final impaired water is the Mississippi River which is the District's western border and a major receiving water. The Mississippi River is impaired for aquatic consumption due to mercury and Polychlorinated Biphenyls (PCBs), aquatic recreation due to fecal contamination, and aquatic life due to excess phosphorus.

The stressors contributing to these impairments include suspended solids, phosphorus, poor habitat, altered hydrology, chloride levels, low dissolved oxygen levels and *E.* coli.

The most significant emerging issue is the lowering of water within the vadose zone. This upper most part of the surficial aquifer provides an estimated 100% to 50% of the water to the lakes, streams, and wetlands within the watershed. It is also showing signs of high chloride level and is discharging that pollutant to streams, contributing to impairment of surface water resources.

Added to these natural conditions, we are faced with aging infrastructure, labor shortages and limited financial resources. The District is already making efforts to further optimize its management processes and practices. A key approach is to increase integration of its planning, programming, budgeting, and implementation efforts, particularly flood risk management and water quality protection and restoration.

How We Got Here

The District was established in 1959 in response to the promises offered by Federal Law PL-566 and the potential increase in the efficiency and effectiveness of agricultural production. The focus was on money for improved drainage. Those funds were never realized, and the District relied on the assessment process provided through the drainage law to repair the system. The period between 1960 and 1987 was characterized by legal and political controversy and challenges surrounding the conduct of the District and the equity of its cost apportionments.

In 1987, the District completed its first Comprehensive Watershed Management Plan under the Metropolitan Surface Water Management Act. At that time, the District was largely rural, and

the landscape was dominated by farms growing shallow rooted crops, and seasonally flood wetlands. The developed areas in the lower portion of the watershed were experiencing flooding. The watershed management focus was on catch up, mitigating and balancing the provision of both established drainage rights up stream and flood control downstream in a financially equitable way.

In 1991, the Wetland Conservation Act placed the District at ground zero of the competition and conflict between drainage, development, and the preservation of wetlands. From 1991 to 2003, (The wetland era), the District was immersed in reviewing, managing and balancing the effects of urban growth in one of the fastest growing areas of the state and nation. The District's response was to:

- Adopt a management strategy based on 'Growth Management' and "Sensitive Lands" land use management.
- Strict adherence to:
    - the law and the principles of established use or right (or first in time)
    - the wetland delineation requirement of Normal Circumstances (not normal conditions) as described and litigated at the Federal Level though Regulatory Guidance Latter 90-07.
    - Recognition that 98% of all wetlands in the District needed to be evaluated as either problem and/or disturbed (new atypical) conditions under the 1987 Federal Delineation manual.
    - A commitment to advocate solving the development, agriculture, natural resource management problems.
    - Reliance on a finding of facts and an acceptance that the result "is what it is".

In 2003, the District developed its second Comprehensive Watershed Management Plan anticipating a future focus on water quality. In 2004, the District was recognized as a special Municipal Separate Storm Sewer System (MS4) under the National Pollution Discharge Elimination System (NPDES), ushering in the "Water Quality Era". The District completed a minor amendment to its rules and standards to address "non-degradation" of the District's receiving waters. In 2006, the District also saw its first water quality impairments (Coon, Sand Pleasure and Springbrook Creeks for Aquatic Life) under the Federal and state program.

The "Water Quality Era" has increased program responsibilities 50%, increased required tasks 83% and a significant increase in staff. The District has evolved from being an organization primarily responsible for ditch maintenance and wetland preservation, to an organization responsible for drainage, water quality, flood risk management systems, and aquatic wildlife habitat management.

Also, in 2006, the recession struck emphasizing a need for certainty in decision making and control of costs by a constituency that prizes thrift, practicality, and minimum government involvement. The tightened operating environment made investing in long term, less tangible,

non-utilitarian benefits, common characteristics of many natural resource concerns, extremely challenging.

At this time, the District began to formally transition toward a 'natural infrastructure' asset-based management approach. This approach was, founded on a sensitive lands/geologic sensitivity view of the resource which emphasized ecological function, the value as natural infrastructure and the public out of pocket cost to repair, replace or mitigate the consequences of imbalanced decision making.

This effort remains supported by well- defined legislative requirements and enforcement. The District also began moving to more formal planning, programming, and budgeting approach. In this new management framework, the District focused on the costs and consequences of mismanagement and evolving and connecting the planning, programming, budgeting and implementation systems and activities.

In 2013, the District developed and adopted its third Comprehensive Watershed Management Plan. In 2014, the District began developing an asset management program for all of its activities and continued to adhere to the doctrine adopted in 1991. The asset management approach defined each program and activity the District needed to meet the legislative requirements or through the expectations of citizens.

The approach has provided a clear relationship between the provision of the beneficial uses of the District's water resources and investments protecting in the people and property from natural catastrophes or expensive unintended consequences. This combination of asset management and sensitive lands management allows the District to make more defendable and compelling investments and provides needed transparency for elected and appointed officials and citizens.

How We Have Done

The 2013 to 2023, the Comprehensive Plan was approved by the Minnesota Board of Water and Soil Resources (BWSR) in August 2013. The District's Mission was to:

> *"To manage groundwater and the surface water drainage system to prevent property damage, maintain hydrologic balance and protect water qualityfor the safety and enjoyment of citizens, and the preservation and enhancement of wildlife habitat."*

The District's goals were distilled from the various legislative mandates as they apply to the watershed. The goals were:

1. To prevent property damage from flooding, erosion, and degraded water quality.
2. To ensure balance between inflow, outflow, and storage of water.
3. To ensure that water is protected from contamination.
4. To provide for a variety of beneficial uses including the safety and enjoyment of the watershed's residents.
5. To preserve and enhance wildlife.

The dominant concerns at the time were:

1. Preventing flooding.
2. Improving water quality in impaired or impacted waters.
3. Maintaining and enhancing water quality in waters that are not impaired.

Emerging issues were:

1. Aquatic Invasive Species (AIS)
2. Changes in Precipitation Intensity, duration, and apparent return frequency
3. The decline in surficial Groundwater and the effect on Groundwater dependent resources

Goal 1: Preventing Property Damage

The District has done an excellent job at protecting property damage.

- Enforced erosion and sediment control rules to prevent the loss of topsoil and sedimentation restricting recreational use and aquatic life of waters within the watershed
- Regulated the low floor and low entry point to structures to prevent flooding from ground water and flooding.
- Avoided adverse impacts associated with the use and modification of floodplains and with the destruction, loss, or degradation of wetlands.
- Prohibited development within the floodway and new construction in wetlands wherever there is a practicable alternative.
- Continue bank stabilization & repair projects.
- Performed regular surveys to evaluate flood hazards and storm damage occurrences and their hazards and to develop treatment programs where needed.
- Respond quickly and effectively to alleviate the effects of natural disasters and reduce the threat to life, public health, and property.
- Assist in preventing, treating, and controlling aquatic invasive species where they have degraded the water quality of natural water bodies restricting recreational use, aquatic life, or enjoyment.
- Identified minor sub-watersheds providing water within the drinking water supply Management Area
- Ensured District participation in State and local early flood warning systems.
- Prepare public service announcements used to caution against strong currents and under tows that may exist in the watershed during times of high water.
- Provided opportunity for early public review of plans or proposals for actions in floodplains.
- Identify critical events and conditions that lead to local flooding and water quality problems.

Goal 2: Ensuring Hydrologic Balance

The District has done a satisfactory job in ensuring hydrologic balance. It has done very well if the increased randomness of precipitation is considered. The following actions and policies support this assessment:

- The update of the hydrologic model using XPSWMM. The model has both the ability to scale, account for reverse flows, and account for varying hydraulic conditions.
- Working with the cities within the District and Department of Natural Resources (DNR) to update the Floodplain management model to be used by FEMA in the old National Flood Insurance Program and New National Resiliency Program.
- Having DNR recognize the model as the Best Available Science and information on local surface water hydrology.
- Strict administration of the District's Drainage Sensitive Use policy which reduces discharge volume from developed land, reduces peak flows and thereby protects established drainage rights.
- Established and evolved a watershed wide precipitation tracking and reporting system and water content information on snowpack that has improved flood predictions and spring flood preparedness.
- Modified regulatory standards to ensure that the rate, volume, and quality of water entering wetlands matches wetland type and need.
- Worked with USGS to establish a real-time, continuous discharge monitoring station at the outlet of Coon Creek.
- Raised a warning flag to the DNR, the Northeast Groundwater Management group, and Minnesota geologic survey that the surficial ground water aquifer is at risk, places the lakes, wetlands and other groundwater dependent surface water resources and needs to be evaluated separately from the routine assessments of "groundwater".

Goal 3: Addressing Water Quality

The District has done an excellent job at addressing the water quality problems, issues, and concerns of the watershed. Examples include:

- Hiring of a Water Quality Coordinator and a specialist competent in Aquatic Invasive Species, Clean Water Act requirements and the continued monitoring, evaluation and response to Total Maximum Daily Load (TMDLs).
- Secured $3,616,729.58 in state and federal grant funds to further water quality restoration objectives.
- Constructed the first and largest Iron Enhanced Sand Filter (IESF) amended with biochar filter media that treats runoff from nearly a square mile catchment. Also have since constructed three additional IESF and biochar filters. We continue to monitor and report on the treatment success as well as the maintenance needs and costs to operate and maintain this practice. All have significant effect on load reductions and progress towards meeting approved TMDL standards.
- Restored three segments of the creek within the watershed where no upstream or downstream conflicts can occur due to flow modification. Techniques involved

remeandering, reconnection to the floodplain and flow modification and was conducted in close collaboration and with the support of the DNR, Minnesota Pollution Control Agency (MPCA), BWSR. the Anoka Conservation District and the Cities of Andover and Coon Rapids.

- Applied for and was accepted into the MPCA's pilot small watersheds program that provides guaranteed federal funding in excess of $1.2 million dollars for water quality restoration projects over 16 years starting in 2022.
- Stabilized 28,326 LF of channel (5.36 Mile) of active erosion, reducing sediment and attached phosphorus loads by 2951 Tons TSS/yr and 2507 Lbs TP/yr, respectively.
- Initiated and was successful in treating and largely eliminating Hybrid Eurasian Watermilfoil from Crooked Lake with the support and assistance of the Crooked Lake Area Association, DNR, and the Cities of Coon Rapids and Andover.
- Initiated semiannual early detection inspections of all lakes and aquatic habitats likely to support colonization of "at risk" AIS.

Goal 4: Providing Beneficial Uses

The Coon Creek Watershed is a "working" watershed, where a host of beneficial uses are in demand and experience elevated levels of use. The District has done an excellent job, under a performance based multiple use management doctrine to provide opportunities and access to the quantity and quality of water demanded. Actions supporting this assessment include:

- Routine maintenance conducted to accomplish objective while minimizing alterations and facilitating channel equilibrium.
- Monitoring of lake and stream quality.
- Completion of the Watershed Restoration and Protection Strategy (WRAPS) with MPCA.
- Completion of a Nine Key Elements Document for Coon and Sand Creeks with MPCA.
- Updated the Crooked Lake Management Plan.
- Developed the Ham Lake Management Plan.
- Actively worked to address recreation impairments via bacteria source tracking, implementation of pet waste management program, and testing of innovative biochar-amended filtration media.

Goal 5: Preserving And Enhancing Wildlife

Wildlife is clearly the legal responsibility of the State and the Federal government. The District has done a good to excellent job in implementing its supportive goals, given the history, constraints, and restraints under which it operates. Actions supporting this assessment include:

- Early encouraged or required reconnaissance and preapplication meetings that include review of threatened and endangered species and rare plant communities recorded or potentially on the site.
- Coaching on project alternatives and modifications that can avoid of reduce potential impacts.

- Strong encouragement of applicants to contact DNR immediately and coaching on the nature of both their project and the probable and potential resulting impacts to wildlife resources.
- Strict refusal to issue permits involving threatened, endangered species or rare plant communities until a DNR decision or permit can be shown.
- Successful restoration of fishery habitat in three locations and an analysis of barriers to aquatic organism passage to be addressed.
- The successful planning to avoid and protect threatened and endangered species on approximately 50 developments and subdivisions over the past 10 years.
- Implementation of Aquatic Invasive Species (AIS) prevention and management activities.

Goal 6: Aquatic Invasive Species

The District has done an excellent job in facilitating the education, inspection, intervention and treatment of aquatic invasive species within the watershed. Significant actions in the past 10 years include:

- Assisted in the formation of the Ham Lake Lake Association and continued operation of the Crooked Lake Area Association.
- Updated and developed lake management plans for Crooked and Ham Lakes in collaboration with their respective lake associations and the Cities of Andover and Coon Rapids in the case of Crooked Lake.
- Conducted public information and education program for lake residents and interested parties on AIS and identification of key species.
- Launched and administered a volunteer zebra mussel spotter program for early detection of zebra mussels.
- Facilitated and coordinated the assessment, grant acquisition and treatment of Crooked and Ham Lakes for hybrid Eurasian Watermilfoil and curlyleaf pondweed.
- Established a rapid response fund to address either new minor colorizations or to supplement cost share for major occurrences.
- Developed and implemented a twice annual inspection program of key habitats.
- Annually review, refresh and brief stakeholders on trends and risks of new AIS species.
- Successfully defended against invasive common reed (*Phragmites australis*) through early detection, herbicide treatments, and post-treatment monitoring; reduced infested area by 98%.
- Successfully eradicated pale yellow iris.

Goal 7: Addressing Changes In Precipitation Patterns

The District has done a good job in adjusting to changes in the effects of higher intensity and shorter duration rainfall events. Key District actions in the past 10 years include:

- Adopted Atlas 14 as the best available information for planning and sizing infrastructure.
- Evolved precipitation monitoring network to better assess the length and intensity of storms.

- Evolved stream level monitoring to enable real-time data viewing through telemetry-enabled devices.
- Expanded local information and communication network to include ongoing implications of impending weather conditions and hydrologic implications for current conditions.
- Established a system that has been key in coordinating and documenting storm damage for grants, adapting and updating select standards and providing the foundation for planning and anticipating issues ranging from flooding to aquatic invasive species monitoring.
- Required staff to remain current on evidence-based research, findings and developments, on best practices in their areas of responsibility.
- Collaborated with cities to consider in frequency and occurrence of precipitation in planning and decision-making involving infrastructure construction, replacement, and rehabilitation.

Goal 8: The Effect of Declining Regional Surficial Groundwater on Groundwater Dependent Resources

Actions taken in the past 10 years to address this goal have included:

- Development of a detailed conceptual model and water budget of the vadose zone within the district
- Presentation to DNR North-east Ground Water Management Area project managers during scoping to address larger Anoka Sand Plain surficial/unconfined aquifer issues
- Collection of continuous lake and wetland level data at long-term monitoring sites

Lessons Learned

The planning and management approach adopted in 2013 needs updating and continual evolution to enable the District and its collaborators to adapt and succeed through and beyond 2034. The following lessons will be incorporated into the fabric of the 2024-34 Comprehensive Watershed Management Plan:

1. **Water Management involves the continual combination, recombination and evolution of physical, social, and political/economic factors and trends**. These factors combine at multiple scales to influence water resource decision making, even when they originate from the resource itself or the actions of non-government groups.

2. **The physical, social and management factors and trends, are 'open' systems**, available to constant inputs creating an operating environment characterized by volatility, uncertainty, complexity, and ambiguity (VUCA). The result is often a profound sense of struggle on the part of local managers.

3. **Short- and long-term water management 'is characterized by a fog and friction created from the risk and uncertainty in the physical, social and management domains**. The risk and uncertainty is the product and a dynamic combination of human perception, and chance.

These two variables tend to distort, cloak, and twist the course of events, regardless of the advances in science, technology, or computing power.

4. **Planning and the planning process is more important than ever**. Not to decide and commit to a rigid schedule of projects and activities, has proven unrealistic and impractical. Its value is in facilitating and communicating common understanding of problems, and identifying available options and their consequences, and to facilitate unified action.

5. **Management actions need to be practical and relevant to those financially affected**. The reliance on a proactive, multiple use utilitarian management approach that focuses on physical consequences, even if when those consequences will occur is uncertain, is more effective than the traditional defensive based conservation, "just say no" strategy that increasingly dominates the natural resource and environmental debates.

6. **Where you are going is more important than where you are at**. The performance, evolution, and potential of physical, social and management systems is more important than their current condition. However, immediate and short-term condition and capacity are important too.

Implications

1. Fulfillment of the responsibilities for drainage, flood prevention, wetland conservation and water quality restoration will be challenging.
2. We cannot predict what types of specific water management problems, issues, or concerns, or for what purposes or priorities other land and water management organizations will be engaged in over the next ten years.
3. We can only speculate about potential and probable problems and issues, how they might occur and the costs they may cause to either prevent, mitigate, or recover from their effects.
4. We can, however, state with certainty, that the fundamental foundation and nature of water management within the Coon Creek Watershed will not change in the sense that the mix of political and economic aims, pressures, and hesitations will continue to condition water management operations.
5. The likely result will be an operating environment characterized by:
    - Volatility, uncertainty, complexity, and ambiguity (VUCA) in the physical, social and political economic environments in which it operates.
    - Increasing pressure to meet water quality targets, anticipate flood risk, and account for the effects of changes in precipitation.
    - A growing obligation and need to manage aging infrastructure within limited budgets and resources.

The 2024 to 2034 Comprehensive Plan provides an opportunity to further adapt and transform the collective water management organization into one that can adapt and sustainably manage storm water quality and drainage in a transparent and cost-effective manner, that justifies funding

requirements and management decisions. It will require the District, and its collaborators to continually evaluate programs to develop and refine its core mission, goals, objectives, levels of service and measures of performance and effectiveness.

Review And Consideration of Input Received During Initial Planning Process

In May 2022, the District published its "Intent to Amend Comprehensive Watershed Management Plan". The notice was published on the District website and sent directly to the state review plan agencies identified in M.R. 8410 through the contacts identified on the BWSR web site. The agencies and public were provided 60 days to submit written comments. Respondents were requested to note:

- Their management expectations for the Watershed Management Plan
- Their priority water management issues
- A summary of their relevant water management goals and water resource information
- Official Controls
- Water Management Programs

Five stake holders submitted 37 comments. Comments were reviewed with the Board of Managers at their July 11, 2022, regularly scheduled meeting.

NOI Comment Topics	Public	BWSR	DNR	Met Council	Total
AIS			2		2
Bank stabilization			1		1
Climate Change	2	1		1	4
Channel restoration/ Conservation Drainage			1		1
Chloride		1	2		3
Ditch maintenance			1		1
Fish & Wildlife			1		1
Forested riparian lands			1		1
Ground Water		1	6	1	8
Parks				1	1
Planning & Management process	1	3	1	1	6
Stormwater Management			1		1
T&E Species			3		3
Water quality		1	1	1	3
Water Quality Impairments	1	4	7	2	14
Watershed Assessment tool			1		1
Total	4	11	29	7	51

A summary of the comments organized by Notice of Intent (NOI) category is below:

Management expectations for the planning process

There were five expectations raised in the comments made on the NOI. They were:

1. Climate Change.
2. Principal Based Management: Management will adhere to fundamental management principles for watershed and natural resource management.
3. Integrated Management.
4. Public participation process will consider diversity, equity, and inclusion elements to ensure robust stakeholder engagement.
5. Contain measurable goals.

1. <u>Climate change and adaptiveness.</u>

The issues of climate change, often coupled with the issue of global warming remain an extremely hot and divisive issue among the public and the elected officials who make policy.

What is not at issue is the increase in the intensity and duration of precipitation events, the localized damage they have caused, the extreme variations in temperature and the volatility of the atmosphere.

The District has identified been adapting to these changing conditions since 1997 and has identified the increase in intensity and duration as an issue in its last two Comprehensive Watershed Management Plans.

- The 2003 watershed management Plan began the development and facilitation of a monitoring and communication network to assess precipitation.
- In 2005, the District established its own grid of precipitation monitoring gauges to assess the variation in precipitation over the watershed. While a fundamental watershed management component, the system served its intended purposes.
- In the 2013 Watershed Management Plan, the District implemented efforts for tracking, informing and anticipating the time, intensity and potential hydrologic effects of incoming storms. That system has been key in documenting storm damage for grants, adapting and updating select standards and provided the foundation for planning and anticipating issues ranging from flooding to aquatic invasive species monitoring. In addition, District staff is required to remain current with evidence based developments, and evolution of evidence based best practices in their areas of responsibility. The District also works with its collaborating cities to consider these changes in precipitation patterns in planning and decision-making involving infrastructure construction, replacement, and rehabilitation.

Readers should understand that these decisions involving potentially oversizing infrastructure to accommodate changes in precipitation. The useful life is often between 50 and 100 years, and involves the use of public funds, are rich with uncertainty and political consequences, and are bounded by legal and public accounting constraints and restraints of financial accountability. Also the legal need to show some evidence based rational connection for the disposition and use of those funds, as well as, the priorities and preferences of the local public who pay for local services.

To remain efficient and effective in providing the beneficial uses and services provided by the watershed, the District will need to continue to adapt to this fundamental change and reality in its operating environment.

The issue of climate change is of global scale and in the public arena, remains emotionally debated and is rich with opportunities for misunderstanding, and is often heavily influenced with philosophy, opinion and second guessing. None of these helps focus attention on addressing the specific water management problems at the local level.

2. <u>Ground Water Protection and Sustainability</u>

- While the District is not a water supply utility it does play an influential role in protecting water quality and preventing land use practices that may harm or present serious risk to groundwater and public drinking water supplies. The District also comments on DNR Appropriation and Dewatering Permits when it is known that the cone of depression formed by the dewatering or well could adversely affect water resources for which the watershed district has some responsibility.

3. <u>Inclusiveness of Planning Process</u>

In response to these concerns the District developed a Public Engagement Plan (Appendix B). Implementation of the plan resulted in:

- Contact with over 150 members of the public.
- Fifty-two (52) responses to a District wide survey on water priorities and concerns.
- Eight meetings each with the Citizen and Technical Advisory Committees where various problem, issues and concerns as well as process and procedures were identified and discussed.
- Four meetings were held with specific staff and interests to review community planning and development.
- Members from at least three state review agencies attended meetings on specific topics such as groundwater and wetlands.

4. <u>Comprehensive and Integrated Management approach</u>

Official and unofficial comments favored a dedication to "sustainability" through adaptive planning and management. The sustainable version advocated focuses on and establishes investment and action priorities on the restoration and preservation of natural components and functions and whose use is provided by the residuals or a product of living lightly on the resource. The DNR comments advocated, , a process for accomplishing this.

At present, the District practices multiple-use management through a version of adaptive planning that relies on conservative, evidence based forecasting and readiness.

The Coon Creek Watershed District (CCWD) was officially formed in 1959. The agency's mission was significantly defined with the passage of the Metropolitan Surface Water Management Act (MWMA). The MWMA recognized the multiple beneficial uses provided by water and related resources and required a statement and plan for local care and continued provision of those beneficial uses.

The term "multiple use" seems self-descriptive. For local water resource management, it means that water resources have many beneficial uses (renewable and non-renewable), such as drinking water, aquatic life and wildlife, recreation, navigation and aesthetics, etc.

This multiple use "mandate" through MWMA and State Water policy (MS 103A) states that the use of water resources within Minnesota should be allowed through a balanced combination that will best meet the needs of the people (current and future needs for current and future generations). This is one articulation of the "provide but protect" paradox inherent in most public land and natural resource management.

Working within this paradox on problems that inherently have physical, social, political and economic elements highlights the operating environment characteristics identified above:

- Increasingly volatile: weather patterns, social tastes and preferences, and political priorities and predilections are all characterized by swings in what appears to be extremes.

- Rife with uncertainty: The volatility described above is a major but not the only contributors to creating immense uncertainty for decision makers faced with allocating, investing resources or positioning their organization for anticipated changes or demands.

  A second significant source of uncertainty lies with the courts. The history and volume of past and present litigation has forced the courts, at all levels, to increasingly specify their judgements. The result often has much broader implications for policy and practice. This situation combined with what appears to be increasing attempt to influence agency and statutory priorities through "advocacy" litigation has also contributed to the uncertainty and, at times, hesitancy to take actions that could prevent or preempt water resource problems.

- Inherently complex: Multiple Use Watershed Management is an amalgam of various arts, sciences, and disciplines including law, economics, geology, hydrology, biology, chemistry, physics, and sociology. These are the applied and practiced through a combination of management and political science, engineering and a host of other natural resource-based disciplines including soils, hydrology and forest or range management.

Persistent Ambiguity: One step back from collection of a water sample, identification of a plant species, construction of a best management practice, or inspection of a construction site the most honest and direct answer to the majority of water resource problems, issues and concerns is, "it depends". The variety and enormity of demands on water resources and the sophistication and complexity of their structure and function requires that response until there is a common understanding of the problem, issue or concern an what is to be done. As water management moves away from the tactical, to the programmatic to the legislative and strategic, the ability to accomplish that within a meaningful time frame decreases, thus increasing ambiguity and forcing local organizations to be more adaptive and agile which, in turn makes their own demands on budgets, equipment and staffing. To effectively operate in

these conditions and adopt an approach which is comprehensive and integrated the District views the resource and its responsibilities by:

1. Considering that "the people" is a collection of widely diverse individuals (and groups) that all have an interest in their water resources. From citizen to developer to environmentalists, everyone has a stake in quantity, quality and continued provision of the benefits provided.

2. Recognizing that there are dozens upon dozens of state and Federal laws that influence water management. From the Drainage Law (1887), the Watershed Act (1953), Federal Clean Water Act (1971), Metropolitan Surface Water Management Act (1982), Wetland Conservation Act (1991), Clean Water Legacy Act (2022) along with the numerous other regulations, court orders and decisions, and Corps of Engineers, BWSR and MPCA policies, and various manuals and handbooks, there is quite an analysis to perfect when determining the best course of action for water resources.

   Many of these laws, regulations, and policies are broadly applicable to the District, while others are prescriptive and specific to the problems, issues or concerns of different resources or conditions. The management for multiple uses involves a potentially overwhelming set of resources, uses, and issues. Each with its own set of environmental, social, and economic consequences and a history of conflict.

   So how does the CCWD manage this complexity?
   In each case, decisions are considered in light of:
   1. The condition and capacity of the water resources affected.
   2. The specific physical, social and management circumstances of the situation.
   3. These specifics are then considered in light of the ability and time involved for water resource to absorb and or recover and continue to provide the full set of beneficial uses being demanded AND the alternatives available to avoid, minimize or mitigate any impacts from the proposed use.

Comprehensive planning is one of the most important tools that the District has, as it comprehensively considers and publicly discloses and ensures that the CCWD manages the water resources of the District consistently and in a way that upholds the principle of multiple use.

In addition, the planning and ten-year execution process, involves continuous opportunity for public involvement through twice monthly public meeting with the Board and full-time staff dedicated to public involvement and information.

The CCWD makes every effort to plan for and implement decisions that will most positively affect the citizens and landowners of the watershed and the state of Minnesota.

5. Measurement of Performance, Effectiveness and Progress

The issue of measures and benchmarks of performance was raised by two state agencies, at least one local agency and a member of the Citizen's Advisory Committee. In developing the 2013 Comprehensive Plan the BWSR encouraged the articulation of measurable outcomes

for major goals. No other guidance was provided other than the importance and value in identifying trends, strengths and weaknesses and benchmarks for historical use.

Within the context of natural resource management, the 2013 required suggestion was viewed with confusion due to the lack of context, longitudinal data and the typical long period it can take to see and measure meaningful differences. be able to validly show a cause and effect relationship between current conditions and the initiation of some practice or program.

The District has however, developed and reports a set of performance measures monthly. These monthly measures are typically aggregated and reported annually in various reports. However, performance measures are only useful at recording inputs, levels of effort and the efficiency of doing the right things. Performance measures, however, cannot tell you if you are doing the right things or are being effective.

A fundamental modern multiple-use management is to continuously assess the operational environment and the progress of the programs, projects and activities that comprise operations. The first step toward a successful assessment is deciding what to measure and how to measure it. Managers often find two concepts helpful in assessment:

Measure of Performance (MoP) (Which ask the question "Are we doing things right?") will be defined as the criterion used to assess friendly or supporting actions that are tied to measuring task accomplishment. Behavior, capability, or operational environment that is tied to measuring the attainment of an end state, achievement of an objective, or creation of an effect. MOPs are necessary for correlation to specific Measures of Effectiveness (MoEs) in order to determine the optimal levels of effort for objective achievement. A careful analysis of the relationship between MOPs and MoEs reveals the need to change what and how things are done if the current plan is inefficient or have adverse effects.

Measures of Effectiveness (MoE) (Which asks the question "Are we doing the right things?") will be defined as criterion used to assess changes in system behavior, capability or operational environment that is tied to measuring the attainment of an end state, achievement of an objective, or creation of an effect. They measure the ability of a system to meet its specified needs (or requirements) from a particular viewpoint. This measure may be quantitative or qualitative and it allows comparable systems to be ranked. These effectiveness measures are defined within a specific problem-space. Implicit in the meeting of problem requirements is that threshold values must be exceeded. The criteria used for the development of the Watershed Condition assessment above are one example of effectiveness measures.

Those who understand the difference know that in a complex operating environment, organizations need to "do the right things" (succeed at MoEs) to achieve objectives, not just "do things right" (succeed at MOPs).

This comprehensive plan will initiate an evolution of the outcomes articulated in the 2013 plan and will include measures of performance (MoP) and measures of effectiveness (MoE).

The distinction between MoEs and MoPs can depend on their context within the comprehensive plan.

Priority Water Management Issues raised:

1. AIS
2. Bank stabilization
3. Channel Restoration
4. Chloride
5. Climate Change and Community Adaptiveness and Resiliency
6. Ditch maintenance
7. Fisheries
8. Forested riparian areas
9. Ground water
10. Impact on Parks
11. Threatened and Endangered Species
12. Water Quality

Relevant Water management goals

- No specific water management goals were provided by any of the agencies responding to the NOI. The goals and purposes to be used in the plan will be based on those provided in Minnesota Statutes, Rules and regional Guides. Where or when those goals appear contradictory as applied to a specific circumstances the Board of Managers will balance the public interest conflicts at the watershed level after consideration of the whole body of water law.

- Priorities were identified through survey and focus groups
  i. Priorities for Beneficial Use of Water
     1. Drinking water
     2. Fish and Wildlife
     3. Aquatic Life
     4. Agriculture
     5. Aesthetic enjoyment
     6. Recreation
     7. Industrial use
     8. Navigation

  ii. Ground Water Management Priorities
     1. Drinking water
     2. Drinking water sustainability
     3. Source water protection
     4. Water supply
     5. Chloride
     6. Groundwater recharge
     7. Ground water x Surface water interactions and reliance

iii. Water Quality Management Priorities
    1. Water quality impairments
    2. Chloride
    3. Lake health
    4. Water borne pathogens.
    5. Contaminants of emerging concern
    6. Aquatic life impairment
    7. E. coli
    8. Fisheries impairment
    9. Aquatic invasive species
    10. Aquatic recreation impairment

iv. Water Quantity Management Priorities
    1. Flooding
    2. Altered hydrology
    3. Change in storm type
    4. High water table

Official Controls

None provided.

Water Management Programs

Two tools were recommended:

- Principles for Sustainability and Adaptive Planning:

  Response:

  Minnesota Statutes clearly state that the purpose and intent of the legislature is the ongoing provision of the "beneficial uses" provided by the water resources of the State (M.S. 103A, 103B & 103D). To "provide" these uses requires protection and enhancement of the productive capacity of the soil and water resources within in an area This requires an ecological (vs an environmental) approach that embraces the complex dynamic nature of the physical, social and political/economic domains that compose differing operating environments in time and space. The Coon Creek Watershed District has been formally engaged in sustainable multiple use management since its second-generation plan in 2003 and informally since 1991.

- Watershed Condition & Health Evaluation:

  Response:

  The DNR suggested use of the State's Watershed Condition framework. The District has formally assessed the condition of the watershed every two to three years since 2013. The District uses the Watershed Condition Framework developed by the National Forest Service for use on national forests under high demand for the multiple uses provided by those forests (USFS, 2011). The Coon Creek Watershed District has continued to refine the measures used under the basic framework and variables in order to make the model more useful for managing priorities, making decisions and prioritizing research, monitoring, and planning studies. The results of the 2022 assessment are presented in Part 3 of this report.

Framing the Problem, Evaluating the Concerns

Twelve of the issues identified during the initial engagement process will be evaluated for inclusion in the Watershed Management Plan.

Those twelve are:

1. AIS
2. Bank stabilization
3. Channel Restoration
4. Chloride
5. Climate Change & Community adaptiveness & resiliency
6. Ditch maintenance
7. Fisheries
8. Forested Riparian Areas
9. Ground water
10. Impact on Parks
11. Threatened and Endangered Species
12. Water Quality

The remainder have been evaluated and discussed in the previous section. These 12 issues represent a variety of scales and types of problems, issues, and concerns. Water quality, for instance is a domain, where chloride is a specific pollutant and stressor which causes or can contribute to water quality impairments such as aquatic life. Aquatic Invasive Species is another recognized component of the physical, chemical and biological aspects of water quality. Bank stabilization and healthy riparian lands, while aspects of a water resource can also be viewed as best practices for water quality, protecting property and flood prevention.

Evaluation of Problems, Issues and Concerns and Preparation for Planning and Operations

The District will use a three step systematic process of analyzing the problems, issues and concerns of groundwater, public drainage, water quality, water quantity, and wetlands, as well as, civil considerations within the watershed to determine their effect on achievement of legislative goals and future operations. The process is formatted to allow governing Boards, managers and staff to take a comprehensive approach to analyzing the operational environment. A comprehensive approach must:

- Describe the totality of relevant aspects of the operating environment that may impact collaborator and District efforts.
- Account for all relevant domains that may impact collaborator and District operations.
- Identify windows of opportunity to leverage District and collaborator capabilities against problems, issues, and concerns.
- Allows managers to leverage positions of relative advantage at a time and place most advantageous for achieving legislative goals and local needs with the most accurate information available.

During this evaluation, District staff will create data files for the District and program an operational environment based on existing information and their evaluation of the information and intelligence related to the operational variables (political, storm water management, economic, social, information, infrastructure, physical environment, and time). District staff can also access data maintained by different programs. This programmed-aligned process will be designed to refine, and store information and intelligence on a regular basis, which benefit subwatershed aligned work groups.

Throughout the evaluation, planning and most of all the ongoing operations process, managers and staff should be continually collecting and analyzing information and operational variables to provide increased situational understanding due to possible contingency operations. Situational understanding is the product of applying analysis and judgment to relevant information to determine the relationship between the ever changing and evolving physical, social and political-economic operational environment and the variables involved in making decisions affecting legislative mandates, goals and objectives.

Upon publishing the notice of intent to amend the Watershed Management Plan, the Board, District Administrator and Program Coordinators began to gather information relevant to the resource and operational variables and filter and fit them to the legislative mandates affecting the District.

The primary variables are legislative goals, intent and the specified and implied tasks stated in statute and rule. These were then applied to the watersheds' landscape and hydrology and the problems, issues and concerns that effect and are effected by water management, and act as constraints and restraints to future management actions.

To be effective, the approach taken must:

- Be part of a continuous process with all staff members providing input (We currently do this twice monthly).
- Account for all domains, and the information environment.
- Facilitate mutual understanding between collaborators.
- Define the District's area of operational interest by its geographic boundaries to focus collection and analysis of information.
- Describe how the resource variable, problems, issues and concerns will affect water management programs and activities (operations).
- Include relevant aspects of the operating environment for decisive, shaping, and sustaining programs, projects, and activities.
- Determine how the interactions of collaborators, problems, issues and concerns and the public affect each other to continually create outcomes that positively affect the public.
- Supports the District's and collaborators planning, programming, budgeting, and operational frameworks relative to time, cost and benefit.
- Facilitate Board's, Councils', and managers ability to visualize the desired end state and a broad concept of how to shape current conditions into that end state.

- Support managers in directing research and planning.
- Facilitate understanding the characteristics of problems, issues, and concerns for setting more efficient and effective courses of action.

The Evaluation Process

The evaluation process consists of three steps:

1. Define the Operating Environment.
2. Describe effects of the operating environment on water management programs and activities.
3. Evaluate the problems, issues and concerns that threaten the desired legislative intent and outcomes and identify high value subjects, topics, and targets for management intervention.

STEP 1: Define the Operational Environment

An operational environment is a composite of the conditions, circumstances, and influences that affect an organizations capabilities and bear on the decisions of managers and Board. The operational environment for any specific program, project or activity comprises more than the interacting variables that exist within a specific physical area. It also involves interconnected trends and influences from the Federal, state, and regional perspective (such as politics, economics). Thus, each manager's operating environment is part of a higher authority's operating environment. Defining the operating environment results in the identification of:

- Significant characteristics of the operating environment that can affect programs and projects.
- Gaps in what we know and need for decision making.

Step 1 is important because it assists the manager in defining relationships within the operating environment in time and space. This is equally important when considering characteristics of several agencies and or locations. Aspects of these differing agency and site operating environments may occur simultaneously across the watershed but may only factor in supportive as well as detrimental activities at specific times and locations.

During step 1, collaborators and staff must identify those significant characteristics related to the mission and driving the problems, issues and concerns. They must evaluate significant characteristics to identify gaps and initiate information collection. Field staff then justifies the analysis to the management team. Failure to identify or misidentifying the effect these variables may have on programs, projects and/or activities at a given time and place can hinder decision making and result in the collection of meaningless data or information. During step 1, the area of operations (AO), and area of influence must also be identified and established.

Understanding collaborator capabilities and the problems, issues and concerns is not enough; other factors, such as culture, affiliations, and other variables, can be equally important. Identifying the significant characteristics of the operating environment is essential in identifying the additional information needed to commence planning.

Additionally, where a program is assigned and how its operations will synchronize with other associated operations must be considered. For example, regulatory programs should be forming questions regarding where their program fits within the entire regulatory picture and the specific requirements needed to handle the program's contingency plans.

STEP 2—Describe Environmental Effects On Operations

During step 2 staff describes how significant characteristics affect water management. Staff also describes how the landscape, hydrology, civil considerations, and collaborators affect problems, issues and concerns. This evaluation focuses on the general capabilities of each organization until the development of alternative course of action. The entire staff and collaborators determines the effects of combined efforts on the population and water resource.

If the organizations operating environments do not have the information required to form conclusions, it uses assumptions to fill information gaps always careful to ensure the manager understands when assumptions are used in place of facts to form conclusions.

STEP 3—Evaluate of the Problems, Issues and Concerns and The Threat They Present

The purpose of evaluating the threat is to understand how risk can affect collaborative efforts. Although problems, issues and concerns may conform to some of the fundamental principles of watershed or storm water management, these problems, issues and concerns will have obvious, as well as subtle, differences in how they approach situations and problem solving. Understanding these differences is essential to understanding how a problem, issue or concern will play out in a given situation.

Managers and Staff conduct threat evaluations and create threat models. Using the information presented in this report and information collected and analyzed during the implementation phase, staff can refine threat models, as necessary, to support planning and implementation. When analyzing a well-known threat (such as flooding), the staff may be able to rely on previously developed models. When analyzing a new or less well-known threats (such as declining groundwater levels), staff may need to evaluate the threat and develop models during the mission analysis step.

In situations where there is no threat, the analysis conducted and the products relating to landscape and land use, hydrology, and civil considerations may be sufficient to support planning. An example of this type of situation is a natural disaster.

2
Analysis Of The District's Mission

Purpose

To review and update the update the requirements, guidance, and time allotment handed down by state and Federal legislative bodies and agencies and to identify gaps in information required for further planning and decision-making during preparation and execution.

Outcomes

- Develop a preliminary problem statement.
- Develop a mission statement to guide roles, tasks, timing locations and reasons for local water management activities.
- Initial statement of management intent.

Understanding of the District's Mission

The Coon Creek Watershed District is a special purpose unit of government authorized and established by the State of Minnesota. As such the District is a creature of the state whose purpose is to implement the policies and goals of the State of Minnesota.

The Water policy and goals of Minnesota is contained in several statutes. Minnesota Statute 103A states that these statues must be considered as a whole to systematically administer water policy for the public welfare (M.S. 103A.211).

State water policy and goals that appear contradictory in a specific situation or circumstance should be discussed in a public forum where the conflict surrounding a specific public interest can be presented and, by consideration of the whole body of water law, the controlling policy can be determined, and apparent inconsistencies resolved.

For development and implementation of this plan, public forums are identified as

1. Public engagement
2. Initial planning meeting
3. Public and State Agency review
4. Board of Water and Soil Resources
5. The Board of Managers regularly scheduled meetings
6. BWSR Dispute Resolution Committee
7. Court

Legislative Goals: What We Are Supposed to be Doing

1. To conserve and use water resources in the best interests of the people, and to promote the public health, safety, and welfare (M.S.103A.201).
2. To preserve the wetlands of the state to conserve surface waters, maintain and improve water quality, preserve wildlife habitat, reduce runoff, provide for floodwater retention, reduce stream sedimentation, contribute to improved subsurface moisture, enhance the natural beauty of the landscape, and promote comprehensive and total water management planning (M.S. 103A.202).
3. To reduce flood damages through floodplain management, stressing nonstructural measures such as floodplain zoning and floodproofing, and flood warning practices (M.S. 103A.207).
4. To plan and manage groundwater and surface water resources from the perspective of aquifers and watersheds to achieve protection, preservation, enhancement, and restoration of valuable groundwater and surface water resources. (M.S. 103A.212)
5. To provide for the sustained use of our natural resources through direct and coordinated actions with other agencies and parties. (M.S. 103A)
6. To conserve the natural resources for the protection of the public health, safety, and welfare and the provident use of the natural resources. (M.S. 103D)
7. To protect, enhance, and restore water quality in lakes, rivers, and streams and to protect groundwater from degradation. (M.S. 114D.10)
8. To achieve and maintain water quality standards for groundwater and surface waters, including the standards required by section 303(d) of the federal Clean Water Act, United States Code, title 33, section 1313(d) (114D.10).
9. To broker requests and petitions for repair and improvement of the public ditch system (M.S. 103E).

Methods: How We Are Supposed to Achieve The Goals

To achieve the above goals, the legislature authorizes the District to:

- Tax and specially assess to fund actions to achieve those goals.
- Regulate property to guide land use actions to operate in harmony with and synchronized with their landscape and to prevent uses that would harm or damage the public health, safety or welfare or the resource's ability to provide beneficial uses now or in the future.
- To budget and invest in people, projects, programs and actions.

End States: Why We Are Pursuing the Goals

The reason the legislature has stated these goals and provided the District with taxing and regulatory authority is to:

- Protect the public health, safety, and welfare. (M.S. 103A.211, & 103D.201)
- Protect the watershed's capacity to continue to produce and provide beneficial uses. (M.S. 103D.201)
- Operate and maintain those natural and manmade structures and functions necessary for the ongoing provision of beneficial uses. (M.S. 103B, 103D & 103E)
- Restore adverse changes to the most sustainable productive capacity the resource can attain. (103B, 114D, 33 U.S.C §§ 1251 et seq.)
- Minimize capital costs associated with repair, replacement, or restoration of property and or water resources. (M.S.103B.201)

Concept of Operation: How the Legislature Envisions It Working:

To achieve the above goals, objectives, intentions and effects, the legislature prescribed a set of hierarchical plans to discover, disclose and address the needs for comprehensive water management and prevent costly problems and issues. The hierarchy is driven at the:

1) State level by the laws and rules identified in the reference section above.
2) Watershed level by Comprehensive Watershed Management plans developed to address those goals as they relate to local hydrologic conditions.
3) The municipal level through local water plans that further refined and operationalize the objectives of the watershed plan.

Consistency, reflection of local tastes and preferences and a broadened perspective is intended through required engagement and documentation with public and private stakeholders and is further assured through formal review and comment by those stakeholders and approval of the Watershed Management Plan by the Board of Water and Soil Resources.

Local water plans are assured consistency with watershed plans through watershed organization approval and review by the Metropolitan Council. Additional compliance and consistency is achieved by the Municipal Local water plans also being consistent with the stormwater chapters of the city Comprehensive Plans that are reviewed and approved by the Metropolitan Council. This system is intended to reflect local natural resources and their condition; and be consistent with metropolitan and state policies and priorities.

Task Organization: Objectives and Specified and Implied Tasks

Specific Legislative Objectives (M.S. 103B):

Within the Metropolitan Area, the Legislature has identified nine objectives which also address problems, issues, and concerns within the metropolitan area of the Twin Cities. The legislative objectives are:

1. To protect, preserve, and use natural surface water and groundwater storage and retention systems.
2. To minimize public capital expenditures needed to correct flooding and water quality problems.
3. To identify and plan for means to effectively protect and improve surface water and groundwater quality.
4. To establish more uniform local policies and official controls for surface water and groundwater management.
5. To prevent erosion of soil into surface water systems.
6. To promote groundwater recharge.
7. To protect and enhance fish and wildlife habitat and water recreational facilities.
8. To secure the other benefits associated with the proper management of surface water and groundwater.
9. To provide authority, direction, and resources to achieve and maintain water quality standards for groundwater and surface waters, including the standards required by section 303(d) of the federal Clean Water Act, United States Code, title 33, section 1313(d), and other applicable state and federal regulations.

Required Tasks

1. Develop a Watershed Management Plan that is prepared, adopted, and implemented in accordance with the other requirements of M.S. 103B.231.
2. Specify the period covered by the plan and must extend at least five years but no more than ten years from the date the board approves the plan.
3. Coordinated with an adopted county groundwater plan developed under M.S. 103B.255.
4. Addresses and sufficiently analyzes the following factors and offers a prescription necessary to accomplish legislative purposes.
    1) Describe the existing physical environment, land use, and development in the area and the environment, land use, and development proposed in existing local and metropolitan comprehensive plans.
    2) Present information on the hydrologic system and its components, including drainage systems previously constructed under M.S. 103Ee, and existing and potential problems related thereto.
    3) State objectives and policies, including management principles, alternatives and modifications, water quality, and protection of natural characteristics.
    4) Set forth a management plan, including the hydrologic and water quality conditions that will be sought and significant opportunities for improvement.

5) Describe the effect of the plan on existing drainage systems.

6) Identify high priority areas for wetland preservation, enhancement, restoration, and establishment and describe any conflicts with wetlands and land use in these areas.

7) Describe conflicts between the watershed plan and existing plans of local government units.

8) Set forth an implementation program consistent with the management plan, which includes a Capital Improvement Program and standards and schedules for amending the comprehensive plans and official controls of local government units in the watershed to bring about conformance with the watershed plan.

9) Set out procedures and timelines for amending the plan.

5. Identify priority issues (M.R. 8410.0045 Subp. 1)
    1) Identify priority issues in consideration of
    2) Water management problems, including prevention of future water management problems.
    3) Funding levels.
    4) Identified regional, county, city, state, and federal water management priorities.
6. Contain information and a general analysis based on existing records, plans, and publications for the elements.
    1) Topography
    2) Soil
    3) General geology
    4) Precipitation
    5) Surface water resources including streams, lakes, wetlands, public waters, and public ditches.
    6) Water quality and quantity including trends of key locations and 100-year flood levels and discharges.
    7) Groundwater resources, including groundwater and surface water connections if defined in an approved and adopted county groundwater plan.
    8) Storm water systems, drainage systems, and control structures
    9) Regulated pollutant sources and permitted wastewater discharges.
    10) Fish and wildlife habitat and rare and endangered species.
    11) Water-based recreation areas.
    12) Existing land uses and proposed development in local and metropolitan comprehensive plans.
    13) Priority areas for wetland preservation, enhancement, restoration, and establishment.
7. Develop specific measurable goals for the following that address identified issues and are consistent with the purpose and intent of relevant legislation.
    1) Groundwater
    2) Public Drainage
    3) Water Quality
    4) Water Quantity
    5) Wetlands

8. Develop prioritized implementation actions through the year the plan extends to, that will consist of administrative processes and programs to address the resource management goals. Those implementation actions must be organized around:
    1) Capital Improvement Plan
    2) Data Collection
    3) Incentives
    4) Information and Engagement
    5) Local Water Planning
    6) Operations and Maintenance
    7) Regulation
    8) Water Restoration and Protection

9. A Federal National Pollutant Discharge Elimination System (NPDES) storm water permit is required for MS4's located in an urbanized area in whole or in part, that are regulated in accordance with Code of Federal Regulations, title 40, section 122.26(a)(1)(iii) and (iv), and (a)(9)(i)(A)

10. MR 7090.1040 MS4's must have a storm water pollution prevention program to address environmental concerns related to storm water discharge. The program must address the following minimum measures in accordance with Code of Federal Regulations, title 40, section 122.34(b):
    A. Public education and outreach
    B. Public participation/involvement
    C. Illicit discharge detection and elimination
    D. Construction site runoff control
    E. Postconstruction runoff control
    F. Pollution prevention/good housekeeping

Implied Tasks

1. Develop a statement of the current and desired 2033 condition of the resource.
2. Define the problem set.
3. Develop specific measurable goals for wildlife that address identified issues and are consistent with the purpose and intent of relevant legislation.
4. Facilitate consensus on the broad collaborative operational approach.
5. Assess centers of gravity catalyzing both problems and response capacity.
6. Articulate assumptions and limitations.
7. Identify critical information requirements.
8. Develop prioritized implementation actions through the year the plan extends to, that consists of administrative processes and programs to address the resource management goals for:
    a. Program positioning, response, and intervention
    b. Stability and sustainment that address:
        i. Collaboration and support

ii. Coordinating
iii. Civil Engagement and Affairs

c. Assessment and Evaluation of Measures of Effectiveness to assess progress and end state conditions
d. Coordinating instructions
e. Administrative support and sustainment
f. Leadership, liaison, and ongoing communication

Proposed Revised Mission Statement

All the statutes cited above emphasize a comprehensive approach to the wise use, preservation, and protection of water and related land resources for the public health, safety, and welfare. While the statutes address almost all water resource features, they emphasize flood control and water quality. To this end, the District's most basic responsibilities are:

1. To develop and manage a uniform program of water use within the Coon Creek Watershed.

2. To protect the health, safety and welfare of the present and future people that live, and will live, within the watershed.

3. To provide for opportunities and uses of the water and related natural resources of the watershed which are demanded and appropriate for the area. Appropriate refers to the natural ability of the water and related resources to continue to perform and function on their own or with a minimum subsidy or cost to the public at large.

4. To prevent unacceptable damage to the water and related natural resources of the watershed. Unacceptable means decreasing or diminishing the ability of the water and related resources to continue to perform and function on its own in perpetuity.

To focus these broad mandates to the Coon Creek Watershed and provide more direction to this charge, the mission of the District is:

> *"To manage groundwater and the surface water drainage system to prevent property damage, maintain hydrologic balance and protect water quality for the safety and enjoyment of citizens, and the preservation and enhancement of wildlife habitat."*

The District intends to do this by using the natural drainage system to provide for conveyance and disposal of storm water runoff without degrading the natural system.

Initial Statement of Management Intent

To sustain the beneficial use of water resources and protect the public interest will require:

- A multi-agency collaborative approach at the local and state levels.
- Prudent but aggressive investment of public funds to maintain, improve, and restore hydrologic function.

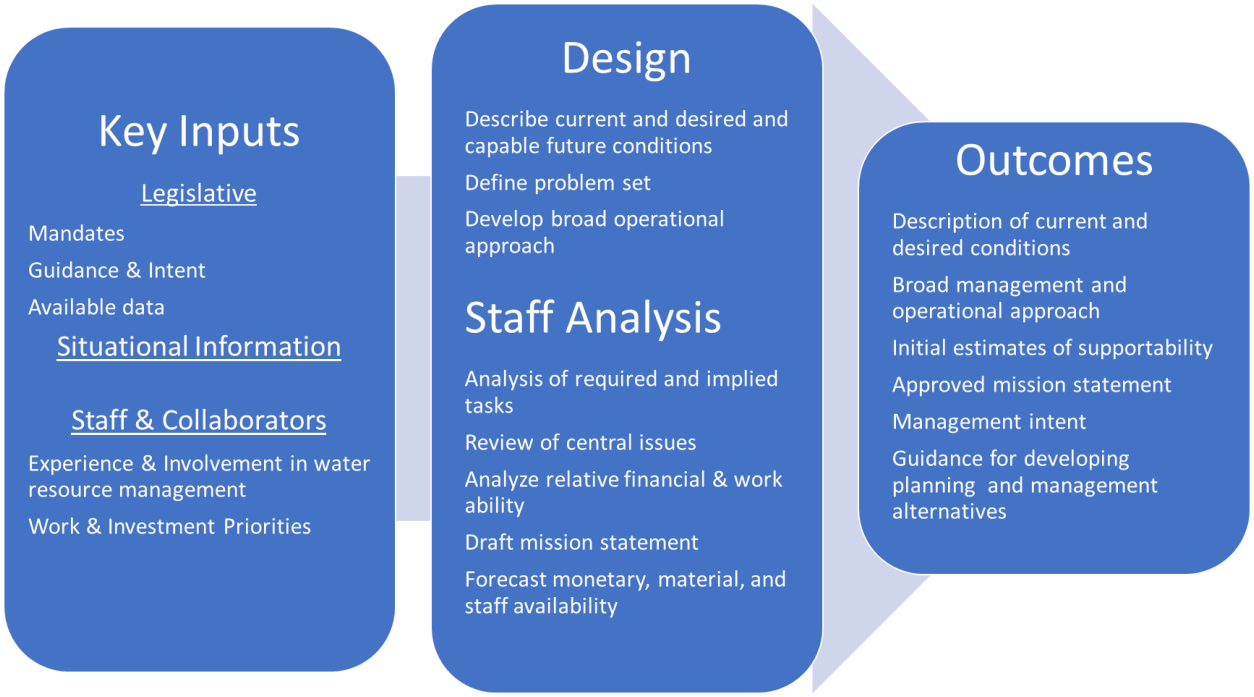
- An agile and adaptive regulatory approach that respects and defends property rights but aggressively restrains and/or mitigates those consequences that adversely affect resource function and/or the health, safety, or welfare of adjacent properties.
- Access to talented and capable staff expertise who are able to continually adapt, are persistent, technically current, creatively problem solve, practical, continually learn and adapt and are resilient.

We will know we have been successful when waters are no longer impaired, life and property are protected, land is used and developed in a manner that supports sustainment of the water resource and public costs reflect what is required to prevent, mitigate and sustain the healthy and safe water resource conditions.

Initial Planning Guidance

In May 2022, the District published its "Notice of Intent to Amend Plan (NOI)". The NOI noted the following planning process. This document addresses the second step: Mission and Problem Analysis.

Guidance



3
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.

Outcomes

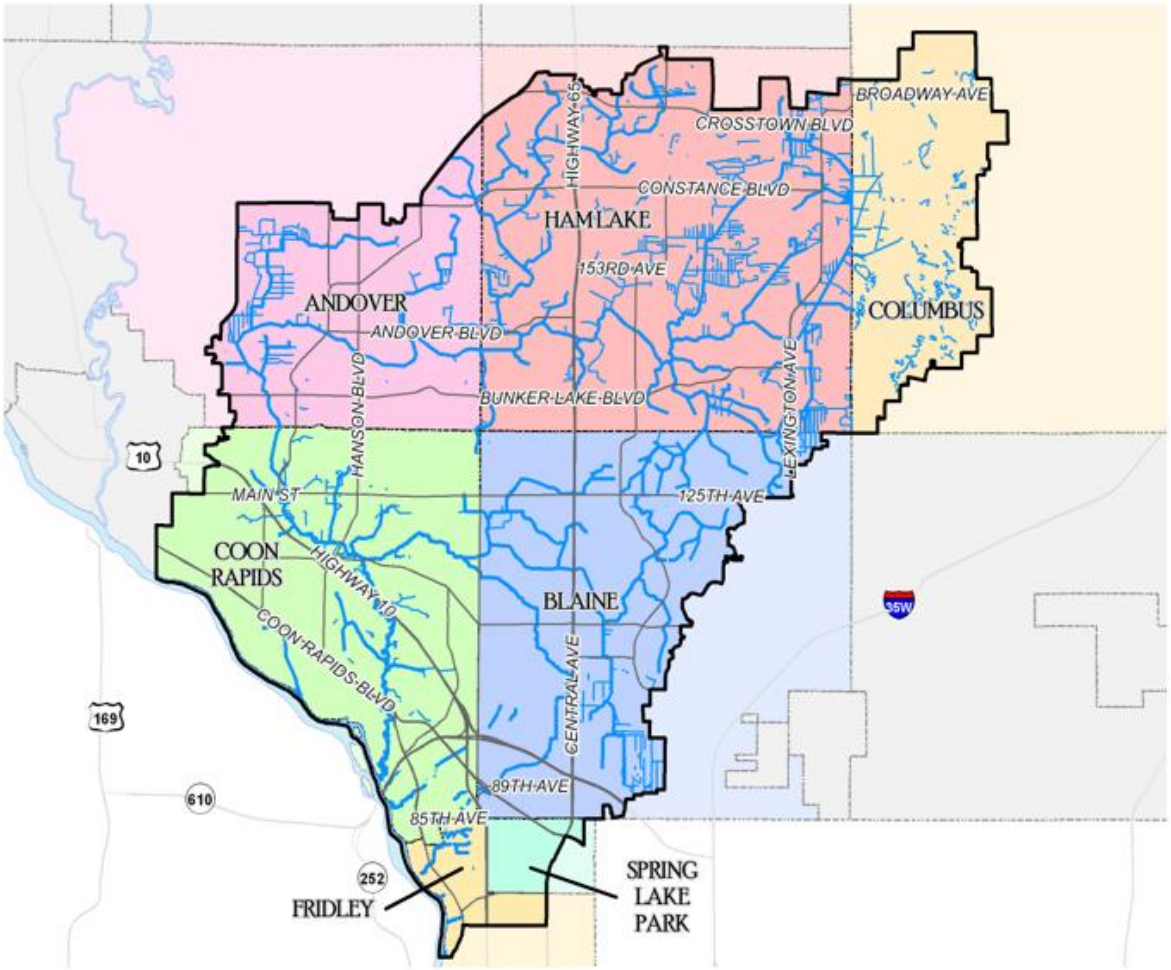
- Clarification of the geographic limits of District authority
- Identification for potential change, in District interests
- Significant physical, social, and man-made features, factors, and considerations

Page left intentionally blank.

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.



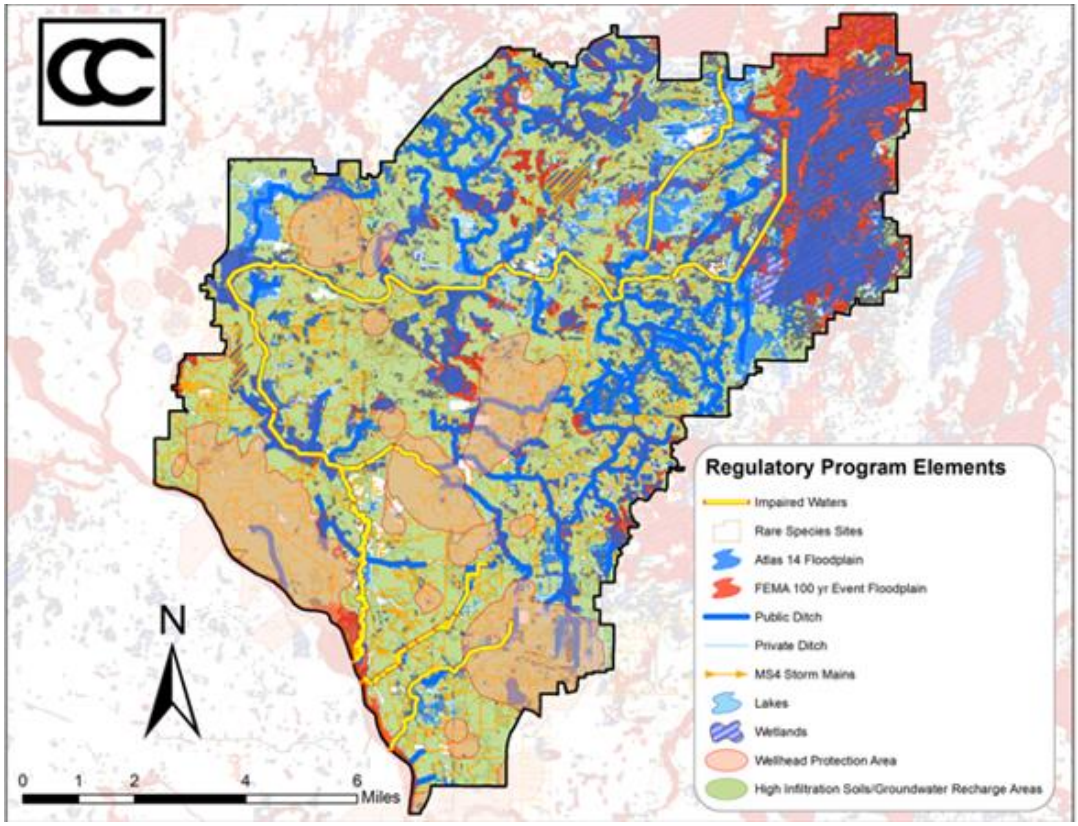
City	Sq Miles	Pct of District	% of City in CCWD
Andover	15	14%	43%
Blaine	22	21%	64%
Columbus	11	10%	23%
Coon Rapids	22	21%	100%
Fridley	2	2%	21%
Ham Lake	33	30%	90%
Spring Lake Park	2	2%	68%
Total	107	100%	

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

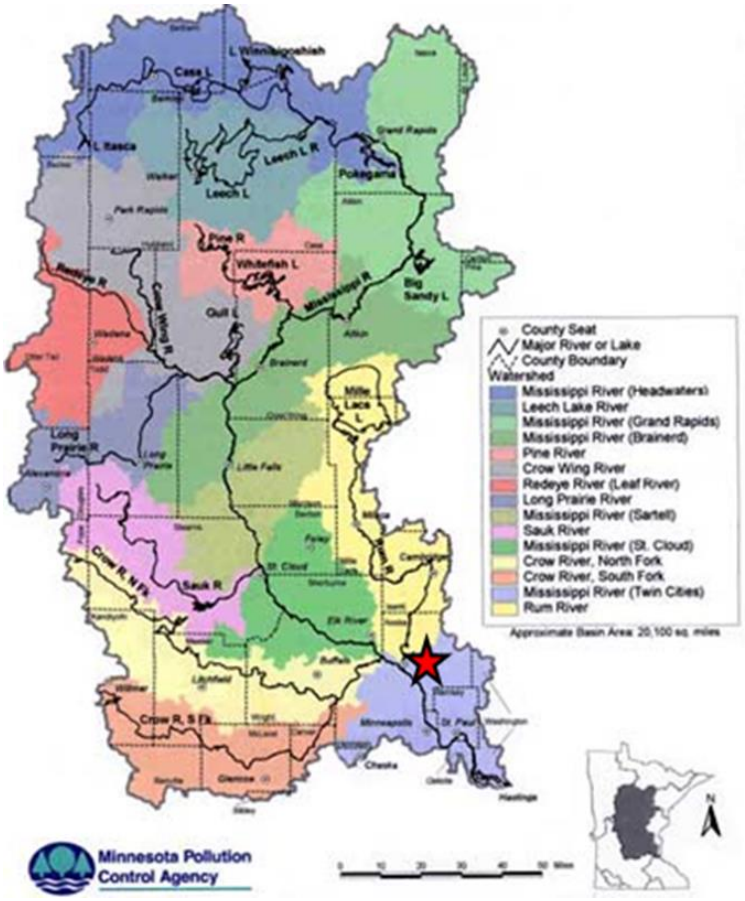
Summary

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

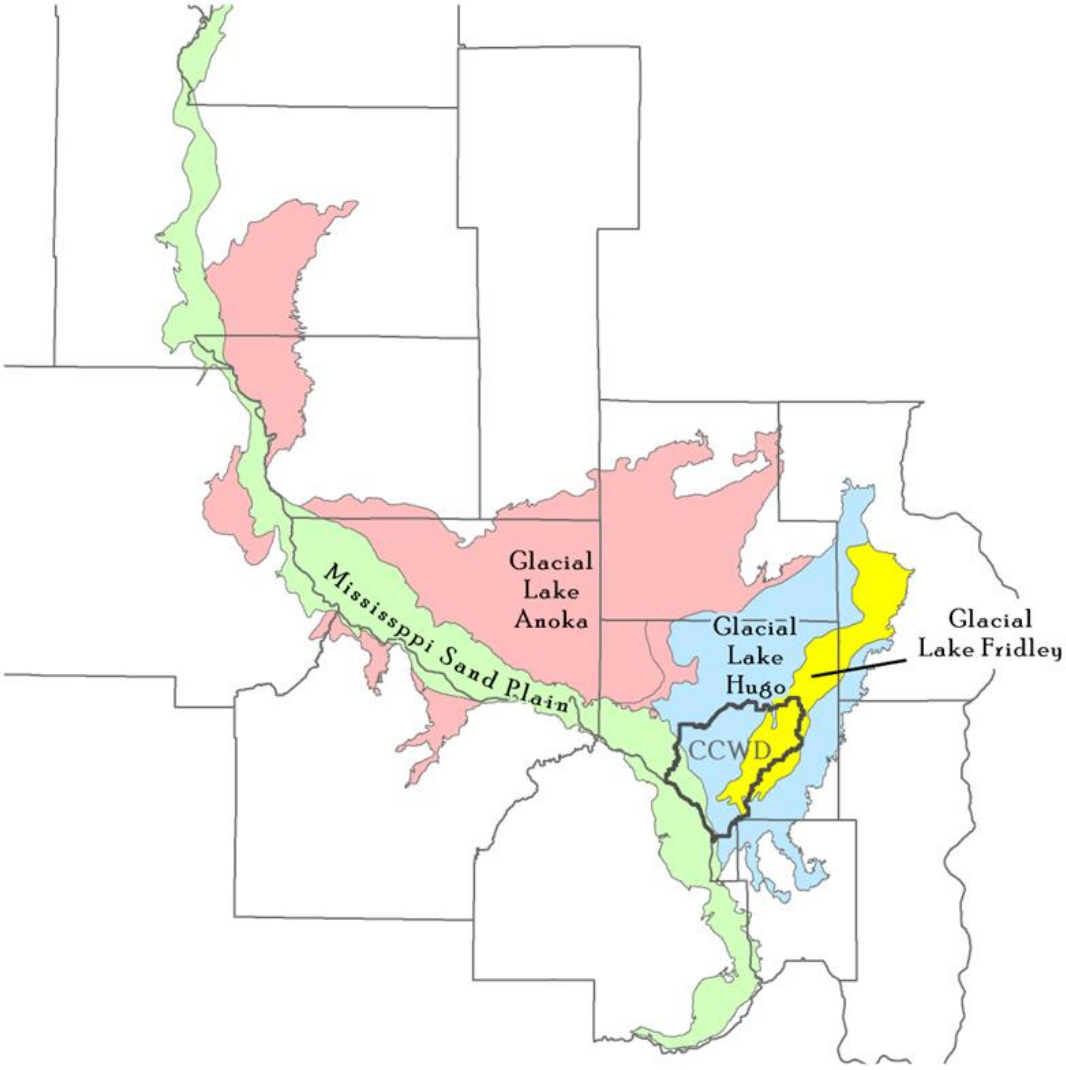
The Coon Creek watershed is part of the Twin Cities portion of the Upper Mississippi River Watershed (UMRW). The UMRW includes the headwaters of the Mississippi River, and its outlet is at its confluence with the Minnesota River. The Coon Creek Watershed outlets to the Mississippi River approximately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

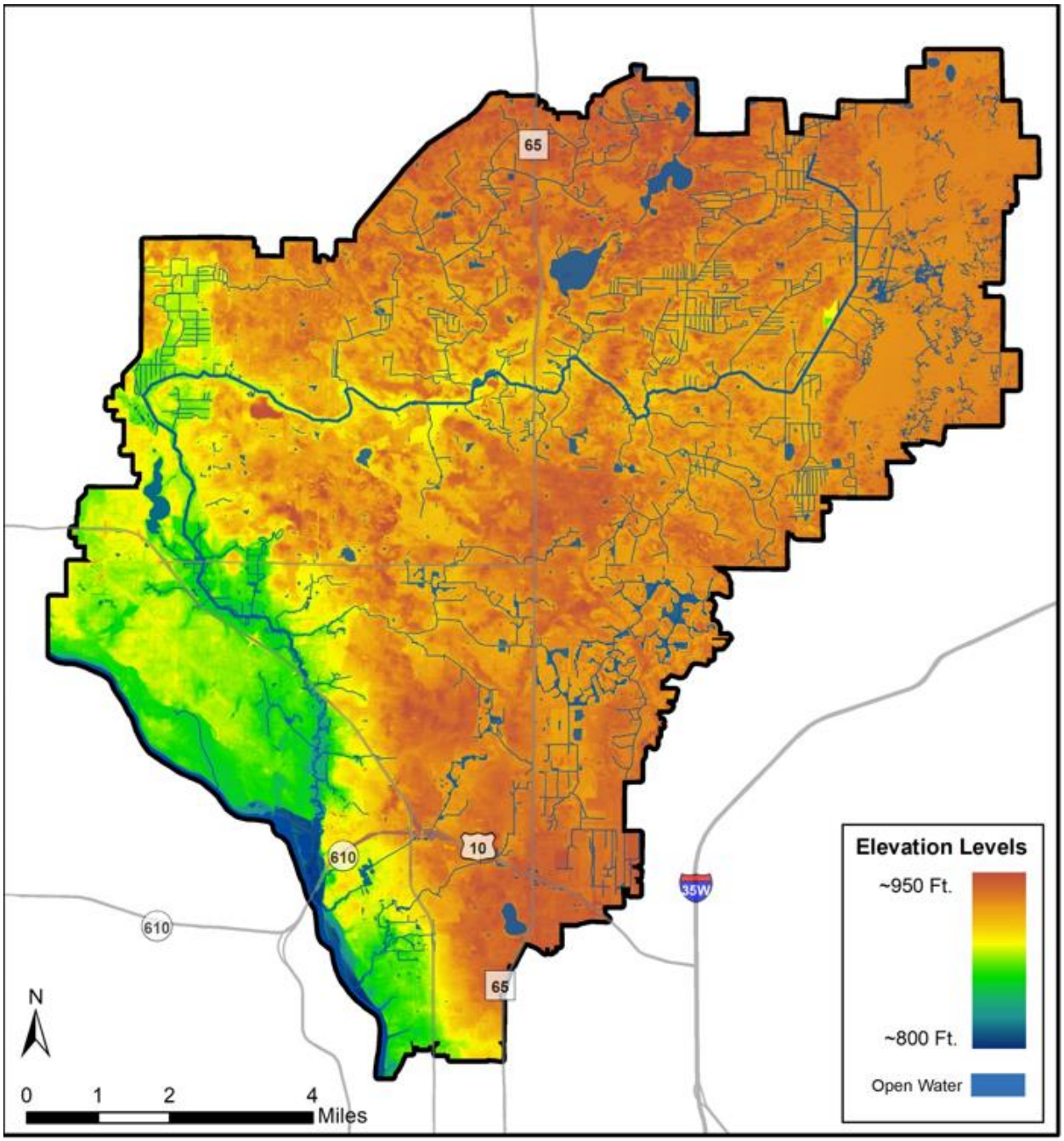
The soils are primarily fine sands with organic and loamy and hemic hydric soils in depressions. The regional water table is very shallow, usually less than 17 feet below the surface with much of it exposed in the form of wetlands, lakes, and streams.



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.

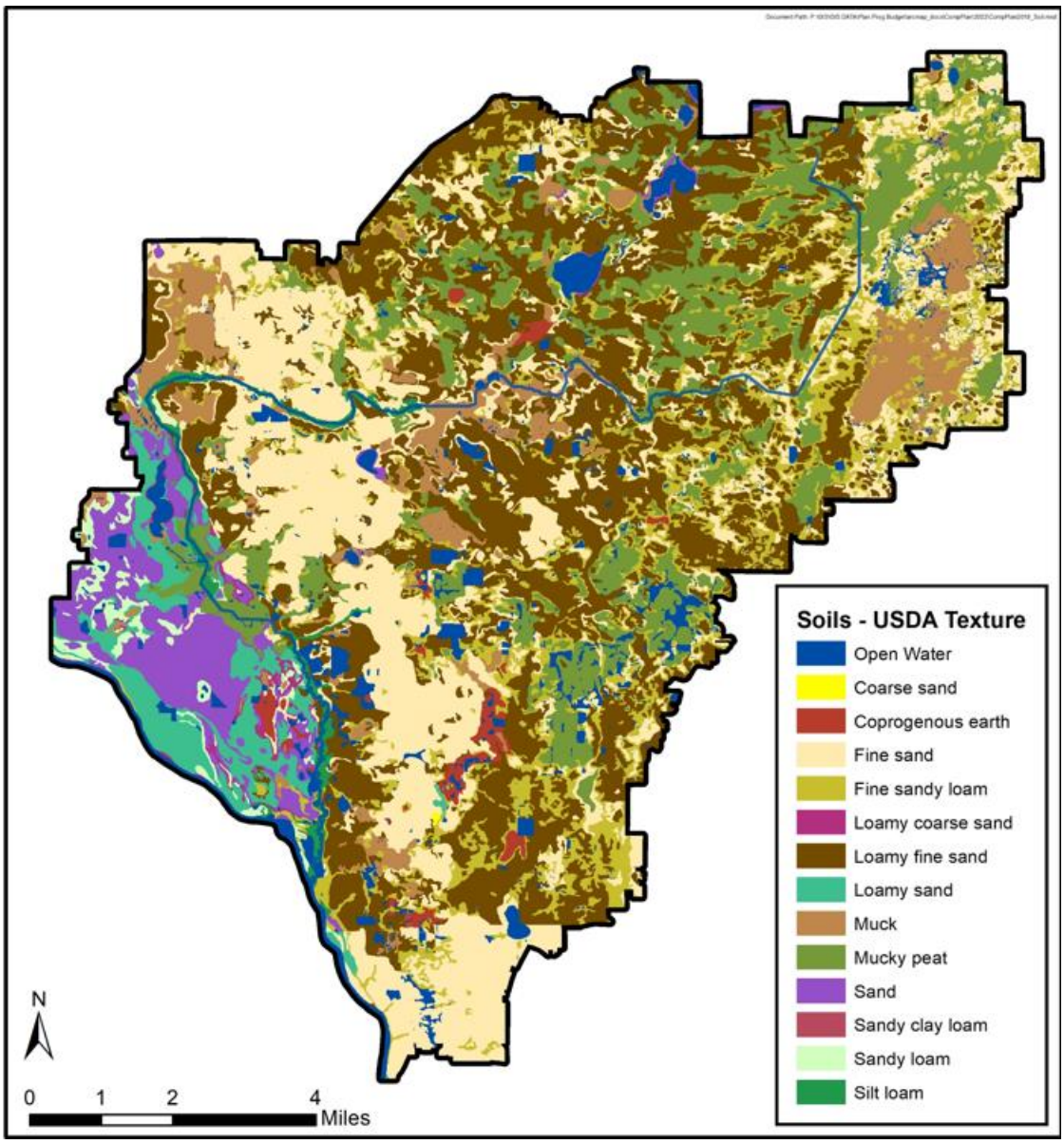
Lower elevations lie along the Mississippi River sand plain in the cities of Coon Rapids and Fridley. This area lays just below the Mississippi River bluffs and the lakes plain of glacial lake Hugo and Fridley where there is minimal topographic relief.



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 is 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

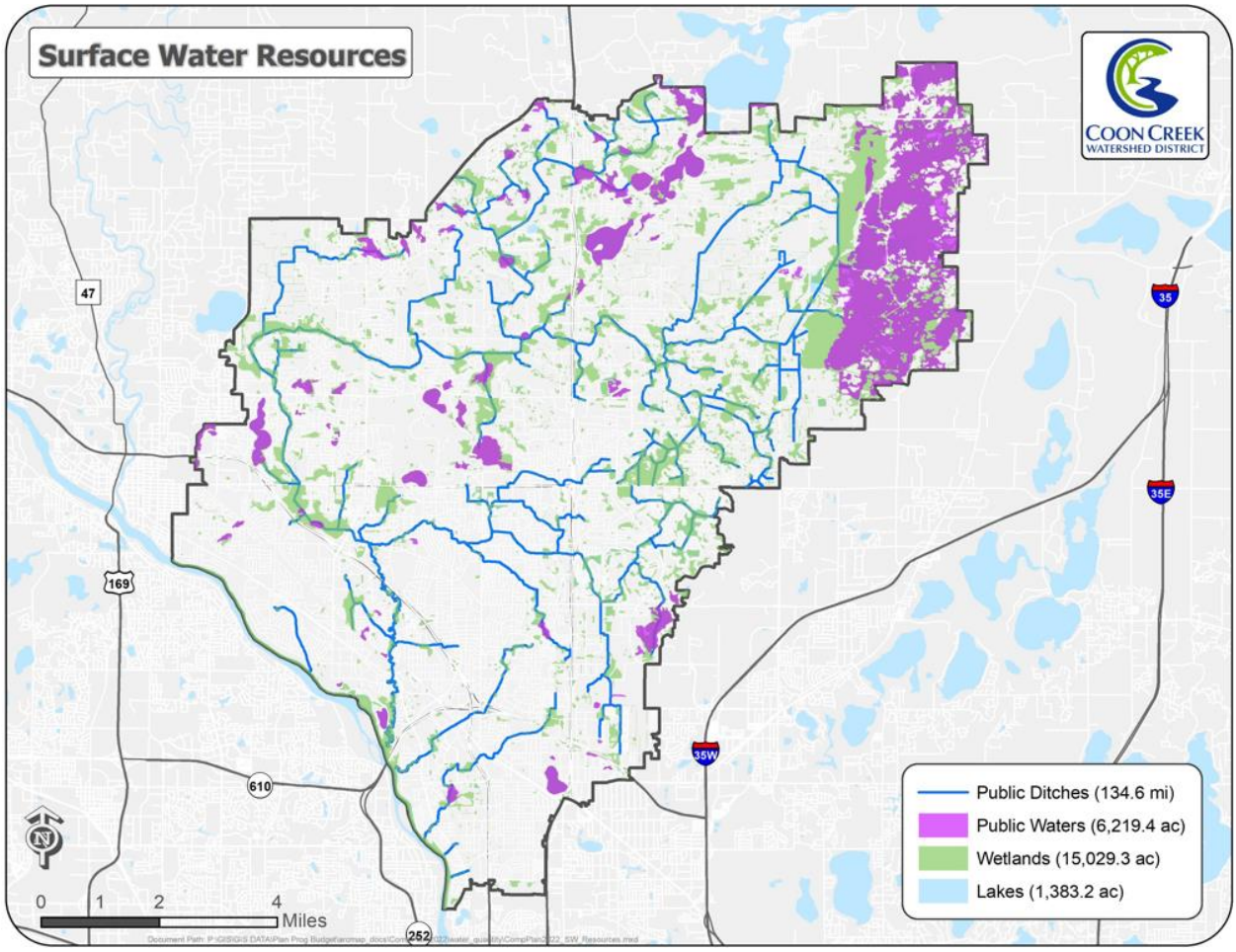
The watershed receives approximately 28 to 34 inches per year. About 70 percent of the annual precipitation (22 inches) falls between April and September. About six inches of precipitation occurs during the spring groundwater recharge period of April and May.

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
Annual	**30.60**	**28.26**	**34.11**

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.

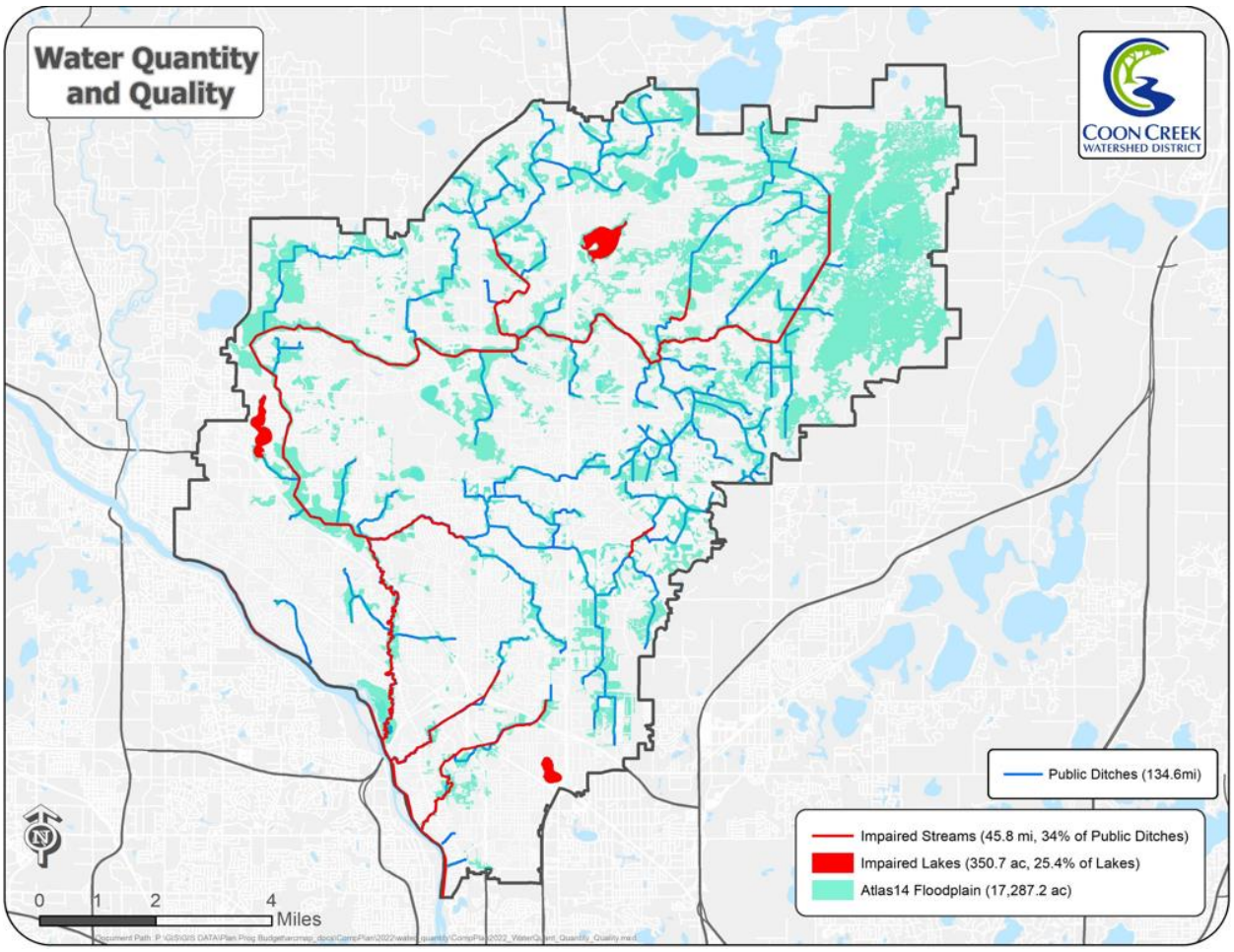
There are 10 natural and manmade lakes within the watershed. The natural lakes are shallow lakes usually associated with type 4 and 5 wetlands.



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.

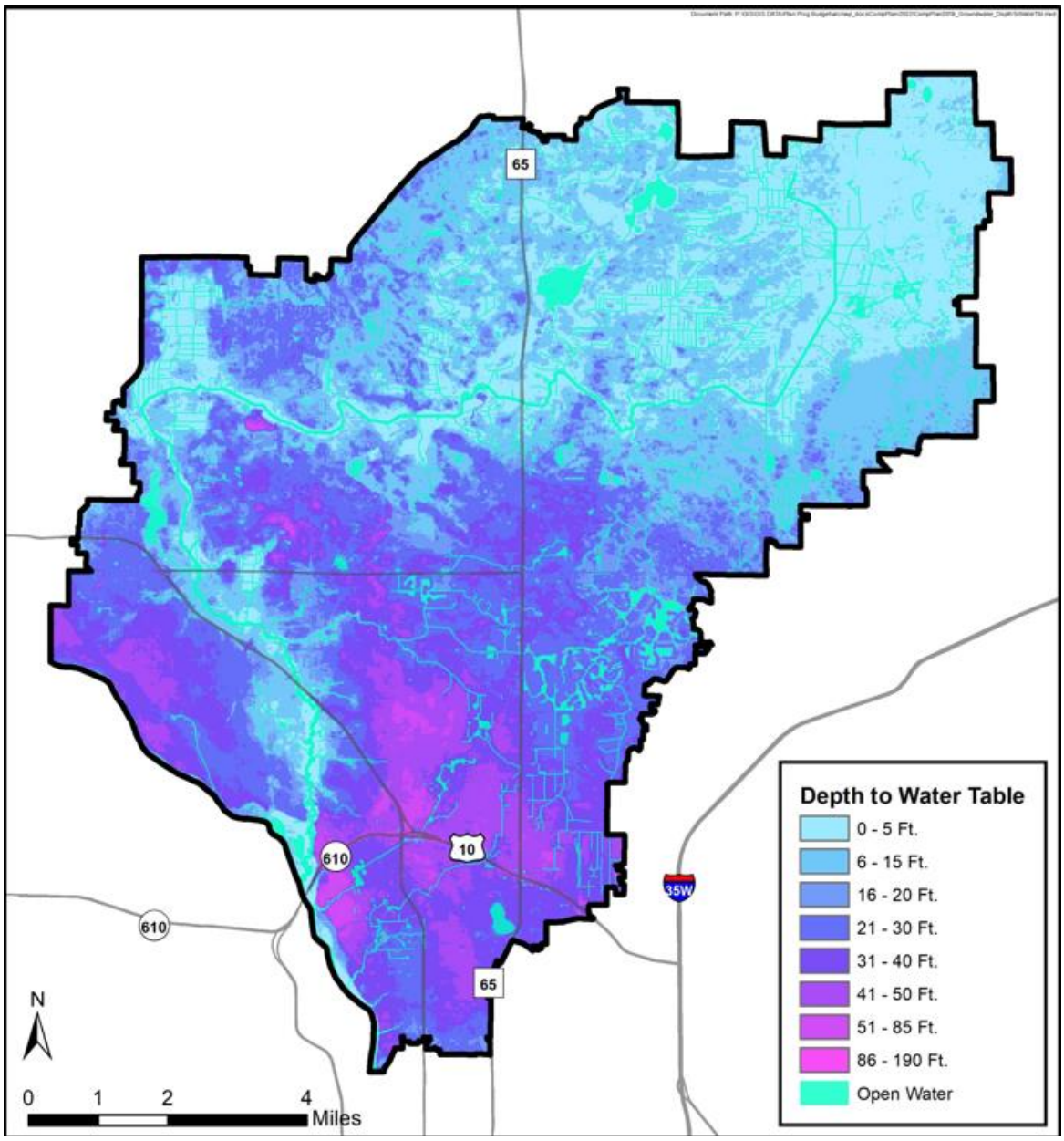
Water Quality: The District contains 11 impaired waters comprising approximately 46.1 miles of impaired stream and 1,383 acres of lake. Stream impairments are for aquatic life and recreation. Two of the lakes are impaired for aquatic consumption due to high mercury levels in fish tissue. The impairments 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 potion 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.



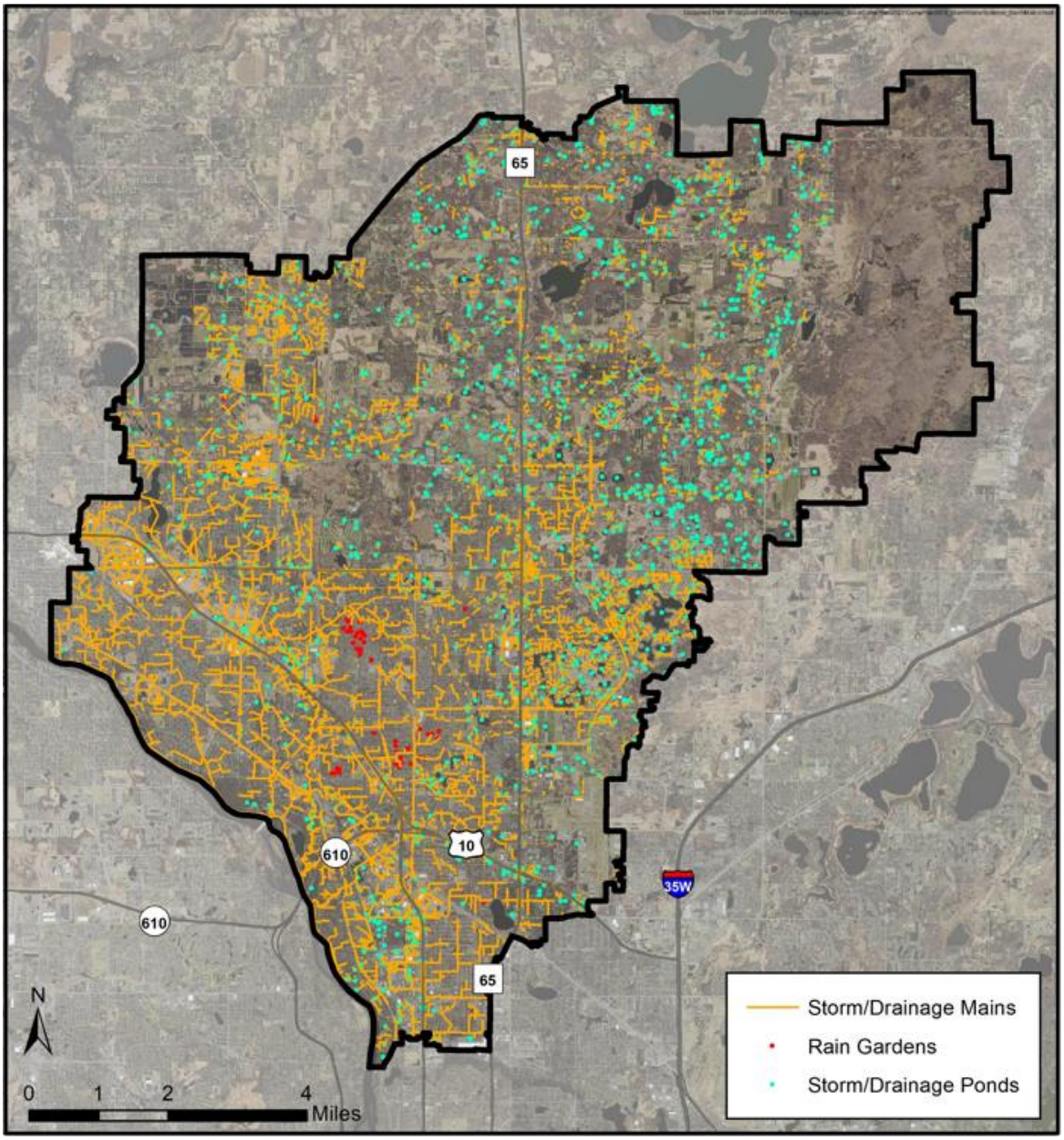
Storm Water Systems

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

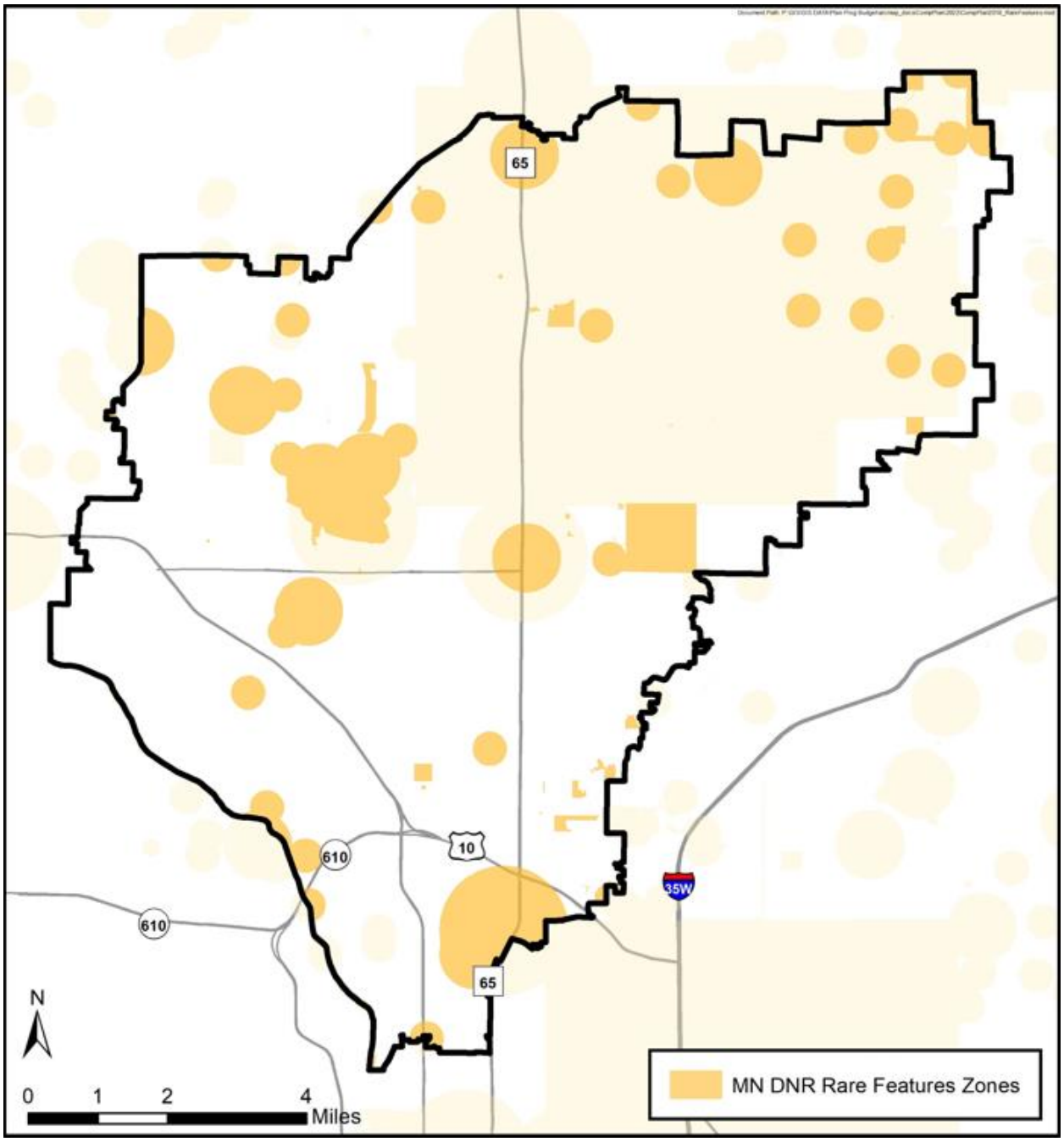
encourage infiltration to groundwater. 293 ponds are designed to detain water in order to delay or alter the timing and volume of flows in select areas.

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.



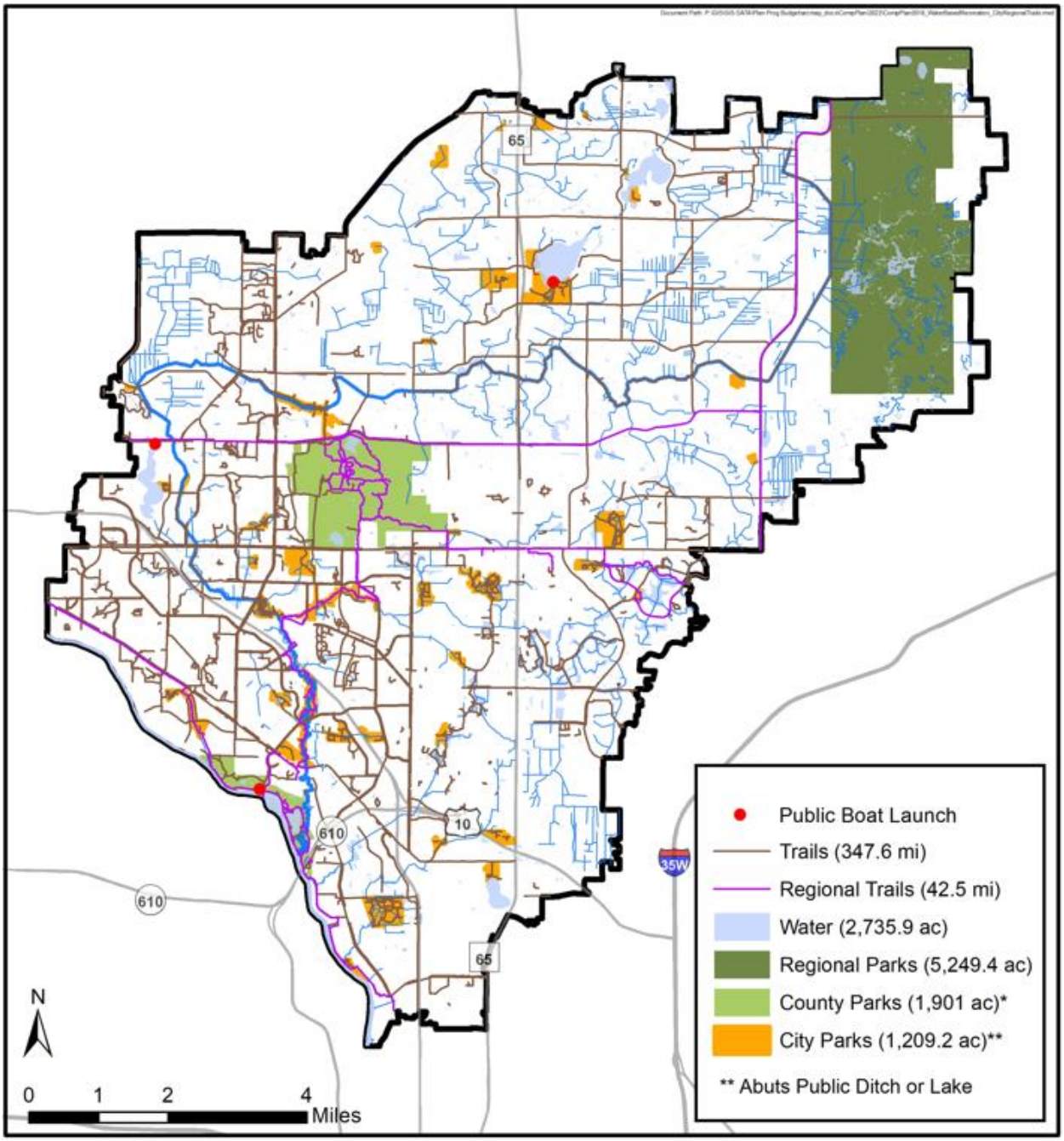
Fish and Wildlife Resources

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

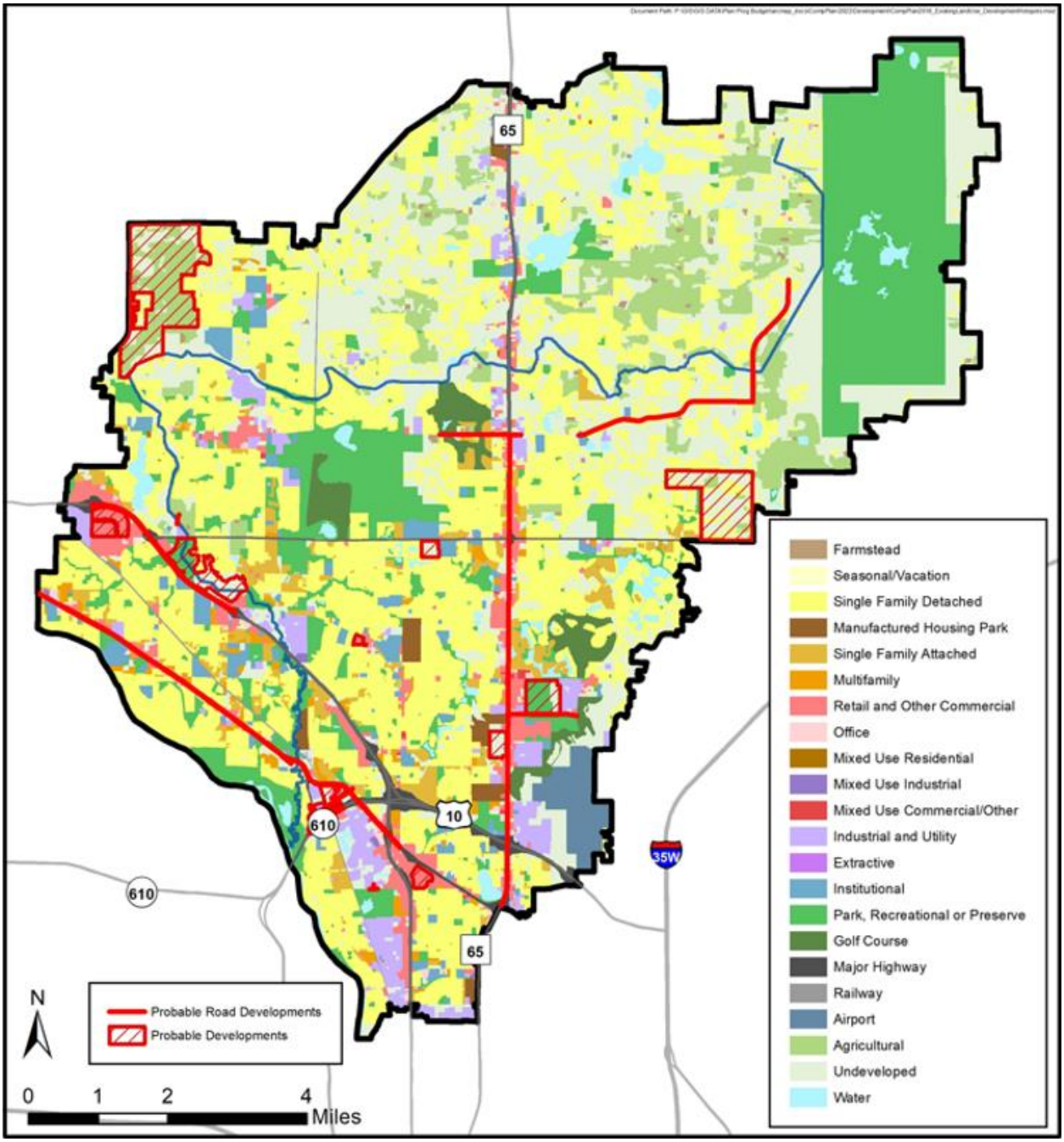
In addition to Carlos Avery State Wildlife Management Area, the watershed contains two regional parks (Bunker Hills and Coon Rapids Dam). There are approximately 50 city parks and two public boat ramps located on Ham Lake and on Crooked Lake. Fishing piers exist on Crooked Lake and on Lake Cenaiko in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

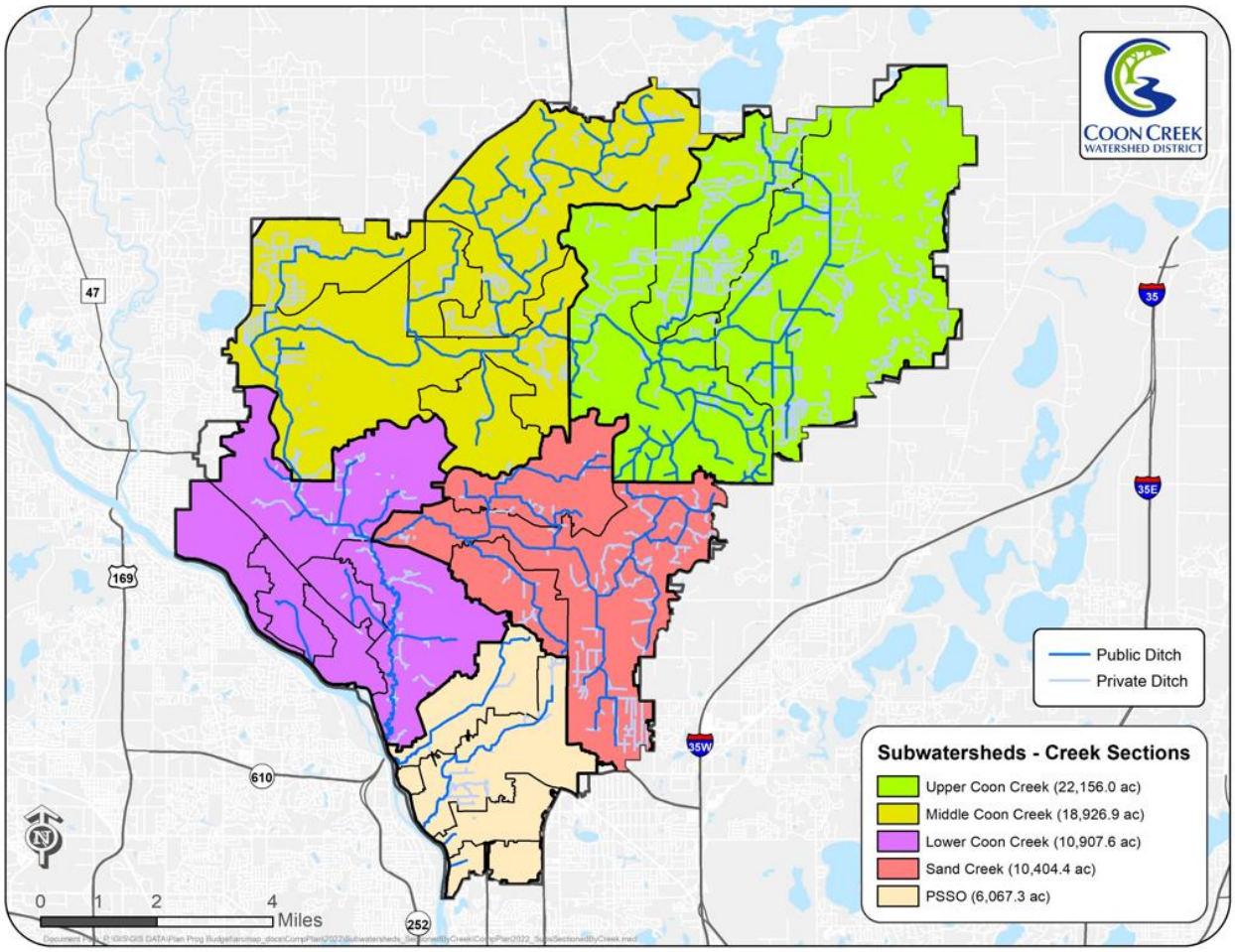
There are approximately 2,296.4 acres of highly visible land that will, in all probability, be developed or redeveloped within the next 10 years.



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


COON CREEK
WATERSHED DISTRICT
47
169
610
252
35
35E
35W
Public Ditch
Private Ditch
Subwatersheds - Creek Sections
Upper Coon Creek (22,156.0 ac)
Middle Coon Creek (18,926.9 ac)
Lower Coon Creek (10,907.6 ac)
Sand Creek (10,404.4 ac)
PSSO (6,067.3 ac)
0 1 2 4
Miles

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:

Asset Class	Asset Description	Subwatersheds	Quantity
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[1] (Blaine, Coon Rapids, Fridley, SLP)	124.6
		Total	26,854.7
	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[1] (Blaine, Coon Rapids, Fridley, SLP)	14
		Total	3,852
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[1] (Blaine, Coon Rapids, Fridley, SLP)	9.3
		Total	134.6
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[1] (Blaine, Coon Rapids, Fridley, SLP)	6.7
		Total	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[1] (Blaine, Coon Rapids, Fridley, SLP)	516.4
		Total	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[1] (Blaine, Coon Rapids, Fridley, SLP)	395.2
		Total	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[1] (Blaine, Coon Rapids, Fridley, SLP)	4.1
		Total	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[1] (Blaine, Coon Rapids, Fridley, SLP)	6.3
		Total	**261.9**
	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[1] (Blaine, Coon Rapids, Fridley, SLP)	87.6

Asset Class	Asset Type	Subwatersheds	Quantity
		Total	**537.1**
	Culverts – Concrete and Metal (Number)	Lower Coon Creek (Coon Rapids)	62
		Middle Coon Creek (Andover)	101
		Upper Coon Creek (Ham Lake)	142
		Sand Creek (Blaine/Coon Rapids)	112
		PSSO[1] (Blaine, Coon Rapids, Fridley, SLP)	57
		Total	**474**
	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[1] (Blaine, Coon Rapids, Fridley, SLP)	11
		Total	**34**
Ponding	Detention Ponds (Number)	Lower Coon Creek (Coon Rapids)	1
		Middle Coon Creek (Andover)	156
		Upper Coon Creek (Ham Lake)	0
		Sand Creek (Blaine/Coon Rapids)	7
		PSSO[1] (Blaine, Coon Rapids, Fridley, SLP)	2
		Total	**166**
	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[1] (Blaine, Coon Rapids, Fridley, SLP)	2
		Total	**123**
	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[1] (Blaine, Coon Rapids, Fridley, SLP)	41
		Total	**348**
	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[1] (Blaine, Coon Rapids, Fridley, SLP)	35
		Total	**268**
Structures	Bank Stabilizations (Number)	Lower Coon Creek (Coon Rapids)	59
		Middle Coon Creek (Andover)	13
		Upper Coon Creek (Ham Lake)	10
		Sand Creek (Blaine/Coon Rapids)	34
		PSSO[1] (Blaine, Coon Rapids, Fridley, SLP)	28
		Total	**144**
	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[1] (Blaine, Coon Rapids, Fridley, SLP)	2,728
		Total	**16,437**
	Dams and Ditch Plugs (Number)	Lower Coon Creek (Coon Rapids)	5
		Middle Coon Creek (Andover)	3
		Upper Coon Creek (Ham Lake)	10
		Sand Creek (Blaine/Coon Rapids)	2
		PSSO[1] (Blaine, Coon Rapids, Fridley, SLP)	5
		Total	**25**
	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[1] (Blaine, Coon Rapids, Fridley, SLP)	32
		Total	**120**
	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[1] (Blaine, Coon Rapids, Fridley, SLP)	32

Asset Class	Asset Type	Subwatersheds	Quantity
		Total	**120**
	Pumps (Number)	Lower Coon Creek (Coon Rapids)	2
		Middle Coon Creek (Andover)	1
		Upper Coon Creek (Ham Lake)	3
		Sand Creek (Blaine/Coon Rapids)	1
		PSSO[1] (Blaine, Coon Rapids, Fridley, SLP)	0
		Total	**7**
	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[1] (Blaine, Coon Rapids, Fridley, SLP)	11
		Total	**128**

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	Asset Class	Asset Type
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

4
Watershed and Asset Condition

Goal

To assist in making planning, capital investment and operations and maintenance decisions the District will:

1. Determine the relative state of the physical and biological characteristics and processes of the watershed that affect the hydrologic and soil functions supporting aquatic ecosystems.

2. Assess the physical condition of critical Natural assets.

Outcomes

- Accurate and reliable benchmarks for high functioning watersheds.
- To classify watershed condition.
- To proactively implement integrated restoration tracking and monitoring outcome-based program accomplishments.
- To improve the way the District approaches watershed restoration.

- To target the implementation of integrated suites of restoration activities in priority sub-watersheds.
- To foster integrated ecosystem-based watershed assessments.
- To target projects and activities in priority watersheds.
- To improve reporting and monitoring of program accomplishments.

What is its Condition?

A condition assessment is a technical review of an assets condition. In general, the assessment uses an organized method to assist in decision-making regarding maintenance, restoration or rehabilitation through capital renewal and Operations and Maintenance (O&M) programs. Condition assessments provide the most up-to-date and accurate look at an asset's current status.

The District and cities have implemented numerous condition assessment programs for various hard asset classes, notably conveyance systems such as ditches and pipes, outfalls, and pump stations. The condition assessment methodologies range from field inspections (e.g. survey and measured variable to closed circuit television inspections) to conducting workshops with key members of the O&M staff. Workshops use the process of iterative, independent questioning of a panel of experts to assess the timing, probability, significance and implications of factors, trends and events in the relation to the problem being considered.

A condition assessment is time- and resource-intensive process. As such, it is expensive. A significant financial investment in time and material is required to conduct condition assessments. However, in some cases, it may not be necessary.

In watershed management there is a trend towards watershed health. Those assessments, in a multiple use setting must be integrated and consider: Landscape Condition, Habitat Condition, Hydrology, Geomorphology, Water Quality, Biological Condition, and Vulnerability.

Multimetric indices or other methods are used to integrate multiple indicators representing different healthy watersheds attributes. Integrated watershed assessments can range from screening-level assessments using GIS data layers to statistical and geospatial modeling of ecological attributes.

In 2013, the District recognized that a growing trend in state agency policy and preference was watershed restoration and landscape health. We also recognized that effective management and restoration would require strategically focused investments of money, material and know-how.

Purpose

The purpose of condition assessment is to determine the relative state of the physical and biological characteristics and processes within the Coon Creek and associated watersheds of the District that affect the hydrologic and soil functions supporting aquatic ecosystems. Watershed condition reflects the variability from natural pristine to degraded (severely altered or impaired).

Methodology

The District conducted and continues to conduct reviews of integrated assessments. In all, the District has review over 20 technical documents that present the results of comparative measurement of a series of watershed health and vulnerability indices across large areas or watersheds. Several are statewide-scale efforts undertaken in partnership with state agencies and non-governmental organizations; others are targeted studies of specific ecological regions or river basins. Statewide assessments have included California, Minnesota, Wisconsin, Alabama and Tennessee. Targeted assessments have included the Taunton River Basin, the Clinch River Basin, the Mobile Bay Watershed, and the Montana Prairie Potholes Region.

In 2014 the District adopted and has continued to refine the Forest Service Watershed Condition Classification System (WCCS) because of its ability to:

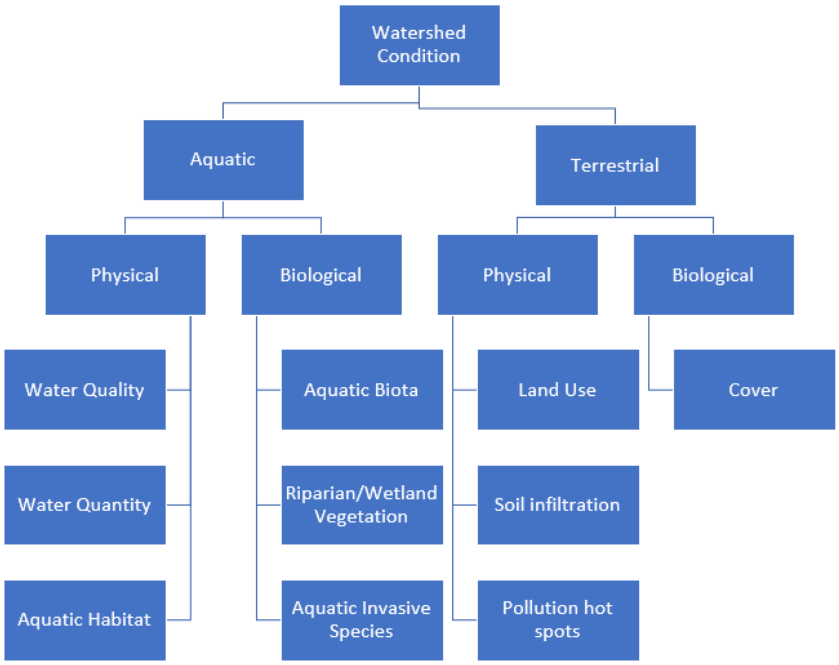
- Be developed and updated in the same time frame as annual planning, programming, budgeting, and execution.
- Handle the complexity of urban and urbanizing natural resource management.
- Be scaled and applied at both the site level, catchment, minor subwatershed, and watershed levels.
- Be accomplished within existing budgets and staffing.
- Aggregate the results of existing District and municipal monitoring and inspections efforts.

Watershed Condition Model

The basic model used in this classification system provides a watershed-wide, reconnaissance-level evaluation of watershed condition. It offers a systematic, adaptable means for classifying and comparing watersheds based on a core set of watershed indicators. These indicators are grouped into four process categories:

1. Aquatic Physical Processes
2. Aquatic Biological Processes
3. Terrestrial Physical Processes
4. Terrestrial Biological Processes

These categories represent terrestrial, riparian and aquatic ecosystem processes and mechanisms by which management actions can affect the condition of watersheds and associated resources. The WCCS relies on professional judgement exercised by a watershed interdisciplinary team, GIS data and local state and federal databases and written rule sets and criteria for indicators that describe proper function, function-at-risk, and impaired conditions.



2022 Assessment

This assessment is the fourth integrated assessment performed for and by the District. District staff continued to apply and refine the model and assessed the condition of the watershed in 2018 and again in 2022-23. During the winter of 2022-23 the District formed a Watershed Assessment Team comprised of District Program Coordinators and select staff, District Engineer and GIS staff to conduct a fact and data driven assessment of the watershed using the following basic construct.

Between December 2021 and March 2022, the Watershed Assessment Team met 14 times (at least once on each factor) to review and discuss data, studies, expert perspectives from outside the agency and review, refine and decide on criteria that validly and reliably expressed the current condition of the factor and could be mapped. The team relied on consensus to remain focused and true to the science and the knowns of watershed processes in Coon Creek.

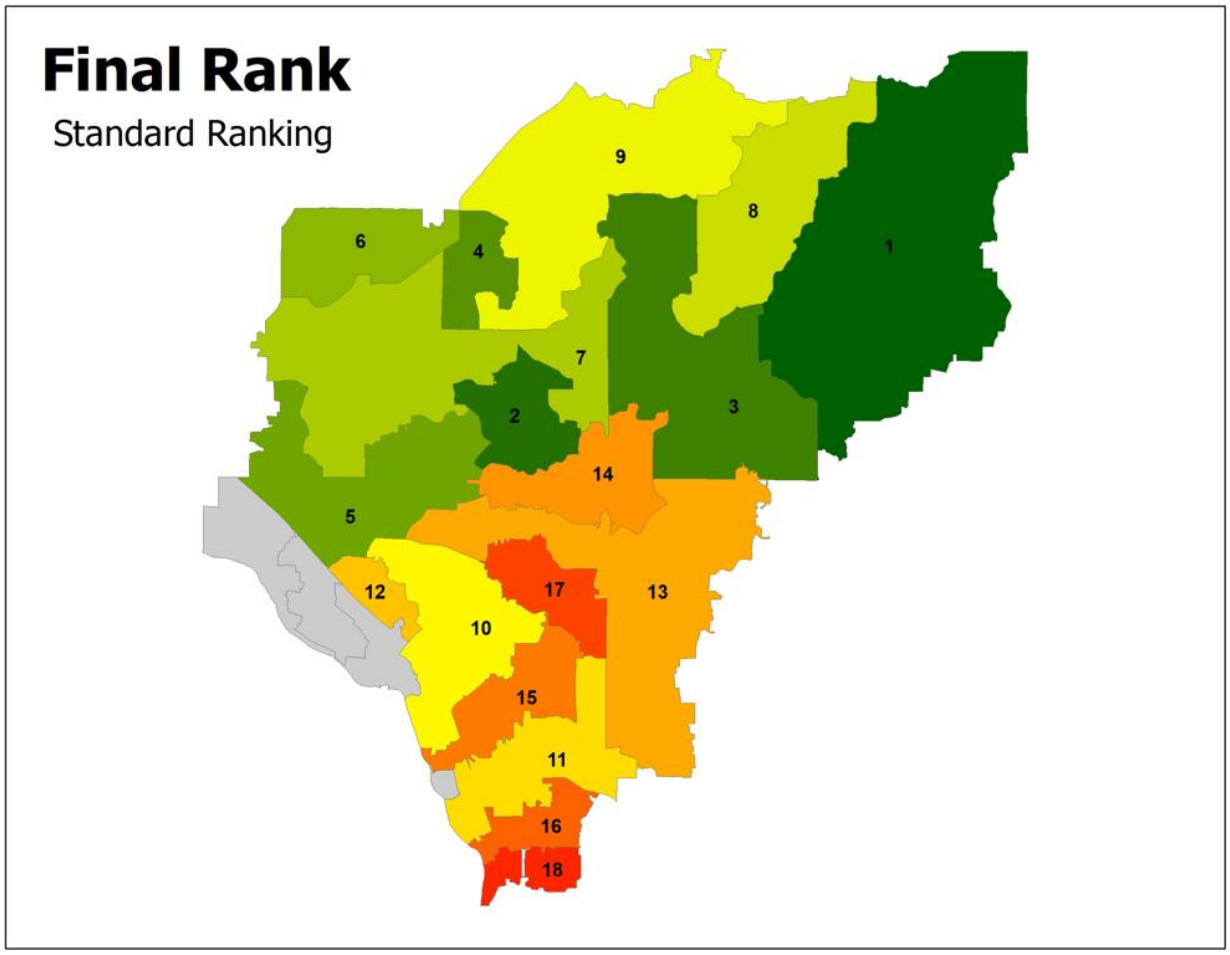
The goals of the integrated assessment were:

1. To assess relative watershed condition as influenced by integrated land use practices.
2. To assess the changes in watershed capability to produce resource outputs that result from changes in watershed condition.
3. To use a consistent and scientific approach to land management and to assess, protect, and restore watershed condition.

Findings

The District staff found that:

1. The approach was extremely useful and the benchmarks for high functioning watersheds accurate and dependable.
2. Some of the initial criteria offered by the US Forest Service (USFS) were not useful or helpful in dealing with the particulars of urban or urbanizing watersheds.
3. In general, ecological condition was fair to good in headwater subwatersheds and fair to poor in the southern, urbanized portion of the District.



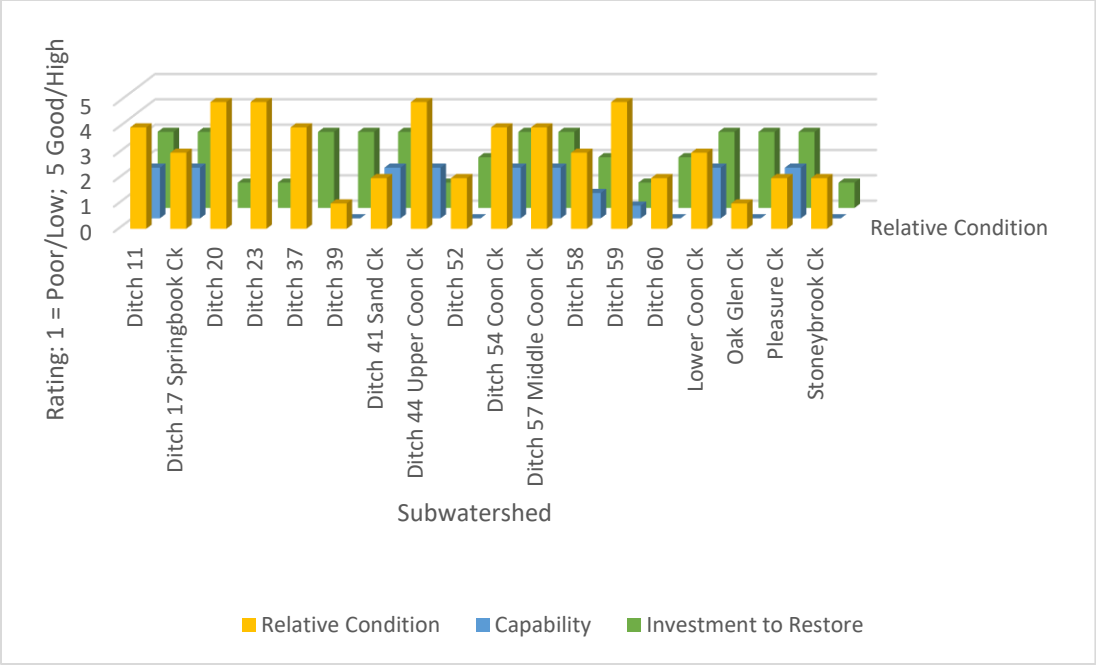
Condition of Natural Assets

1. **<u>Orange to Red subwatersheds</u>**
   - Largely exhibit low geomorphic, hydrologic, and biotic integrity relative to neighboring subwatersheds and their natural potential condition.
   - A majority of the drainage network may remain unstable but less than 2022 and more so should the break in the drought be characterized the high intensity damaging storms.

- Physical, chemical, and biologic conditions will likely show limited and select signs of supporting beneficial uses over the subwatershed, however, it could exhibit significant improvement if stressors are effectively dealt with.
- Regular investment is made to repair and restore portions of the resource, usually to prevent further damage or prevent other problems.

2. **Yellow subwatersheds**
   - Exhibit moderate geomorphic, hydrologic, and biotic integrity relative to neighboring subwatershed and their natural potential condition. Although they remain at risk.
   - The drainage network in these areas will likely exhibit unstable characteristics resulting from intensive land use and land disturbance activities such as urban development or agricultural drainage modifications.
   - Physical, chemical, and biologic conditions do not support or are at risk of not being able to support beneficial uses. Restoration potential is high.
   - Semi-regular investments of money, material and/or expertise will be required to maintain or improve these conditions and address pending and probable impairments.

3. **Green subwatersheds**
   - Exhibit high geomorphic, hydrologic, and biotic integrity relative to neighboring subwatershed and their natural potential condition.
   - The drainage network in these areas will likely exhibit stable characteristics.
   - Physical, chemical, and biologic conditions are generally supportive of beneficial uses although some impairments exist in some reaches. Natural wetland and soil conditions also preclude attainment of select standards.
   - Periodic investments of money, material and/or expertise will be required to maintain or protect these conditions.


Rating: 1 = Poor/Low; 5 Good/High
5
4
3
2
1
0
Ditch 11
Ditch 17 Springbook Ck
Ditch 20
Ditch 23
Ditch 37
Ditch 39
Ditch 41 Sand Ck
Ditch 44 Upper Coon Ck
Ditch 52
Ditch 54 Coon Ck
Ditch 57 Middle Coon Ck
Ditch 58
Ditch 59
Ditch 60
Lower Coon Ck
Oak Glen Ck
Pleasure Ck
Stoneybrook Ck
Relative Condition
Subwatershed
Relative Condition
Capability
Investment to Restore

This page left intentionally blank.

5
Effects of the Operating Environment on Watershed Management

Purpose

To evaluate how significant characteristics of the operating environment effect water management activities to determine the nature, capability and tendencies of the problems, issues, and concerns.

Outcomes

- Map and table of problems, issues, and concerns
- Map of sensitive lands and critical resources
- Description of the effects of the landscape on both problems, issues and concerns and management activities
- Operational hydrology chart
- Precipitation frequency and return
- Hydrologic effects chart
- Civil considerations table

Description of How the Problems, Issues and Concerns That Can Effect the Public Health, Safety and Welfare

The problems issues and concerns (PICs) listed below have their origin in the required and implied tasks of the governing statutes and the comments received from review agencies and the public.

PICs[1]	Definition	Occurrence	Location	Effect
Aquatic Invasive Species	An organism that has spread or been introduced beyond its native range and is either causing harm or has the potential to cause harm.	There are various pathways of invasion. Sometimes species are deliberately introduced, but more often they are unintentionally introduced. They can become inadvertent hitchhikers on or in boats, ballast water, packing materials, soil or gear.	Lakes, wetlands, and streams	Can cause costly economic and ecological damage including crop loss, clogging of water facilities and waterways, wildlife and human disease transmission, threats to fisheries, increased fire vulnerability, and adverse effects for property owners.
Flooding	The covering or submerging of normally dry land with a large amount of water	Can occur from heavy rains, rapid snow melt, rises in groundwater, or failure of infrastructure causing an obstruction to flow or rapid release of water.	Along streams From high groundwater levels	Floods can cause power, water, and gas outages; disrupt transportation routes and commercial supplies; pollute drinking water systems; damage homes, buildings, and roads; and cause severe environmental problems including landslides and mudslides and damage or loss of habitat.
Groundwater recharge	The movement of water from the surface of the land through the root zone to groundwater.	Occurs as precipitation falls on the land surface, infiltrates into soils, and moves through pore spaces through the root zone to the water table. It can also occur as leakage or loss from rivers, streams, lakes, and wetlands.	Occurs in areas on the landscape that allow a high volume of water to penetrate the surface.	Recharge can help replenish water quantity preventing impacts such as dry wells, land subsidence or the drying of surface waters. Recharge can harm water quality through the

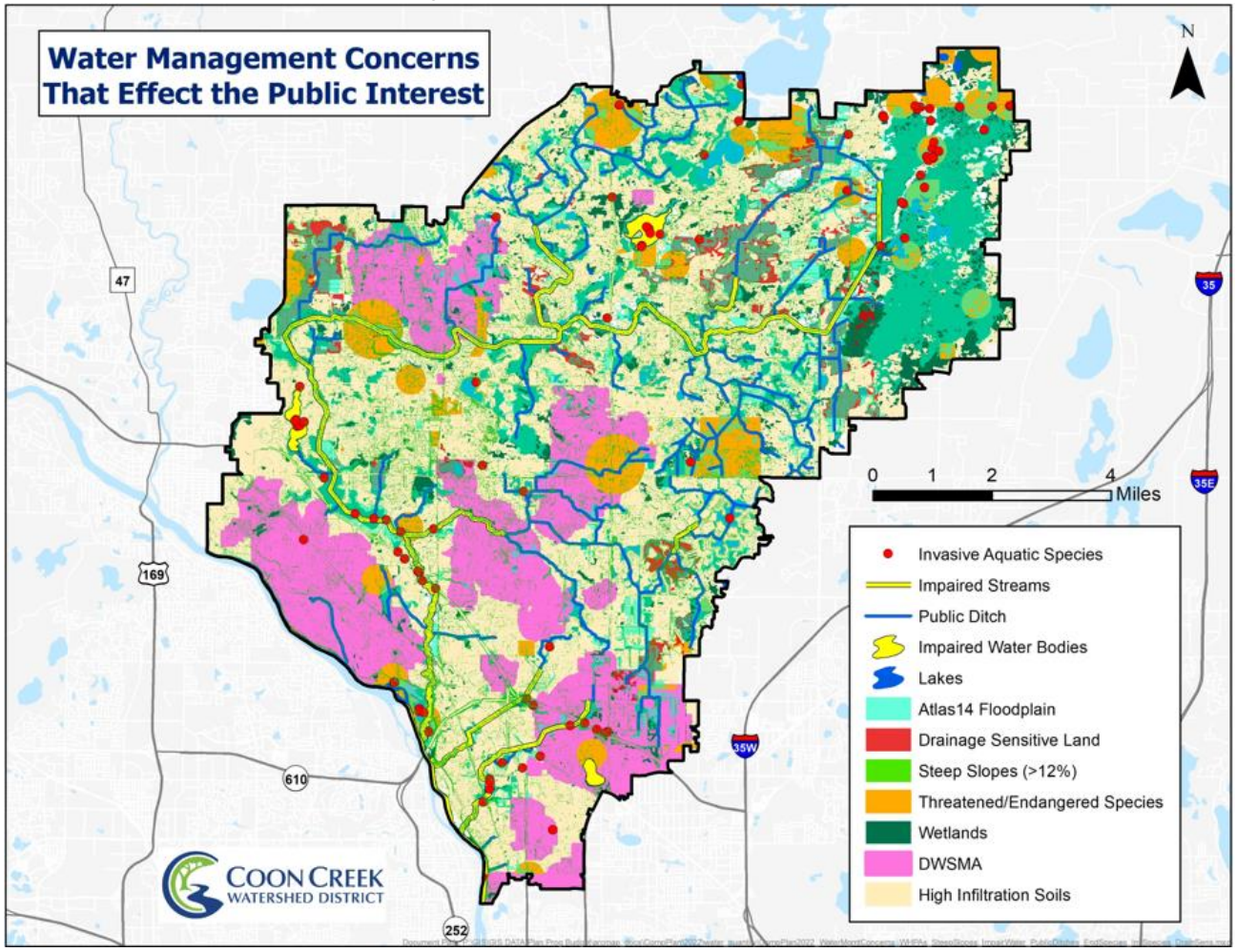
PICs[1]	Definition	Occurrence	Location	Effect
				introduction of pollutants to drinking water and surface water resources.
High Infiltration soils	Soils that have high porosity and permeability. Porosity is how much water the soil can hold. Permeability is how fast water can flow into ground.	Areas characterized by fine to coarse sands and gravels where infiltration occurs at greater than 6 inches per hour	Areas characterized by fine to coarse sands and gravels where infiltration occurs at greater than 6 inches per hour	A high infiltration rate is generally desirable for plant growth and the environment. In some cases, soils that have unrestricted water movement through their profile can contribute to environmental concerns if misapplied nutrients and chemicals reach groundwater and surface water resources via subsurface flow.
Mass Wasting	The movement of rock and soil down slope under the influence of gravity There are three main types in the District slumps, slides, and earthflow.	Are event based and typically lubricated by rainfall or agitated by seismic activity (including vibrations from trains or other regular traffic), these events may occur very rapidly and move as a flow.	Along the Mississippi River bluff. Can occur along large creek banks and cuts.	Leads to Property damage and loss of life. Formation of scars which may leave the land exposed to agents of erosion. Soil erosion leaving the land bare and infertile. Formation of new landforms.
Public drainage	A system of ditch or tile, or both, to drain property, including laterals, improvements, and improvements of outlets. The system was established and constructed by a drainage authority. Public drainage system includes the improvement of	They occur in areas of poorly drained soil and/or high groundwater that could be profitably farmed with sufficient removal of water.	Found throughout the upper 80% “flat” portion of the watershed. Usually involves the efficient and effective connection of organic soils.	Drainage helps by increasing crop yields on poorly drained soils by providing a better environment for plants to grow, especially in wet years. Drainage harms by lowering the water table and altering the volume and timing of flows and hence

PICs[1]	Definition	Occurrence	Location	Effect
	natural waterways and any part of a flood control plan.			contributing to flooding.
Soil Erosion	The denudation or wearing away of the upper layer of soil. It is a form of soil degradation.	This natural process is caused by the dynamic activity of factors such as wind and water. Generally, the vulnerability to erosion is determined by: - rainfall and runoff amount - soil texture - soil erodibility - slope length and steepness - vegetative cover - best practices	Steep slopes, Creek and Ditch Banks Construction sites	Reduced ability of the soil to store water and nutrients. Exposure of subsoil, which often has poor physical and chemical properties. Higher rates of runoff, shedding water and nutrients otherwise used for crop growth. Loss of newly planted vegetation. Deposits of silt in low-lying areas. Contribution of suspended solids to surface waters Property damage.
Unique habitats	The specific, unique area and requirements that support plants, animals, and any other biological forms of life. Typically applied to endangered, threatened of rare species or plant communities.	These habitats can occur anywhere but most often appear in areas that are lightly or not actively used and infrequently visited. They often contain or express unique or rare biogeochemical conditions or processes vital to the sustainment of the species or community.	Many, but not all of these areas have been mapped by the DNR Natural Heritage program. Their exact location is not generally divulged.	When a habitat is destroyed, the carrying capacity for indigenous plants, animals, and other organisms is reduced so that populations decline, sometimes up to the level of extinction.
Water Quality	The physical, chemical, biological and organoleptic (taste-related) properties of water. Context: A classification of the	Water pollution is the contamination of water bodies, usually because of human activities. Effected water bodies include lakes, streams, and groundwater.	Water pollution and the impairment of its beneficial uses exists on the following water bodies:	Impairments within the District adversely affect. <u>Aquatic Life</u> Chlorides Macroinvertebrates Fish

PICs[1]	Definition	Occurrence	Location	Effect
	quality of watercourses or water bodies according to the uses	Water pollution results when contaminants are introduced into these water bodies. Within the District those have been identified as Altered Hydrology Chloride Dissolved oxygen E. coli Poor habitat Total Phosphorus Total Suspended Solids	• Coon Creek • Ditch 11 • Ditch 58 • Sand Creek • Ditch 41-4 • Pleasure Creek • Springbrook Creek • Mississippi River • Crooked Lake • Ham Lake • Laddie Lake	Total suspended solids Dissolved oxygen <u>Aquatic Recreation</u> E. coli Fecal coliform <u>Aquatic Consumption</u> Mercury in fish tissue PCBs in fish tissue <u>Surficial Groundwater</u> Arsenic Chloride Floride Manganese Nitrate
Water Quantity	The timing and total yield of water from a watershed and is measured by total yield and peak flow over a specified period.	Water occurs within the District in four forms. a liquid a solid, as in snow and ice, groundwater, In the atmosphere, as in clouds and invisible water vapor (Humidity).	Liquid form can be found in lakes, stream and wetlands and comprises an estimated 17,000 acres of the District. Groundwater occurs under the entire District. It is within five to ten feet of the land surface over approximately 75% of the watershed.	Too much water leads to flooding. Too little water leads to drought.
Wetlands	Are areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions.	Wetlands occur: In floodplains along rivers and streams In isolated depressions surrounded Along the margins of lakes and ponds, In low-lying areas where the groundwater intercepts the soil surface or where precipitation	Locating wetlands on the landscape involves identifying and documenting three parameters using the mandatory technical criteria for (1) Vegetation. (2) Soil. (3) Hydrology	Wetlands, and their ecological functions of Retaining or Detaining water Infiltrating or out letting groundwater Fostering habitat for a variety of plants and animals. Capture and/or uptake of pollutant is solution or suspension.

PICs[1]	Definition	Occurrence	Location	Effect
		sufficiently saturates the soil. On large gently sloped areas where groundwater is at or near the surface of the land.		Provide a variety of benefits such as food and habitat for fish and wildlife, water quality improvement; flood storage; shoreline erosion control; economically beneficial natural products for human use; and opportunities for recreation, education, and research

Problem/Issue/Concern Overlay



How the Landscape Effects Problems, Issues, Concerns and Water Management

Landscape effects on Water Management

Aspect	Effect
Drainage Area	Drainage area is the basic hydrologic unit considered in analyzing surface water runoff and hydrology. It defines and serves as the catchment for the volume of water received through precipitation. A drainage basin is the source for water and sediment that moves from higher elevation through the river system to lower elevations as they reshape the channel forms.
Surficial geology	Groundwater flow provides the base flow component of streams that sustains their flow between storms. The "flashy" response of streamflow to individual precipitation events may be ascribed to either subsurface storm flow or overland flow.
Soils	Soils play an important role in local hydrology, including buffering the precipitation signal (P) and storing incoming water. At the scale of soil pedon, a field or a forest stand, the moisture status of soils, the vegetation and the groundwater dynamics impact each other. The ability of soils to convey or store water is a function largely of their texture (the relative mix of sand, silt, and clay).
Topography	Topography influences how water is precipitated on, evaporated from, stored in, and routed through the landscape, often because of long-term evolutionary processes. The steeper the slopes the higher runoff water velocity. This increases its erosive energy (remember that erosive energy of runoff is a function of runoff velocity and volume). When the slope is longer (length), surface area for water collection also increases and therefore increases the run-off volume.
Ponding & Depression Storage	Depression storage refers to small low points in undulating terrain that can store precipitation that otherwise would become runoff. The precipitation stored in these depressions is then either removed through infiltration into the ground or by evaporation.

Aspect	Effect
	Ponding is either the pooling or accumulation of water in a place or a reference to a constructed area whose purpose is to retain or detain water.
Land use and cover	Land use changes, which are mostly induced by human activities, affect hydrological processes such as evapotranspiration (ET), interception and infiltration, resulting in alterations of surface and subsurface flows. Land use changes, which are mostly induced by human activities, affect hydrological processes such as evapotranspiration (ET), interception and infiltration, resulting in alterations of surface and subsurface flows.

Effects of Landscape Elements on the Public Health, Safety and Welfare

Element	Effect
Drainage Area	Drainage area most prominently effects • The size and cost of public infrastructure. Principally pipes and ponds.
Surficial geology & Groundwater flux	The proximity of groundwater to the surface of the land and the degree to which it fluctuates has effects: • Water source for a significant number of lakes, wetland, and streams • Fluctuation frequency and duration effects the hydroperiod that the surface is wet, thus influencing soils and vegetation. • The cost of construction by effecting either the cost of dewatering, the cost to reroute or mitigate high water levels or most prominently the cost of site correction and how much fill must be purchased and transported to raise building pads to a safe elevation. • Home repair and insurance by contributing to wet basements. • The size and cost of operating a sump pump. • The cost of drinking well construction • Groundwater flux also influences the location and cost of required infiltration storm water facilities and septic systems due to the requirements for separation between the bottom of the device and the high ground water elevation.

Element	Effect
Soils	Soils can effect both public health and welfare by • Retaining or bonding with select chemicals. This can be positive if the need is to retain or filter harmful chemicals. It can be a detriment if the soil does not chemically bond and or facilitates the passage of harmful pollutants. • They can both increase and decrease the cost of construction by either having to be replaced or not. • They can adversely affect the public welfare, depending on their texture and erodibility by being easily transported into structures or waterways, contributing to obstruction through accumulation and requiring removal through maintenance. • By becoming suspended in the water, inhibiting light penetration, thus influencing plants and habitat and /or burying habitat or aquatic life. • Loosely bonding with chemical pollutants which may become more mobile once they enter the water column and are exposed to varying temperatures, levels or oxygen availability and/or pH, all of which can induce chemical reactions allowing the pollutant to become more mobile.

Topography	Topography effects public health, safety, and welfare by:
	• Determining the rate at which water moves from or through a site.
	  ○ Flat grades, such are found in the watershed, can accumulate algae and bacteria unsafe to humans and other creatures.
	  ○ Steep grades can generate velocities capable of moving people, equipment, and structures.
	• Topography also influences the type and frequency and therefore cost of maintenance. Flat grades allow sediment to settle out and accumulate, potentially preventing future flows and creating and compounding flooding.
	• Topography influences the size and shape of floodplains and the meander behavior, belt, and alignment of stream channels.

Ponding & depression storage	Ponding and depression storage effect the public health safety and welfare by: • Detention ponding and some wetlands can hold water and gradually release it thus regulating both rate and

Element	Effect
	volume of flow leaving a given point on the landscape and in the conveyance system. • Combined, ponds can alter the peak flows and time of concentration downstream to prevent or reduce flooding or create volume within the channel to allow other flow to enter the stream. • By retaining water, ponds and depressional areas can reduce the volume of water flowing down stream and hold any pollutants captured within the pond, unless infiltration is expected. • In either case, holding water subjects the water to evaporation to the atmosphere or infiltration into the ground, reducing the volume of runoff and potentially recharging ground water. • Ponding increases the overall cost of storm water management and flood prevention. • Wetlands can provide natural depressional areas on the landscape that may be factored into local storm water plans.
Land use and cover	Land use and cover influence the volume and rate at which water runs can infiltrate and runoff. • Land use is often characterized by the percent of imperviousness directly affecting the amount of water queued to runoff. • Land use also has a roughness to it which effects the efficiency and timing of the runoff. • The plants that are grown further act to intercept, store, retain or detain precipitation effecting the volume and timing of runoff. • Differing land uses also have different associated chemicals that either accumulate on hard surfaces, are imported, and used on the site or are a byproduct of site activities. These chemicals can become available for transport by water to a receiving body resulting in pollution.

Effects of The Landscape on Water Management

Management	Effect
Observation	Observation/Monitoring Points • Road, street, and trail crossings and bridges with observation greater than 25 feet • Storm and sanitary sewer easements • Recreational trails • Manholes • Across creek or river (opposite side) Critical Regulable Resources • Likely monitoring sites at first road crossing upstream from confluence • Likely tree removal sites in lower third, forested areas • Likely bank failure sites on outside bends of streams • Likely erosion sites at construction sites on sandy soils in dry breezy weather • Likely sand accumulation and obstructions above South Coon Creek Drive and above Jefferson on Sand Creek • Likely problem wildlife obstructions in Coon Rapids Dam Regional Park, Coon Creek above Radisson, ponds either side of Main Street
Access	• Road and bridge ROWs • Public Drainage and Utility easements • Utility roads • Slopes less than 15%
Key Landscape Features	• Aquatic Invasive Species • Ditches & Streams • High Infiltration soils • Highly erodible soils • Floodplains • Lakes • Receiving waters • Steep slopes • Wetlands
Obstacles & Obstructions	• Beaver dams • Debris • Dense creek bank vegetation where efficient conveyance in an objective • Dense vegetation in channel where efficient conveyance in an objective

Management	Effect
	• Garbage • Sand bars • Trees in channel deflecting flow
Legal Basis, Cause and Standing	<u>Inspections</u> • To enter property to conduct inspections of construction compliance with District and Federal rules provided by MS 103D.335 Subd. 14 & MNG440000 • To enter property to conduct inspections, surveys, and investigations to accomplish the purposes of the watershed district is provided by MS 103D.335 Subd. 14 <u>Conduct Work</u> • To enter property to reasonably and responsibly conduct work related to removing obstructions is provided by M.S. 103E.081 Subd 2 • To conduct work removing aquatic invasive species is provided by M.S. 103A.201 Subd 1 • To conduct work involving access and regulation of wetlands is provided by M.R. 8420.

Effects of Hydrology on Problems, Issues and Concerns and Water Management

Aspects of Hydrology

Aspect	Effect
Precipitation	Precipitation is any liquid or frozen water that forms in the atmosphere and falls back to the earth. It comes in many forms, like rain, sleet, and snow. Along with evaporation and condensation, precipitation is one of the three major parts of the global water cycle. Precipitation is needed to replenish water to the earth. Without precipitation, this planet would be an enormous desert. The amount and duration of precipitation events affect both water level and water quality within an area.
Runoff	Is the water available as runoff after interception, depression storage, and infiltration have taken place.

Aspect	Effect
	Runoff keeps rivers and lakes full of water, but it also changes the landscape by the action of erosion. Runoff picks up fertilizer, oil, pesticides, dirt, bacteria, and other pollutants as it makes its way through storm drains and ditches - untreated - to our streams, rivers, lakes and the ocean. Polluted runoff is one of the greatest threats to clean water.
Runoff Curve Number or curve number	An empirical parameter used in hydrology for predicting direct runoff or infiltration from rainfall excess. It is related to land use, land treatment, hydrological condition, hydrological soil group, and existing soil moisture condition in the drainage basin.
Flooding	The condition of becoming filled or covered with a large amount of water. A flood is an overflow of water that submerges land that is usually dry.
Bank Full Condition	The elevation of the water surface when rising water completely fills the active channel and first begins to spill onto the local floodplain. An active channel is the natural waterway that contains all streamflow's at and below the bank full discharge.
Time of Concentration	Is the time required for runoff to travel from the hydraulically most distant point in the watershed to the outlet. It is used to measure the response of a watershed to a rain event. It is a function of the topography, geology, and land use within the watershed needed for forecasting of the peak discharge rate and the timing of the flood event.
Peak Discharge	Is the maximum instantaneous rate of water passing a given point, during or after a rainfall event or snowmelt. Peak discharge plays an important role in triggering flooding, flash flooding and. The rainfall regimes and rainfall characteristics have been demonstrated to have important influences on peak discharge. Peak discharge is determined by the area of the catchment above the structure and the rate of runoff expected from that catchment under the conditions for which the structure is

Aspect	Effect
	designed. Runoff is a sporadic occurrence. Most runoff is the result of occasional intense storm events.
Storage Volume	"storage capacity" means the volume of water or other liquefied material, which is or may be impounded by a structure at a given elevation above the natural stream bed or above the natural elevation of a pond.

Operational Hydrology & Precipitation Frequency Estimates

Variables	Now (Inches)	Projected to 2034
Precipitation		
Days with more than 1 inch	7	8
Liquid	23.4 – 38.7	23.2 – 38.4
Solid	1.7 – 6	1.7 – 5.9
Snow-Water Equivalents	5% - 20%	4.8% - 19%
Soil Moisture		
Sands	1.5 – 3.7	1.3 – 3.5
Silty Loams	4.2 – 5.8	4.0 – 5.6
Evapotranspiration per day	0.10 - 0.22	0.10 – 0.22
Operational Precipitation		
Catastrophic Flooding	7.2 inches	
Nuisance Flooding	4 inches	
Erosive flows	0.9 feet/second	

PDS-based precipitation frequency estimates with 90% confidence intervals (in inches)[1]										
Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	**0.358** (0.277-0.462)	**0.421** (0.325-0.544)	**0.526** (0.406-0.681)	**0.616** (0.473-0.799)	**0.742** (0.556-0.987)	**0.842** (0.619-1.13)	**0.944** (0.676-1.29)	**1.05** (0.728-1.46)	**1.19** (0.803-1.69)	**1.30** (0.859-1.87)
10-min	**0.524** (0.406-0.677)	**0.616** (0.477-0.796)	**0.770** (0.594-0.997)	**0.901** (0.692-1.17)	**1.09** (0.814-1.45)	**1.23** (0.907-1.65)	**1.38** (0.990-1.89)	**1.54** (1.07-2.14)	**1.75** (1.18-2.48)	**1.91** (1.26-2.73)
15-min	**0.639** (0.495-0.826)	**0.752** (0.581-0.971)	**0.940** (0.724-1.22)	**1.10** (0.844-1.43)	**1.33** (0.993-1.76)	**1.50** (1.11-2.02)	**1.69** (1.21-2.30)	**1.87** (1.30-2.61)	**2.13** (1.43-3.02)	**2.33** (1.54-3.33)
30-min	**0.908** (0.702-1.17)	**1.07** (0.830-1.39)	**1.35** (1.04-1.75)	**1.58** (1.21-2.05)	**1.90** (1.43-2.53)	**2.16** (1.59-2.90)	**2.42** (1.73-3.30)	**2.68** (1.86-3.73)	**3.04** (2.05-4.31)	**3.32** (2.19-4.74)
60-min	**1.18** (0.913-1.52)	**1.39** (1.07-1.79)	**1.75** (1.35-2.26)	**2.07** (1.59-2.68)	**2.53** (1.91-3.40)	**2.92** (2.15-3.94)	**3.32** (2.39-4.56)	**3.75** (2.61-5.24)	**4.35** (2.94-6.20)	**4.83** (3.19-6.92)
2-hr	**1.45** (1.13-1.86)	**1.70** (1.33-2.18)	**2.15** (1.67-2.75)	**2.55** (1.98-3.28)	**3.16** (2.41-4.23)	**3.68** (2.74-4.94)	**4.22** (3.07-5.77)	**4.82** (3.39-6.71)	**5.67** (3.86-8.03)	**6.35** (4.22-9.03)
3-hr	**1.61** (1.26-2.06)	**1.88** (1.47-2.40)	**2.37** (1.86-3.03)	**2.84** (2.21-3.64)	**3.57** (2.75-4.77)	**4.19** (3.15-5.63)	**4.87** (3.56-6.65)	**5.62** (3.98-7.81)	**6.69** (4.59-9.47)	**7.58** (5.06-10.7)
6-hr	**1.88** (1.49-2.37)	**2.19** (1.73-2.76)	**2.78** (2.19-3.51)	**3.34** (2.62-4.24)	**4.23** (3.30-5.64)	**5.01** (3.81-6.70)	**5.87** (4.34-7.98)	**6.82** (4.88-9.44)	**8.21** (5.68-11.6)	**9.35** (6.28-13.2)
12-hr	**2.14** (1.71-2.68)	**2.51** (2.00-3.14)	**3.19** (2.53-4.00)	**3.83** (3.03-4.82)	**4.83** (3.79-6.37)	**5.70** (4.36-7.54)	**6.64** (4.94-8.94)	**7.68** (5.53-10.5)	**9.19** (6.40-12.8)	**10.4** (7.05-14.6)
24-hr	**2.46** (1.98-3.05)	**2.84** (2.29-3.53)	**3.56** (2.86-4.43)	**4.24** (3.39-5.29)	**5.29** (4.18-6.90)	**6.19** (4.77-8.12)	**7.18** (5.38-9.57)	**8.26** (5.98-11.2)	**9.82** (6.89-13.6)	**11.1** (7.57-15.4)
2-day	**2.88** (2.34-3.55)	**3.23** (2.62-3.98)	**3.91** (3.16-4.82)	**4.57** (3.68-5.65)	**5.62** (4.48-7.29)	**6.54** (5.09-8.52)	**7.56** (5.72-10.0)	**8.70** (6.37-11.8)	**10.4** (7.34-14.3)	**11.7** (8.07-16.2)
3-day	**3.17** (2.59-3.88)	**3.52** (2.87-4.31)	**4.19** (3.41-5.14)	**4.85** (3.93-5.97)	**5.90** (4.74-7.61)	**6.83** (5.35-8.86)	**7.86** (5.98-10.4)	**9.02** (6.63-12.1)	**10.7** (7.61-14.7)	**12.1** (8.35-16.6)
4-day	**3.39** (2.78-4.13)	**3.76** (3.08-4.59)	**4.47** (3.65-5.46)	**5.14** (4.18-6.31)	**6.22** (5.00-7.97)	**7.15** (5.61-9.23)	**8.19** (6.24-10.8)	**9.33** (6.88-12.5)	**11.0** (7.84-15.0)	**12.4** (8.57-16.9)
7-day	**3.90** (3.22-4.72)	**4.39** (3.62-5.32)	**5.26** (4.33-6.38)	**6.03** (4.94-7.34)	**7.19** (5.77-9.06)	**8.15** (6.40-10.4)	**9.16** (7.00-11.9)	**10.3** (7.58-13.6)	**11.8** (8.44-16.0)	**13.0** (9.09-17.8)
10-day	**4.39** (3.64-5.28)	**4.97** (4.12-5.98)	**5.95** (4.92-7.18)	**6.80** (5.59-8.24)	**8.02** (6.44-10.0)	**9.00** (7.09-11.3)	**10.0** (7.67-12.9)	**11.1** (8.20-14.6)	**12.5** (8.99-16.9)	**13.7** (9.58-18.6)
20-day	**5.96** (4.99-7.11)	**6.68** (5.59-7.98)	**7.86** (6.56-9.41)	**8.85** (7.35-10.6)	**10.2** (8.24-12.6)	**11.3** (8.92-14.0)	**12.3** (9.48-15.6)	**13.4** (9.96-17.4)	**14.8** (10.7-19.7)	**15.9** (11.2-21.4)
30-day	**7.37** (6.20-8.74)	**8.21** (6.91-9.75)	**9.57** (8.03-11.4)	**10.7** (8.92-12.8)	**12.2** (9.87-14.9)	**13.3** (10.6-16.4)	**14.4** (11.1-18.2)	**15.5** (11.6-20.0)	**16.9** (12.3-22.4)	**18.0** (12.8-24.2)
45-day	**9.20** (7.78-10.9)	**10.3** (8.67-12.1)	**11.9** (10.0-14.1)	**13.2** (11.1-15.7)	**15.0** (12.1-18.1)	**16.2** (12.9-19.9)	**17.4** (13.5-21.8)	**18.5** (13.9-23.8)	**20.0** (14.5-26.2)	**20.9** (14.9-28.0)
60-day	**10.8** (9.16-12.7)	**12.1** (10.2-14.2)	**14.1** (11.9-16.6)	**15.6** (13.1-18.4)	**17.5** (14.3-21.1)	**18.9** (15.1-23.0)	**20.2** (15.7-25.1)	**21.4** (16.0-27.2)	**22.7** (16.5-29.7)	**23.6** (16.9-31.5)

Effects of Watershed Hydrology on Management

PIC[1]	Precipitation	Evapotranspiration	Infiltration	Runoff
Aquatic Invasive Species	The likelihood of more extreme precipitation events increases the risk of water quality issues such as erosion, sedimentation, and nutrient runoff. These events can degrade water quality and fuel the transportation and growth of non-native invasive plants and weedy native species.	Some invasive plant species, once they achieve critical densities, have been found to significantly increase the evapotranspiration of the entire plant community	The effect of invasive plants on infiltration depends largely on the physiognomy of the species within the existing plant community structure.	Invasive species can either decrease or increase flows and erosion leading to hyper-eutrophication.
Flooding	The most immediate impact of heavy precipitation is the potential of	Evaporation does not increase from an influx of floodwaters unless the inundation is	A few studies suggest that infiltration rates within streambeds increase during the	Flooding has increased in some areas because water can't soak slowly into the

PIC[1]	Precipitation	Evapotranspiration	Infiltration	Runoff
	flooding. This risk can be heightened in urban areas where non-permeable pavement forces water to quickly run off into sewer systems.	accompanied by a concomitant increase in net radiation.	flood season due to an increase in the stream stage and the remove of the clogged streambed.	ground. Instead, it runs off hard surfaces and, in a heavy rain, can lead to flooding, erosion and property damage.
Groundwater recharge	Rainfall controls the groundwater table. When rainfall is less than normal for a long period, the water flow in rivers and streams slows down, and the water level falls in lakes, wetlands, and ultimately, wells.	In a warming climate, increased evapotranspiration may shift the fraction of precipitation that runs off as surface water or infiltrates to the subsurface as recharge. Long-term shifts in recharge patterns can change groundwater levels and subsequently groundwater surface water interactions and soil moisture.	Infiltrating water is designated potential recharge because it may return to the atmosphere by evapotranspiration; migrate as near-surface interflow and emerge as runoff; or remain suspended in the vadose zone. Infiltration and net recharge vary temporally and spatially by season, storm water intensity, stream stage, soil type, vegetation type and cover, elevation, slope, temperature, solar radiation and other factors, including the presence of buildings, paved surfaces and drainage culverts.	Groundwater recharge or the rate at which aquifers are replenished is one of the most difficult components of the water budget to quantify. Recharge rates are impacted by the amount and intensity of precipitation, soil and vegetation types, geology and topography.
High Infiltration soils	If precipitation is greater than infiltration capacity, surface runoff occurs. If precipitation is less than the infiltration capacity, all moisture is absorbed. When a soil has been saturated by water then allowed to drain by gravity, the soil is said to be	Some infiltration stays near the land surface, which is where plants put down their roots. Plants need this shallow groundwater to grow, and, by the process of evapotranspiration, water is moved back into the atmosphere.	Highly aggregated soil has increased pore space and infiltration. Soils high in organic matter also provide good habitat for soil biota, such as earthworms, that through their burrowing activities, increase pore space and create continuous pores linking	High Infiltration reduces runoff and increases recharge, and Low Infiltration is Bad because it increases runoff, increases erosion, decreases aquifer recharge, decreases dry season stream flow, and other problems.

PIC[1]	Precipitation	Evapotranspiration	Infiltration	Runoff
	holding its field capacity of water.	Higher infiltration rates make less water available for those plants.	surface to subsurface soil layers.	
Mass Wasting	Heavy rain accelerates mass wasting. Mass wasting is the downward movement of rock and soil material under the influence of gravity. It is accelerated by heavy rain because the rainwater lubricates the material meaning it experiences less frictional force that retards its movement.	Evapotranspiration and its associated trees. Increase resistance to shearing through the mechanical action of their roots, ET also alters the water content of the soil	Adding water increases slope instability through increased weight and lubrication. However, a small amount of water in the soil can aid slope stability because of increased surface tension.	Mass wasting is a rapid form of erosion that works primarily under the influence of gravity in combination with other erosional agents.
Public drainage	A decrease in the mean groundwater table in the fields. In addition, the number of days on which groundwater table will be above the level of the drainage network will decrease. The increase in rainfall intensity in the near and far future will result in a fivefold increase in surface outflow in comparison to the present situation.	In the absence of additional rain, evapotranspiration (soil evaporation plus plant transpiration) will begin to dry out the soil.	The purpose of drainage is to remove excess soil water, groundwater and infiltrating water before the cropped plants undergo stress, thus reducing yields.	Runoff volume is typically increased due to both the increased volume (surface + sub-surface waters) and the straightening of the conveyance channels delivers greater volumes to a location per unit time.
Soil Erosion	The cumulative impact of millions of raindrops hitting the ground in a hard-hitting spring storm rainfall can be incredible, dislodging soil particles and	The effect of soil water content on ET is conditioned primarily by the magnitude of the water deficit and the type of soil.	Soil particles plug soil pore space or empty spaces.	As storm water runoff water moves down a slope, it increases in velocity and increases the potential for erosion. The volume of

PIC[1]	Precipitation	Evapotranspiration	Infiltration	Runoff
	"splashing" them up to 3-5 feet away. The splashed particles clog soil pores, effectively sealing off the soil surface and leading to poor water infiltration.	The drier the soil the erodible it becomes.		sediment also increases because the transported particles scour and dislodge more soil particles.
Unique habitats	Affects food supply, it also can affect foraging behavior, reproductive and population growth rates, and competitive interactions.	Increases in evapotranspiration result in changes in local humidity levels which can discourage certain plants.	Native plants and communities tend to have deeper and more extensive plant root development which can facilitate infiltration.	Areas of plant cover have greater retention and detention qualities due to greater total surface area and adhesive qualities for water, thus slowing the rate of runoff.
Water Quality	Rainfall and other precipitation washes nutrients from human activities like agriculture and fossil fuel combustion into rivers and lakes. When these nutrients overload waterways, a process called eutrophication, the results can be dangerous.	Increases in evapotranspiration may shift the fraction of precipitation that runs off as surface water or infiltrates to the subsurface as recharge. Long-term shifts in recharge patterns can change groundwater levels and subsequently groundwater surface water interactions and soil moisture.	Infiltration decreases both the volume of water available for runoff and the pollutants found in that water. However, those pollutants remain available and unless treated will pollute the groundwater they are being carried towards.	Runoff picks up fertilizer, oil, pesticides, dirt, bacteria and other pollutants as it makes its way through storm drains and ditches - untreated - to our streams, rivers, lakes and the ocean.
Water Quantity	In areas where precipitation increases sufficiently, net water supplies might not be affected, or they might even increase. If the precipitation remains the same or decreases though, net water supplies would decrease.	On average 67% percent of precipitation, returns to the atmosphere through evapotranspiration.	Infiltration at the land surface significantly affects the timing and amounts of high and low watershed flows. Infiltration during rainfall events is affected by soil type, porosity, texture, vegetative cover, land management, preferential flow in soil and bedrock due to roots,	Runoff is the natural conveyance of a quantity of water. Too much or too fast can cause problems: Fast-moving runoff can erode stream banks, damaging hundreds of miles of aquatic habitat. Runoff can push excess nutrients

PIC[1]	Precipitation	Evapotranspiration	Infiltration	Runoff
			cracks, and soil fauna.	from fertilizers, pet waste and other sources into rivers and streams.
Wetlands	Changing precipitation patterns can increase evapotranspiration and lead to water losses.	Water losses to the atmosphere from wetlands are a combination of evaporation and transpiration by emergent macrophytes. Wetland surfaces may be permanently or periodically saturated, with periods of shallow standing water.	Infiltration in wetlands within the watershed tends to be low to zero because groundwater tends to be at or near the surface.	Wetlands can reduce runoff depending on their area, effective storage depth and outlet.

Effects of Civil Considerations on Water Management

Operating Environment Factor	Variable	Problems	Opportunities	Effects
Politics and Law	Legislation	Prescribed law increasing or adding to existing requirements.		Requires additional time and money with unknown benefit.
		Legislative and court decisions reshaping existing water management approaches.	To define and articulate local requirements, needs and reasonableness in their application.	Additional time and money involved in.
	Legal action	Water conflicts driven by • Resource protection needs. • Economic or regulatory disparities • Ideological differences.	To clarify and articulate the sensitivity, value of and consequences of poor water resource management.	Underscores the need for direct action focused on consequences.
Management	Priorities	Increased legislative and council focus on unconstrained	Redevelopment and establish stormwater infrastructure in large areas.	Increased need to understand and track the physical,

Operating Environment Factor	Variable	Problems	Opportunities	Effects
		economic development.	Press the immediate financial costs and public health and safety issues of developing sensitive lands.	social, and political economic situation. Increased complexity and dynamics in juggling priorities
	Decision Making	Reliance on the certainty of scientific research will not be a viable option for an increasing number of problems.	For collaborative situationally based adaptive planning and management.	Choosing the best direction and actions will require strong practical vision, leadership, and common understanding.
	Funding	The future of dedicated revenue sources will become more uncertain and burdened with requirements.	Renewal or replacement of the Clean Water Fund will be a legislative topic.	Legislative involvement
		Increases in property taxes and utility fees will be tied to a need for certainty and control.	To focus on the larger long-term costs and economic benefits	Will require increased agility in operations. Will need to articulate and advocate for the prevention of future costs.
	Staffing	Increased difficulty in attracting and retaining qualified staff.	To collaboratively team for select skills and services.	Increased risk of miscalculation resulting in adverse conditions.
Economic	Increased demands for water quantity and quality.	Increased demand for a variety of beneficial uses.	There are no economic substitutes for water	Decreased public confidence and increasing the risk of political instability and decision making driven by expediency and convenience.
Social	Population growth to an estimated 200,000	Increased conflicts between social and political groups, industries, and cities		

Operating Environment Factor	Variable	Problems	Opportunities	Effects
	Increased concern about water quantity, water quality, and flooding.	Problems clouded by a high degree of distrust and skepticism.		
	Increased public activism involving direct public action and expectations to directly and immediately address demands.	Increased risks of societal divisions, broader enforcement, and less coherent policies.		
		Responses founded on either: • appeasement of public demands • actively cutting off or eliminating avenues for activism.		
Information & Technology	Availability of monitoring and AI systems adapted to stormwater management and monitoring	Increased vulnerability and risk due to equipment failure, Increased complexity	Provision of more accurate, better connected, faster, longer range, and more effective practices and treatment devices.	Will make management more responsive but not necessarily more effective.
Infrastructure	Conveyance systems	12.2 miles of ditch and pipe will need replacement or significant repair by 2034.		Increased organization and investment in planning and financing capital assets
	Stormwater Treatment practices	736 stormwater structures will need replacement or rehabilitation by 2034		
	Enhancement	Asset age and space involved may not allow achievement of all required enhancements.	Marginal cost is less than asset replacement	Extension of asset utilization and optimization
	Resiliency of storm water assets	Increased questions and requirements by citizen's, grant providers and	Expansion of asset management approach.	Increased requirements to address resiliency and recovery of water assets by

Operating Environment Factor	Variable	Problems	Opportunities	Effects
		insurance companies.		

Collaborators, Cooperators Managing Water within the District

Agency	Mission/Goal	Activities
Federal		
Environmental Protection Agency	Clean Water Act: To restore and maintain the chemical, physical and biological integrity of the Nation's waters.	• Evaluate and approves action under Section 303(d) of the Clean Water Act (CWA) including Impairments and Toal Maximum Daily Loads (TMDLs) • Provides funding for nonpoint source pollution mitigation via the 319 programs. • Issuance of State Non-Point Discharge Elimination System (NPDES) Permit o Evaluates TMDL reduction plans. • Issuance of Section 401 of CWA addressing violations of state water quality standards set under the Clean Water Act in Waters of the United States (WOTUS). • Monitors USACOE administration of Section 404 of CWA.
U.S. Army Corps of Engineers	To regulate the discharge of dredged or fill material into waters of the United States, including wetlands.	Implementation of Section 404 of the CWA Evaluate • The accuracy of wetland delineations • Potential adverse impact from proposals • Adequacy of sequencing for proposed impacts

Agency	Mission/Goal	Activities
		• Probable success of wetland mitigation
U.S. Geologic Survey	To collect analyze and provide reliable scientific information to describe and understand the Earth; minimize loss of life and property from natural disasters; manage water, biological, energy, and mineral resources; and enhance and protect our quality of life.	• Develop rating curves • Monitors select streams
State		

Board of Water & Soil Resources	To improve and protect Minnesota's water and soil resources by working in partnership with local organizations and private landowners.	<u>Administers'</u>
		• Buffer Law
		  ○ Buffer establishment guidelines
		  ○ Buffer Enforcement
		• Grant programs including
		  ○ Clean Water Fund
		  ○ Local Capacity Grants
		• Metropolitan Water Management Act
		  ○ M.R. 8410
		  ○ Plan review
		  ○ Plan approval
		• Wetland Conservation Act
		  ○ M.R. 8420
		  ○ Technical Evaluation Panel
		  ○ Delineation review
		  ○ Sequencing evaluation
		  ○ Training

Department of Natural Resources	To work with Minnesotans to conserve and manage the state's natural resources, to provide outdoor recreation opportunities, and to provide for commercial uses of natural resources in a way that creates a sustainable quality of life.	Administers • Aquatic Invasive Species Program • Aquatic Plant Management Program • Floodplain program • Works in the bed of public waters permits. • Ground water appropriation permits.

Agency	Mission/Goal	Activities
		• Endangered and Threatened species Takings permits. • State Critical Areas program and rules
Pollution Control Agency	To protect and improve the environment and human health. To protect, conserve and improve our environment and enhance our quality of life.	Administers • Section 303d Water Quality Impairment designation • Section 319 program • Section 401 of the Clean Water Act • State water quality standards • National Non-Point Pollution Discharge Elimination System (NPDES) requirements • Training
Regional		
Metropolitan Council	To foster efficient economic growth for a prosperous metropolitan region.	• Management of Metropolitan Systems • Review of Watershed Plans • Review and approval of City Comprehensive Plans including stormwater
Local		
Anoka County Parks	To positively impact the quality of life in Anoka County by providing parks, outdoor recreation, and leisure services for the public. Our mission encompasses protection of the natural environment, improving the health of citizens, and supporting a strong local economy.	• Administers County Wide Aquatic Invasive Species Prevention Program.

Anoka Conservation District	To holistically conserve and enhance Anoka County's natural resources for the benefit of current and future generations through partnerships and innovation.	• Outreach and Public Engagement
		• Monitoring, Inventory and Subwatershed Assessments
		  ○ Wetland hydrology monitoring network
		  ○ water quality monitoring
		  ○ Subwatershed assessments

Agency	Mission/Goal	Activities

		• Wetland Evaluation and Restoration
		  ○ Technical Evaluation Panel
		• Projects
		  ○ Raingardens
		• Financial, Technical and Grant Assistance

Cities • Andover • Blaine • Columbus • Coon Rapids • Fridley • Ham Lake • Spring Lake Park	To serve as administrative, commercial, religious, and cultural hubs for their surrounding areas, provide essential public services and protect and provide for the public health, safety, and welfare.	• Flood prevention through storm water management. • Provide drinking water where demanded. • Provide for sewage disposal. • Address non-point source pollution as a Municipal Separate Storm Sewer System
Interagency, Intergovernmental and Nongovernmental Organizations		

Technical Evaluation Panel	To pursue
	• No net loss in the quantity, quality, and biological diversity of existing wetlands.
	• Increases in the quantity, quality, and biological diversity of wetlands by restoring or enhancing diminished or drained wetlands.
	• Avoidance of direct or indirect impacts from activities that destroy or diminish the quantity, quality, and biological diversity of wetlands.
	• Replacement of wetland values where avoidance of activity is not feasible and prudent.
		make technical findings and recommendations regarding.
		• Wetland applications,
		• The scope of MR 8420
		• The applicability of exemption and no-loss standards,
		• Wetland functions and the resulting public value,
		• Direct and indirect impacts
		• Possible violations of MR 8420
		• Enforcement
		  ○ Preparation of replacement/restoration plans
		• Review of replacement applications for
		  ○ public road projects
		  ○ banking projects

Crooked Lake Area Association	To protect and enhance the long-term health of Crooked Lake	• Comprehensive Lake Management planning • Public involvement and engagement • Treatments, Studies, Plant Surveys • Regular inspections

Agency	Mission/Goal	Activities
Ham Lake Lake Association	To preserve and maintain the health of the lake.	• Cost sharing on inventories & treatments

6
Evaluation Of The Problems, Issues And Concerns

Purpose

To determine the capabilities and tendencies of the problems, issues, and concerns in order to evaluate the risk and exposure to the public and the productive capacity of the watershed.

To assist asset managers in decision making based on performing a systematic assessment of the level of business risk exposure a local water management organization faces from potential failures of its water resource assets.

Outcomes

- Problem, Issues and Concern Data Files by Resource Type
- Location and Size of Problems, Issues and Concerns
- High Value Target List
- Threat Capability Statement

Characteristics of the Problems, Issues and Concerns

Character

Upon review, comments and legislative requirements are of three types:

1. **Problems**:
   Definition: Are any indication, circumstance, or event with the potential to degrade, cause loss of damage water management assets. They tend to be tangible and controllable. They are directly related to an existing, facility or water resource.

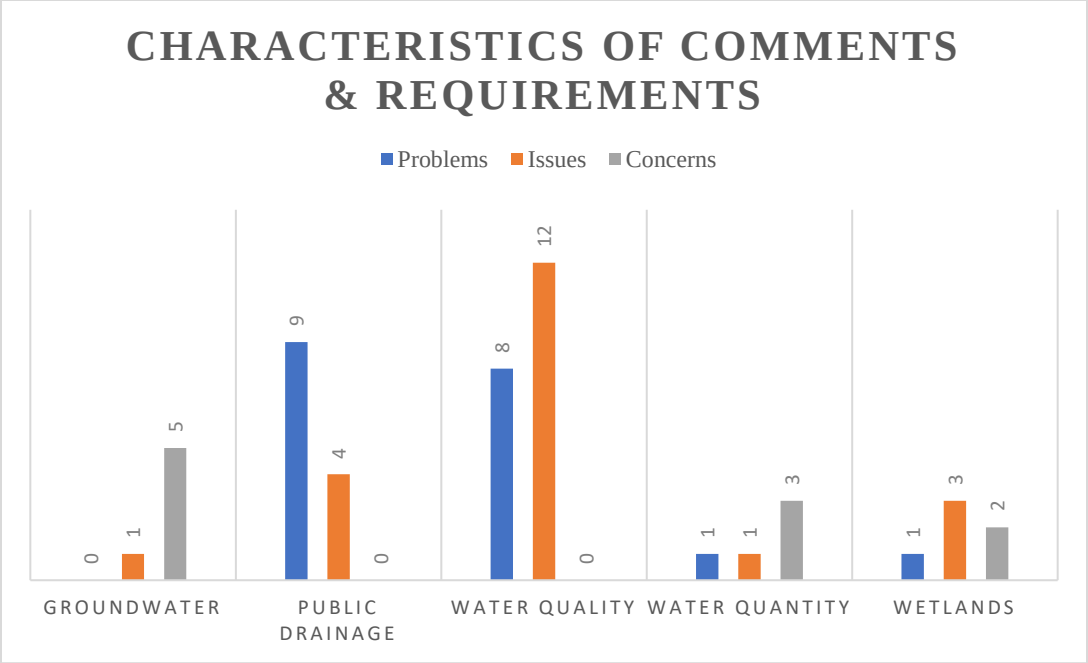
   Nature: To reduce the ability or functioning of those assets. They tend to be well defined conditions or situations with clear consequences. When analyzing regular problems, it is important to understand the complexities of the operating environment. Regular problems almost always have answers.

2. **Issues**:
   Definition: Are trends, forces or factors that are adversely influencing or affecting water resources or management assets through unconventional, or asymmetric means such as unauthorized fill, drainage, or pumping; persistent but irregular complaining or sniping by a persistent individual or group; ideologically based initiatives and/or debates. Irregular problems have diverse capabilities and may change rapidly, outpacing what staff is accustomed to. They tend to be well defined, but the impact and importance of their consequences are not.

   Nature: To eliminate or weaken the authority or function of an asset. They require continuous analysis to keep abreast of changes and the degree of impact and importance. They often have no answer but do have very clear consequences and their resolution is often colored by ambiguity and uncertainty that can be vigorously debated or discussed.

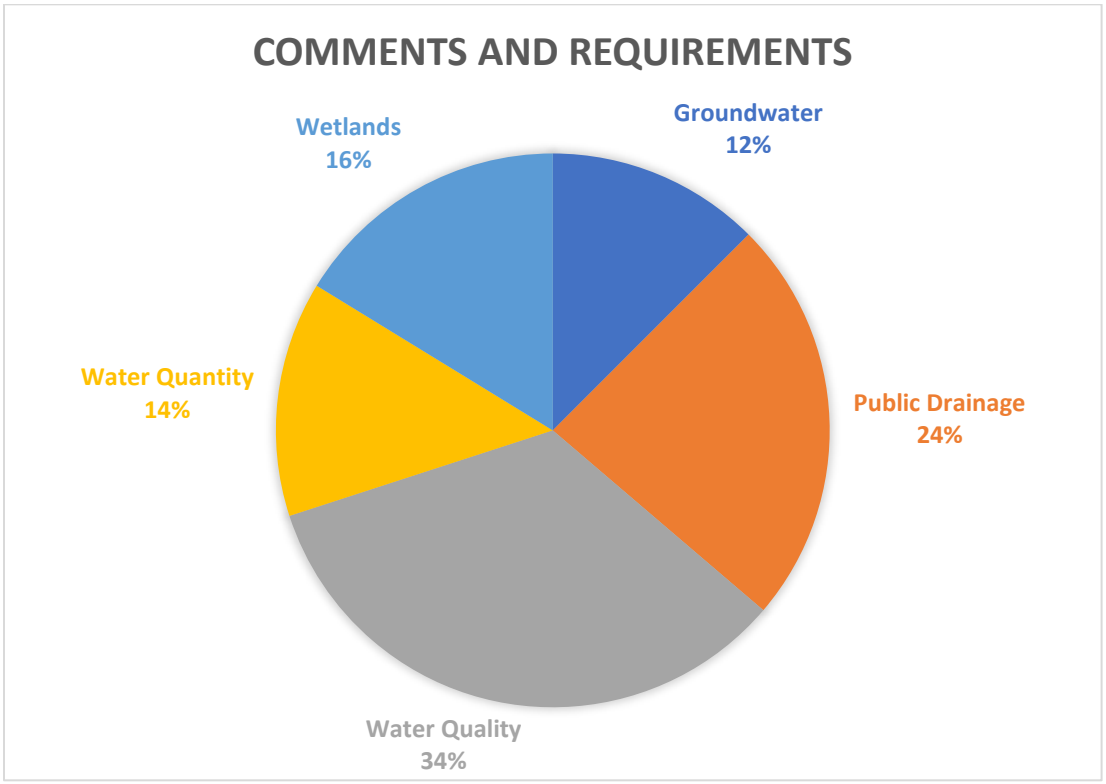
3. **Concerns**: Are a diverse and dynamic combination of regular and irregular problems that are important. They tend to be difficult to define or quantify and serve as a source for worry or anxiety. They are often expressed in terms of unarticulated or unquantified risk and/or uncertainty.

   Nature: Lead an organization toward the right answer to the wrong problem and/or threaten the organizations ability to operate. Addressing concerns requires an accurate perception of the goal and operating environment; an ongoing comprehension of the situation (research, monitoring, inspections); a projection of the future (an adaptive plan) and the ability to adjust or adapt while still pursuing the goal.



Composition of Comments and Requirements

The required and implied legislatively tasks, and the comments received from the public, review agencies and collaborators identified eighty problems, issues and concerns to be evaluated. Comments and requirements were organized and grouped by water resource category.



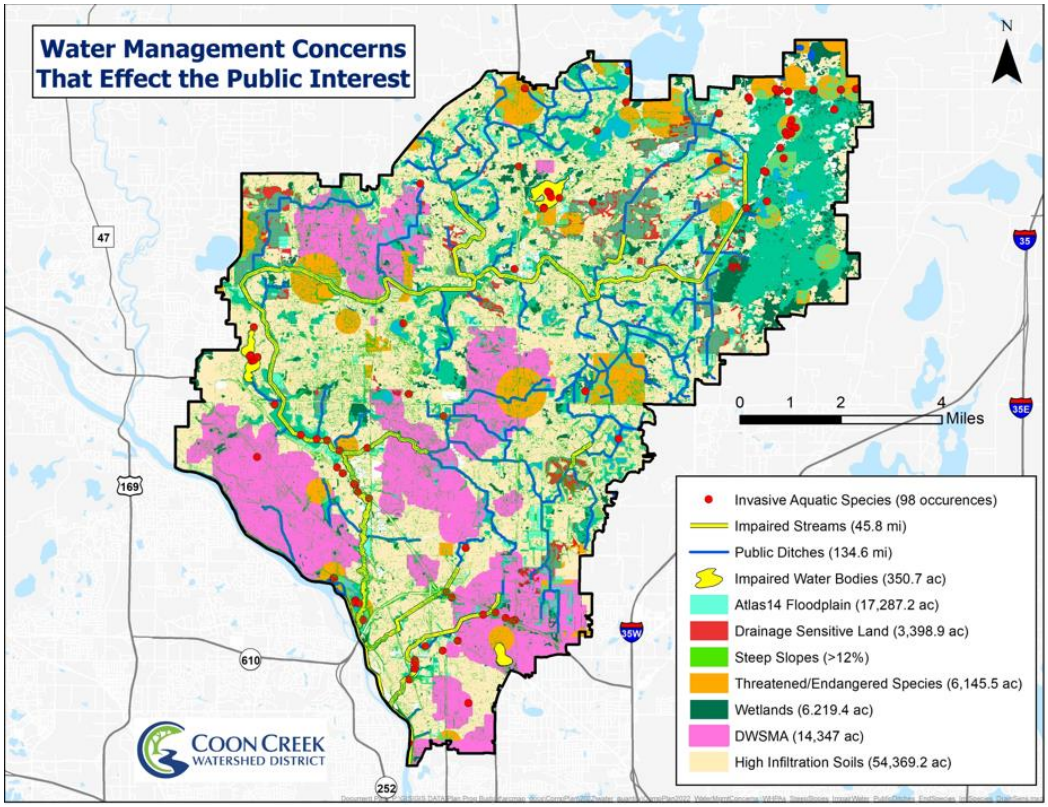
Each comment and requirement were evaluated using the following criteria:

- Definition: To specify the District's operational understanding of the requirement or comment.
- Concern: The nature and disposition of the comment relative to the public health, safety and welfare and sustained beneficial use.
- Character: Description of the nature of the comment or requirement and its disposition within the watershed.
- Composition: Description of makeup and organization of the comment or requirement.
- Trends and Tendencies: Based on its character and composition how the Comment or requirements develop or evolve in the operating environment.

The detailed evaluations of the comments and requirements are organized by water resource category and can be found in the following appendix:

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

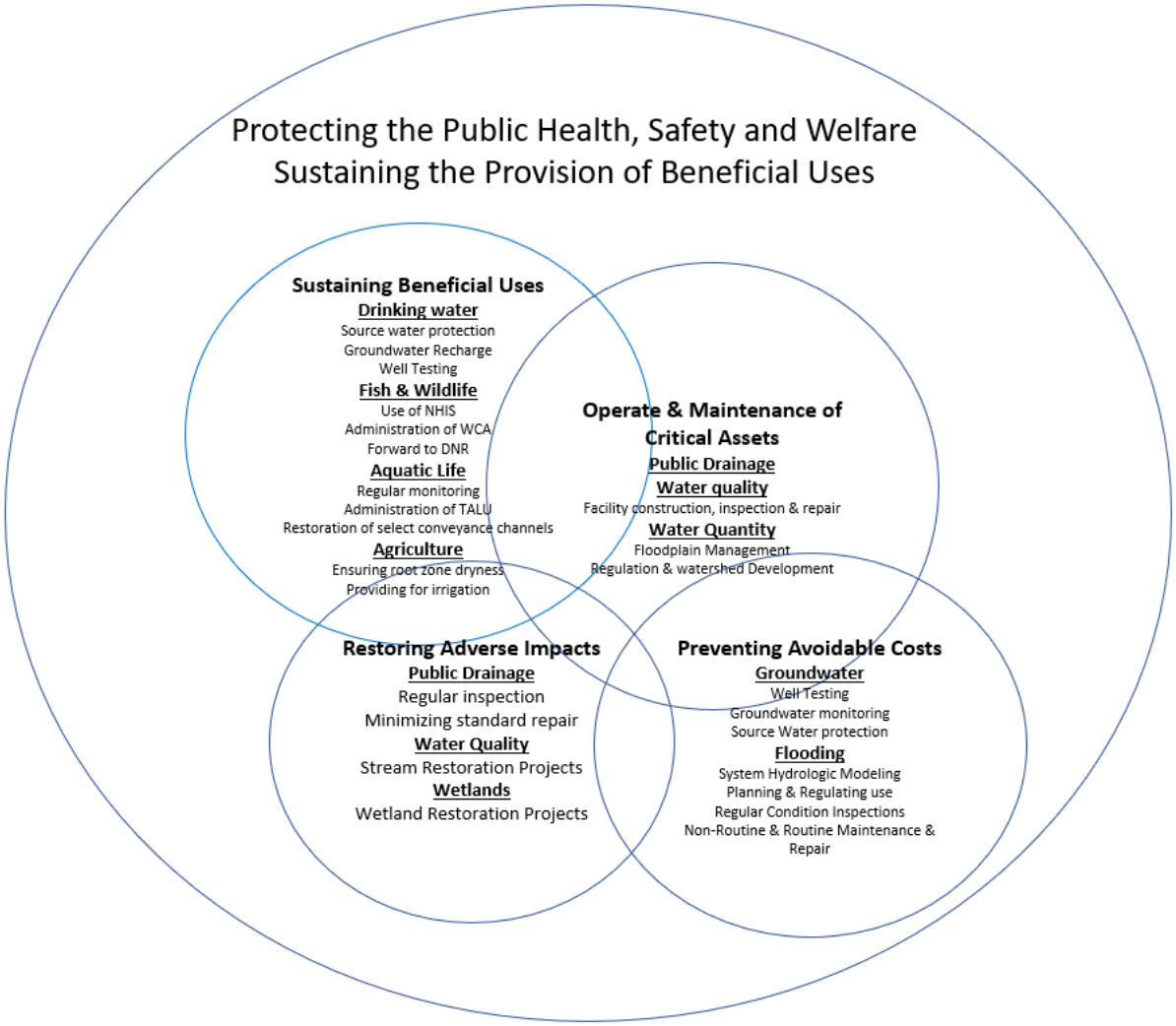
Size and Location of Problems, Issues and Concerns



Alignment with Legislative Goals

The District's Mission and Legislative Goals were presented in Part 2. The Operating Environment and Asset Hierarchy were provided in Part 3. The review of the Natural, Hard and Soft assets in Part 3 advanced the idea that each asset group functions to meet one or more the Legislative goals. They are critical to District and city efforts to protect the public health, safety, and welfare, provide for the wise use of the natural resources, and minimize the public costs associated with repair, replacement, or restoration of property and water resources.

The following figure shows the alignment of legislative goals and the physical and programmatic assets.



The above figure shows that multiple legislative goals are met by certain programmatic assets. For example, Ditch inspections provide invaluable information on more than the physical condition of the channel and the potential need for non-routine maintenance or repair, but an opportunity to assess channel integrity and with-it fish and wildlife habitat, It also provides a close-up look at outfalls and illicit discharges.

Similarly, ditch, construction and permit inspections provide essential information to technical studies, structure BMP care and maintenance and projects and enhancements to further flood protection and water quality restoration. Engagement and outreach events, public information, encourage partnerships with the public, and protect safe, clean water by engaging the public to help in reducing pollution. Capital Improvement Planning and Management, Watershed Asset Management, and Integrated Planning Framework, are all programmatic assets that the Division maintains towards flood control and water quality goals. Programs that support early coordination, regulatory review and policy development, post construction stormwater control (both during design and post development), compliance monitoring program and special studies enable all of the MS4s to advance the goal of providing safe clean water.

Alignment of Management Assets with Floodplain Management Requirements and Water Quality Needs

The alignment of the cities and Districts' Assets for Floodplain and Water Quality Management provide restraints and constraints in the joint implementation of projects and programs to address the water quality enhancements needed to address the TMDLs within the watershed.

The relationship between the seven cities within the watershed and the watershed district concerning floodplain and water quality management revolves around different roles and goals and is bound together by mutual interests, technical sophistication, and complimentary knowledge, skills and abilities on problems, issues, and concerns that often cross municipal boundaries or have adverse impacts beyond municipal boundaries. A brief description of the floodplain management and water quality improvement efforts is provided below.

Floodplain Management Plan

Minnesota Statute 103F states that it is the policy of the state is to:

> *Reduce flood damages through floodplain management, stressing nonstructural measures such as floodplain zoning and floodproofing, flood warning practices, and other indemnification programs that reduce public liability and expense for flood damages.*

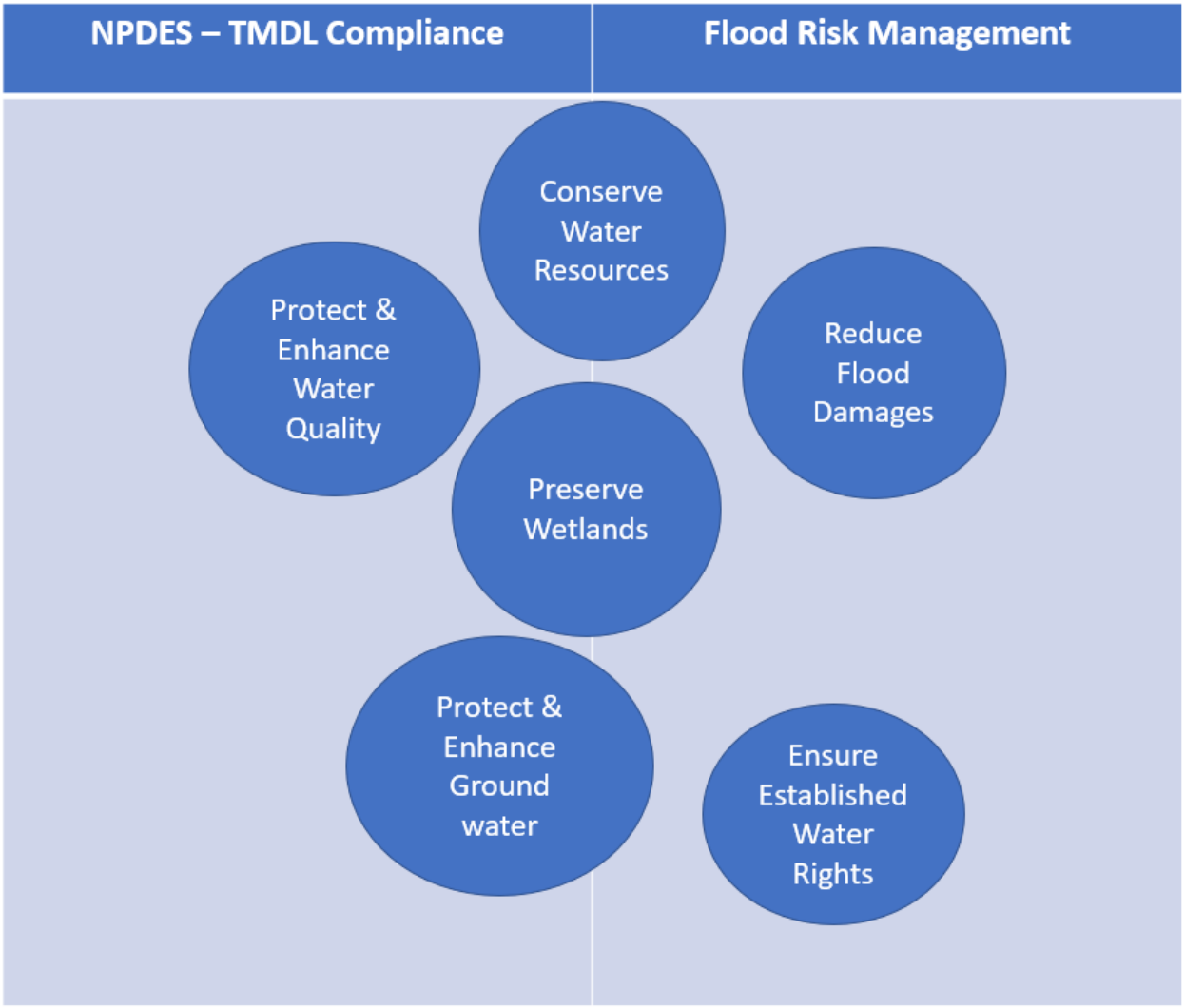
The state program requires cities to adopt floodplain ordinances as an incentive for enrollment into the National Flood Insurance Program. The Watershed District (through M.S. 103B and D) is also directed to address flooding, particularly where and when it serves as the Ditch authority.

The purpose of floodplain management within the Coon Creek Watershed has been to fulfill the requirements of the statute. The Watershed District's role has been to support the cities through regulation, modeling and calculations that protect people and property, facilitates transition to increased precision and accuracy of information and protects upstream and downstream properties and functions from the adverse effects of the use and development of floodplain lands.

Water Quality Improvement Plan

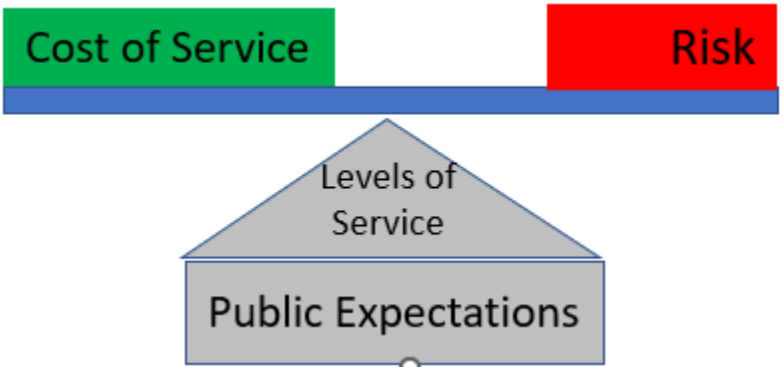
For the MS4s within the watershed, water quality management has focused on addressing the TMDLs of the impaired waters and preventing any further degradation from occurring and protecting the unimpaired waters.

In response to impairment designation, workgroups have been formed around the subwatersheds of the impaired streams and those stream which contribute major loadings and stressors to the impaired waters. In 2016, with completion of the WRAPS and the District and affected MS4s agreed to pursue addressing the impairments as categorical TMDLs, working jointly on a subwatershed basis. The goal of the subwatershed plans has been to quantify discharge and pollutant loadings in order to assess flooding more exactly and to protect, preserve, enhance, and restore the water quality and designated beneficial uses of waters of the state. This goal is accomplished through an adaptive planning and management process that identifies the highest priority water quality conditions within a subwatershed and implements strategies through the District's and cities operating and capital improvement budgets.



Required Level of Service and Measures of Effectiveness

The Level of Service (LOS) is what the regulators require and what the citizens' desire. It is a balance between citizen desires, citizen willingness to bear costs, and the City's risk tolerance in the event of failure. This delicate balance is depicted below:



The District Comprehensive Plan and Municipal Local Water Plans derive their decision-value and capability from tracking the water management programs and activities towards meeting levels of service based on Legislative, program and local goals. Levels of Service are most valuable if they are measurable in order to completely realize the collaborative and decision-making value of the Comprehensive Plan. Additionally, it is better to have fewer LOS to reduce redundancy. More than one program or activity may be performed to meet the same LOS, and therefore, multiple programmatic assets may have the same LOS.

The LOS offered below is organized by NPDES Minimum Control Measure (MCM) and should be re-evaluated every five (5) to 10 years to ensure they reflect current regulatory requirements and the citizens' desire.

Minimum Control Measure	**Programmatic Asset**	**Level of Service/Measure of Effectiveness**
Public Education and Outreach	City Newsletter Articles	Produce articles for city newsletters on what the public can do to prevent storm water impacts. These articles will be published at least quarterly for the first two years of the NPDES permit term.
	School Outreach	A minimum of 50 percent of all school children (K-12) will be educated in the watershed with materials, including videos, live presentations, brochures, and other media.
	Public education program	Outreach material on proper water management practices for homeowners will be annually reviewed and updated.
Public Participation & Involvement	Citizen Advisory Committee	A Citizen Advisory Committee comprised of a representative of the County, SWCD, Agriculture, Lake Association and citizen at large will meet monthly 10 times per year to review, discuss and

Minimum Control Measure	Programmatic Asset	Level of Service/Measure of Effectiveness
		advise the Board on water resource problems, issues and concerns.
	Public Input Meetings and Surveys	A public meeting and forum will be publicly noticed and convened annually to review and discuss water management and receive public input.
	Technical Advisory Committee	The Technical Advisory Committee will meet monthly to review physical, social and legislative and economic circumstances that have/are/will affect water management.
Illicit Discharge Detection and Elimination	Ditch Inspections	A survey during dry weather of 20% of the storm drain system per year will be conducted to identify condition and exception to the system. Potential violations will be reported to the water quality and enforcement personnel and the city where the issue was found. Findings will be inspected to detect suspected direct connections to the wastewater system and identify areas where wastewater might be leaking into adjacent storm drainpipes.
	Investigation and Sampling	To collect samples from all unknown/unidentified discharges for physical and chemical analysis to determine content and concentration of the sample and the appropriate course of action.
	Issues Hotline and Log	A hotline and log for citizens to report illegal dumping and suspicious discharges as well as other problems, issues and concerns will be established and maintained. The hotline will be advertised on the District website and by placement of one ad in the local newspaper every six (6) months.
	Storm Sewer and Outfall Map	A map of the District water resources, active construction and other permits and the location of issue reported and under investigation will be developed monthly and reported to the Board of Managers and on display in the Operations Center and office of the Watershed Development Coordinator.
Construction Site Stormwater Control	Environmental Review	Review and evaluation of all water appropriation and works in the bed permit applications potential for significant impact on the water and related land resources of the watershed.
	Permit Inspection	To ensure compliance with permit requirements and the goals, objectives, and rules of the District.

Minimum Control Measure	Programmatic Asset	Level of Service/Measure of Effectiveness
Construction Site Stormwater Control	Plan Review	In addition to the BMP requirements for all development, require each proposed development to implement onsite structural BMPs to control pollutants in stormwater, and manage hydromodification that may be caused by stormwater discharged from a project. • Require and confirm that prior to occupancy and/or intended use of any portion of the project, each structural BMP is inspected to verify that it has been constructed and is operating in compliance with all of its specifications, plans, permits, ordinances, and the requirements of the Municipal Permit.
	Pre-Application Meeting	to openly consider the proposals, concerns, and requirements of the applicant and the District.
	Rules & Standards for Land Disturbing Activities	Prescribe general, source control, and LID BMP requirements, as outlined in the Permit, during the planning process for all development projects. • Identify the roles and responsibilities of its various municipal departments in implementing the structural BMP requirements, including each stage of a project from application review and approval through BMP maintenance and inspections.
	Routine Maintenance	Inspections: The District is required to inspect the components of the watershed's stormwater system that is within the District's operational jurisdiction.
		Litter & Debris Removal: Regular removal of debris and litter can be expected to help in the following areas: • Reduce chances of clogging outlet structures and trash racks • Reduce chances of diverting or deflecting flow into ditch bank and causing erosion • Prevent damage to vegetated areas • Reduce mosquito breeding habitats • Maintain ditch or facility appearance • Reduce condition for excessive algae growth
		Vegetation & Ground Cover Management: Most BMPs rely on vegetation to filter sediment from stormwater before it reaches the BMP and prevent erosion of the banks and the bottom of the facility.
		Access Management: Most District facilities are designed so that heavy equipment can safely and easily reach the facility for non-routine maintenance.

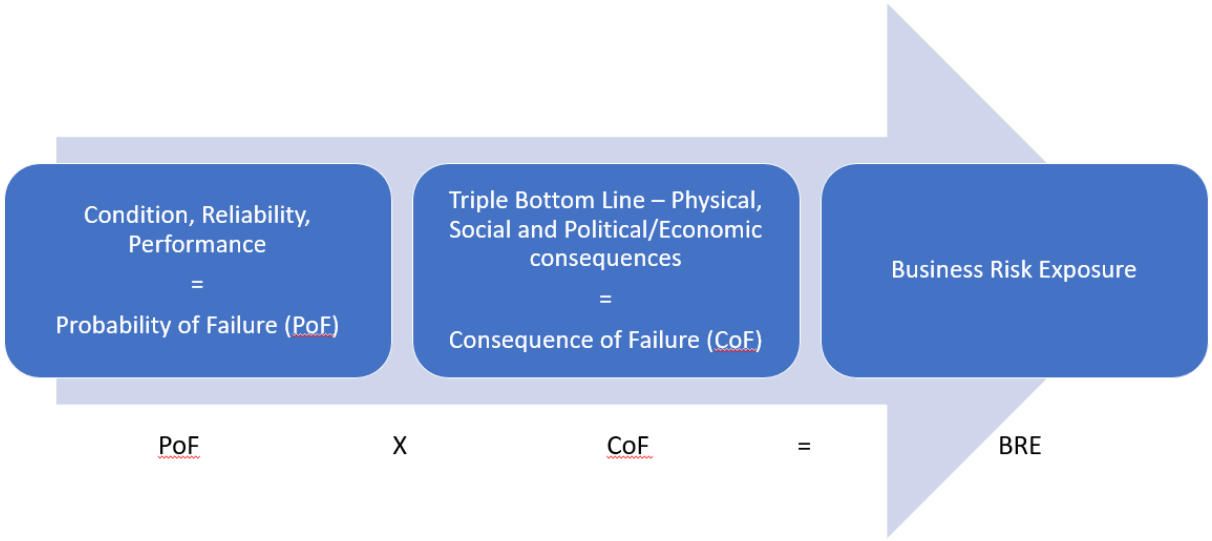
Minimum Control Measure	Programmatic Asset	Level of Service/Measure of Effectiveness
	Non-Routine Maintenance	Cleanout Trees and Sediment: Trees and sediment naturally accumulate in ditches and stormwater facilities and eventually need to be removed. Facilities and portions of ditch systems vary so dramatically in terms of removal requirements, that there are no fast "rules of thumb" to guide maintenance.
		Structural Repair: A stable embankment is important to ensure that erosion does not contribute to water quality problems and that embankments are not breached, resulting in downstream flooding.
	Repair and Rehabilitation	Eventually, like most infrastructure, system components will need to be replaced or reconstructed. System components/facilities may include: • Ditch Channel • Earthworks such as embankments • Ditch/stream banks and side slopes • Weirs and Ditch plugs • Inflow and outflow devices
	Construction Retrofit and Rehabilitation	New construction or modification of drainage or stormwater facilities or the increase in capacity of existing systems.
	Water Quality Outcomes	• Avoid and minimize sediment and pollution discharges from the work area • Prevent drainage systems, facilities and property from becoming pollutant sources • Avoid or minimize vegetation removal • Preserve native plants
	Infrastructure Maintenance Outcomes	• Protect public health and safety • Prevent catastrophic infrastructure failures • Maintain or restore the intended infrastructure function • Prevent or reduce flooding • Protect infrastructure • Meet public expectations for aesthetics

What Problems, Issues and Concerns are Critical

The criticality of any problem, issues or concern is a measure of the risk to the public health, safety, and welfare and/or productivity capacity of the watershed in the event of failure. The more critical the problem, issue or concern, the higher the risk to which the Cities and the watershed district are exposed. This risk may come in the form of flooding, reduced access to clean water, and impairment of water bodies in the case of:

- Natural assets such as drinking water or floodplain
- Physical assets such as pipes, BMPs, etc.

The risk in the case of programmatic assets is different, but significant regardless. This risk may manifest in the form of permit violations, illicit discharges, or non-routine maintenance that become a cumbersome and expensive liability. It is important to understand which problems, issues and concerns are critical to address; this involves an examination of the origin of the problem, issue or concern, how the problem, issue or concern developed, The likelihood of it developing and or developing, the cost to repair and what is the consequence of failure.



Variables used in evaluating the probability of failure included:

- Number of times problem/issue/concern has been raised and/or dealt with in the past 10 years.
- General condition of the asset(s) involved.
- Severity: Rate at which use is causing or creating problems or issues.
- Reliability of past intervention methods: Time between issues.
- Corrective Maintenance of intervention: Number and types of problems/issues/concerns (Impact/Import).
- Number of significant corrective events.
- Cost of correction/mitigation.

Variables used in evaluating the consequence of failure involved the physical, social, and economic impacts of the problem/issues/concern:

- The effect on Public Health and Safety
- Regulatory and Legal consequences
- Problem Complexity

- Control: Ability/Inability to isolate and recover
- Number of people affected.
- Mitigation cost
- Emergency repair cost
- Loss of public relations

Uncertainty, the inability to foretell consequences or outcomes because there is a lack of knowledge or bases on which to make any predictions is expressed as the standard deviation in the probabilities of failure and consequence.

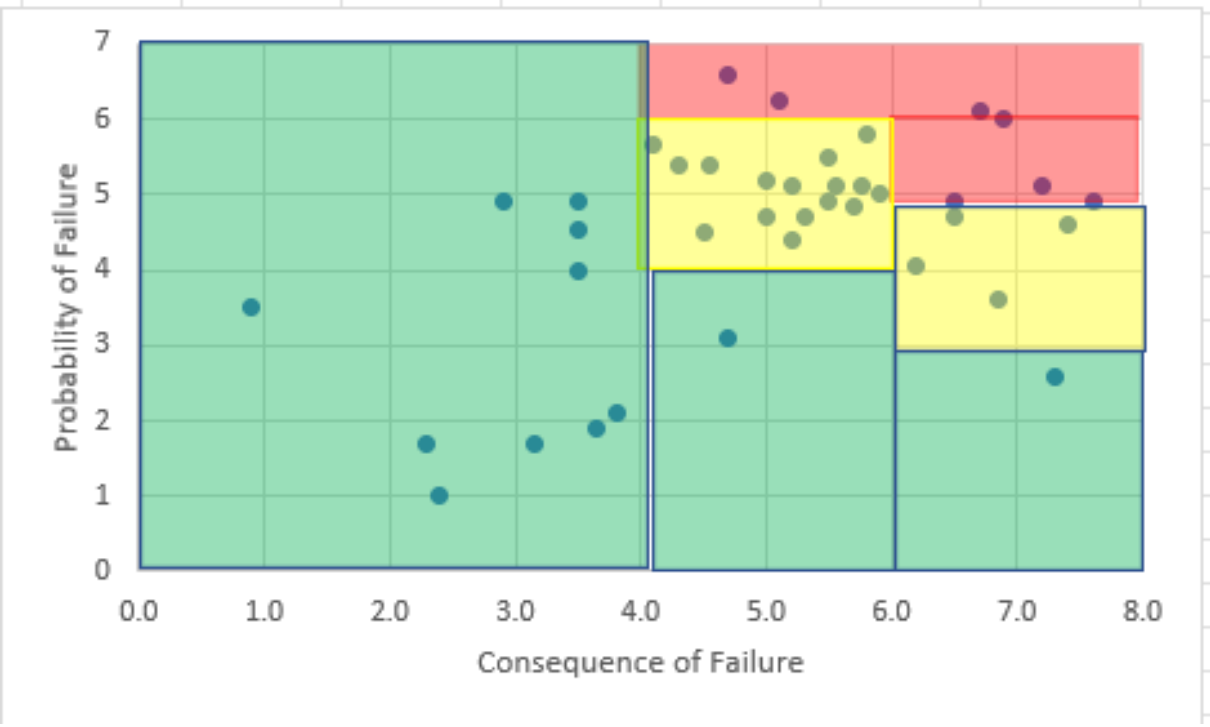
It should be noted that no tool can make risk analysis fool proof. While the tool can facilitate a proper and rigorous application, every application will require careful and systematic application and the application of good common sense at every step.

The table below shows a slightly different presentation of the BRE analysis.

- Green Zone: Problems, Issues and Concerns are deemed low risk,
- Yellow Zone: Problems, Issues and Concerns are deemed medium risk.
- Red Zone: Problems, Issues and Concerns are deemed High risk.

The assets in the upper right corner have the highest (Possibility of Failure) PoF and Consequence of Failure (CoF) scores. These problems, issues and concerns need immediate attention, and as such, resources should be prioritized accordingly.

1. The green shading represents the area where problems, issues and concerns have a low PoF and low CoF. Resources can be diverted from these assets as well because of the low consequence of failure.



Red Zone: High Risk Priorities

Wetlands	Problem
Water Quality	Issue
Chloride	Issue
Ground water - Surface water Interactions	Concern
Drinking Water	Concern

Yellow Zone: Medium Risk Priorities

Obstructions to flow	Problem
Flow velocity and rate	Problem
Ditch maintenance	Problem
Suspended Solids	Problem
Flooding	Problem
Altered Hydrology	Issue
Threatened and Endangered Species	Issue
Stage and discharge	Issue
Aquatic Life	Issue
Dissolved Oxygen	Issue
Fisheries	Issue
Phosphorus	Issue
E. coli	Issue
Groundwater	Concern
Water Supply	Concern

Green Zone Priorities

Poor Habitat	Problem
Silting and scouring	Problem
Channel vegetation	Problem
Channel Restoration	Problem
Bank stabilization	Problem
Channel size and shape	Problem
Channel irregularity	Problem
Channel alignment	Problem
Cross sectional geometry	Problem
Impact on Parks	Problem
Land Use	Problem
Lake Health	Issue
Riparian areas	Issue
Contaminants of Emerging Concern	Issue
AIS	Issue
Stream substrate	Issue
Source water protection	Issue
Detritus & vegetative debris	Issue
Precipitation changes (Intensity)	Concern
Seasonal change	Concern

Target Identification and Categorization

Domain	Problems	Issues	Concerns
Groundwater		• Source water protection	• Ground water - Surface water Interactions • Precipitation changes (Intensity) • Drinking Water – Size of reserves • Groundwater • Water Supply • Wetlands
Public Drainage	• Ditch maintenance • Obstructions to flow • Channel vegetation • Flow velocity & rate • Channel alignment • Poor Habitat • Channel Restoration • Cross sectional geometry • Channel irregularity	• Riparian areas • Stage and discharge • Detritus & vegetative debris • Stream substrate	
Water Quality	• Bank stabilization • Channel alignment • Channel irregularity • Channel Restoration • Channel size and shape • Poor Habitat • Silting and scouring • Suspended Solids	• AIS • Altered Hydrology • Aquatic Life • Chloride • Contaminants of Emerging Concern • Dissolved Oxygen • E. coli • Fisheries • Lake Health • Phosphorus • Riparian areas • Water Quality	
Water Quantity	• Flooding	• Stage and discharge	• Ground water - Surface water Interactions • Precipitation changes (Intensity) • Seasonal change
Wetlands	• Wetland Identification/ Delineation	• AIS • Riparian areas • Threatened and Endangered Species	• Ground water - Surface water Interactions • Precipitation changes (Intensity) • Seasonal change

Threat Capability

Domain	Statement
Groundwater	The high conductivity and transmissivity and unknown reserves of drinking water present threats have the capability of affecting the health, safety, and welfare of all 166,716 people within the District.
Public Drainage	Threat has the capability to result in crop land whose crop damages would exceed $422 million.
Water Quality	This threat has an extremely high potential to result in an increase in public costs for mitigation, Loss of specific beneficial uses of water, and damage to public infrastructure.
Water Quantity	This threat will damage to property, land & infrastructure due to inundation or prolonged saturation.
Wetlands	Threats are related to the direct loss of species or habitat and the indirect loss of species or habitat. Indirect impacts are the loss of landscape function and the "free' infrastructure which is factored into the water management of the watershed.

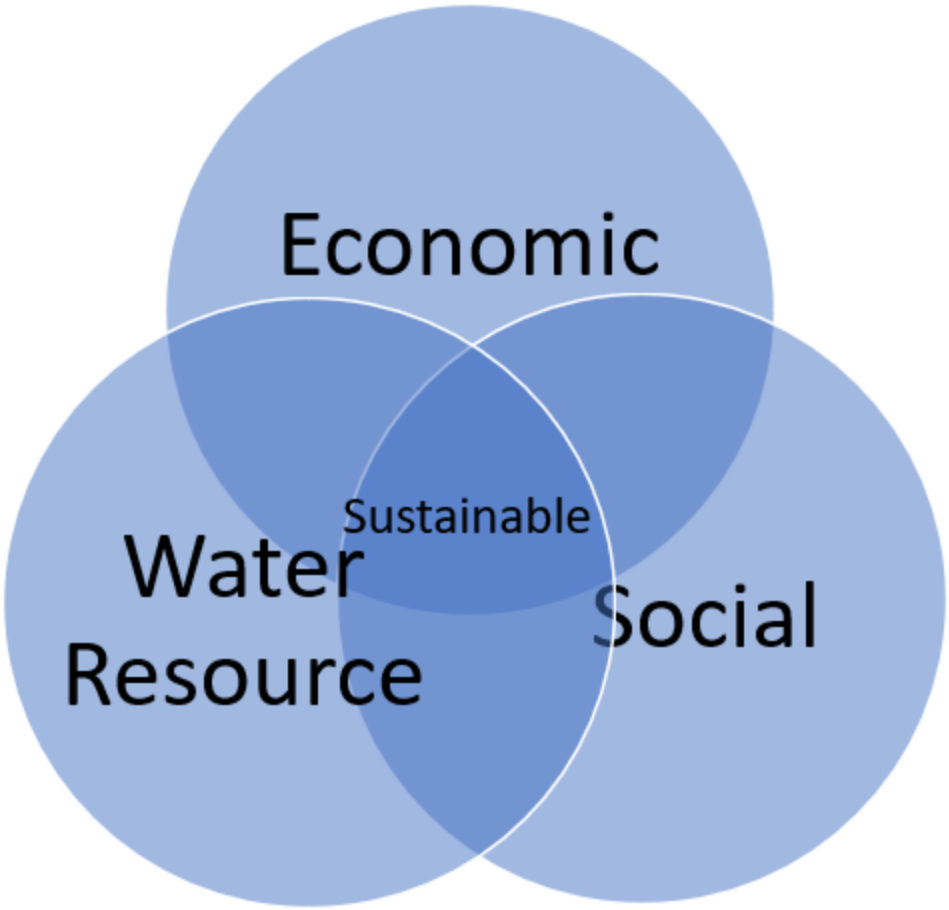
Future Investment Decision Making

Decision making on the prioritization of problems, issues and concerns involves understanding the risks and the criticality of the situation and determining at what point water managers should intervene to avoid a failed condition with an unacceptable cost and/or consequence.

It is important to note that condition assessment alone does not provide any benefit in risk reduction. The follow-up decision making process that leads to prioritization ranking and rehabilitation ranking followed by action to fix problems and upgrade the system is what leads to risk reduction.

The purpose of this section is to highlight and summarize the decision-making process, the final step in the condition assessment process.

The triple bottom line approach was used to guide the process of determining CoF. Using the triple-bottom-line approach makes projects sustainable in that the decisions made in selecting and developing projects, prioritizing investments, and developing actions are less likely to be resisted, and more likely to be funded, maintained, and used. For this analysis, a balanced approach was used to weigh the environmental, social, and economic consequences of failure.



Triple Bottom Line

Two environmental criteria, two social criteria, and one economic criterion were identified against which the consequences of failure were evaluated. Economic criteria differ for existing non-channel assets, existing ditches, and other government assets, and future assets. The table below presents a summary of the evaluation criteria.

Category	Subcategory	Description
Social	Public Perception	Public perception, public trust in local water management declines.
	Public Health and Safety	Injuries, death, or property damage occurs. This includes external or non-quantifiable potential economic costs associated with increased health or safety risks to citizens.
Water Resource	Regulatory	State and Federal regulators take action for non-compliance with the MS4 permit. This includes external or non-quantifiable

Category	Subcategory	Description
		economic costs associated with a deterioration in trust of the regulators for which local management is taking appropriate actions to achieve compliance with a NPDES permit and TMDLs that is not explicit.
	Water Quality	Measurements of water quality show declines (e.g., stream or watershed health or condition declines, standards are no longer met). This includes external or non-quantifiable economic costs associated with a degrading or degraded quality or condition. Such economic costs could include reduction in property values, loss of jobs, and resulting reductions in tax revenues.
Economic	Financial	Cost to manage physical assets whether by replacement or being new to the asset register. Increased regulatory compliance costs, increased water management requirements, increased costs to pay for fines, settlements, and third-party lawsuits.