
2.0 Watershed Issue Identification and Assessment

Understanding that public support is critical for the efficient and effective operation of any government organization, the District emphasized public engagement and outreach throughout the development of this Plan. As a result, the issues identified and emphasized in this Plan are a result of stakeholder input. This section describes the District's public engagement strategy and summarizes the issues identified through its implementation.

2.1 Methodology

2.1.1 IAP2 Spectrum Planning Process

In developing this Plan, the District utilized a public engagement "spectrum" developed by the International Association of Public Participation (IAP2). The Spectrum is organized around the principle that the level of public participation is directly tied to the level of potential public influence on the decision or action being considered. The spectrum is separated into the following five levels of public involvement, each with differentiated goals:

Inform – the inform level provides the public with the information they need to understand an organization's (e.g., the District's) decision-making process, but does not provide the opportunity for public participation before decisions are made. This process does not attempt to persuade or manipulate the public, and thus differs from a public relations campaign. The goal of the public participation process at the inform level is to keep the public informed.

Consult – the consult level of public participation provides the basic minimum opportunity for public input prior to a decision. The consult level includes asking the public for input, but does not include an opportunity to meet together and work on things in any cooperative way. The organization considers the input it receives as it makes a decision. At this participation level, organizations generally ask for input at set points in the process and do not provide an ongoing opportunity for input. The goal at this level is to obtain and consider public input.

Involve – the involve level of public participation is more than a consultation. At the involve level, the public is invited into the process, usually from the beginning, and is provided multiple or ongoing opportunities for input as decision-making progresses.

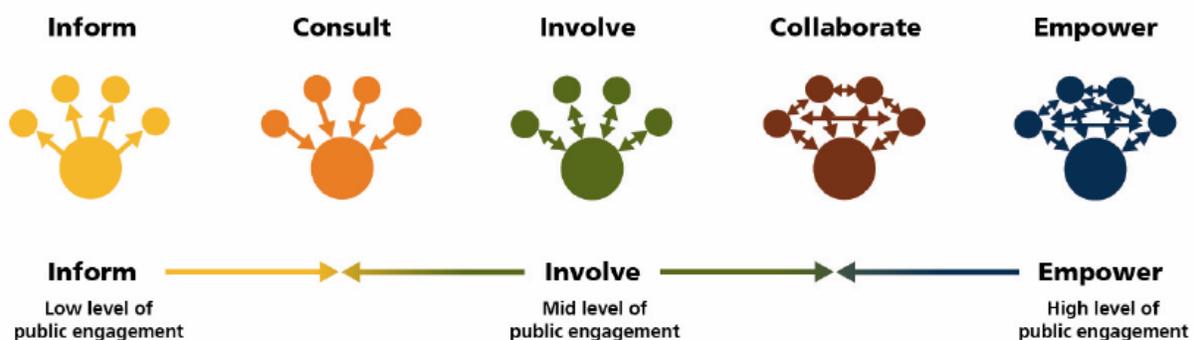
However, the organization is still the decision-maker and there is no expectation of building consensus or providing the public with influence over the decision. The goal at this level is to work directly with the public and consider their input throughout the decision-making process.

Collaborate – at the collaborate level of public participation, the public is directly engaged in decision-making. Collaborate often includes attempts to find consensus solutions. However, the organization is still the ultimate decision-maker. The degree to which consensus will be sought and how much decision authority the organization is willing to share must be clearly identified. In the end, the organization will take all of the input received and make the decision. The goal at this level is to design a process that allows for effective partnering with the public on all aspects of the decision.

Empower – the empower level of public participation provides the public with the opportunity to make decisions for themselves. The most common activities at this level are public voting or ballots, but there are other techniques available as well. Government organizations rarely conduct public participation at the empower level. In general, organizations are not permitted to delegate their decision authority to the public. The goal at the empower level is to create a program that allows the public to make an informed decision.

Throughout the development of this Plan, the District used these various levels of public engagement, see Figure 2-1. Specific public and stakeholder participation activities used during Plan development are described in Appendix A.

Figure 2-1 Public Engagement Spectrum ()



2.2 District Public Engagement Strategy

The District developed a public and stakeholder engagement strategy early in the Plan development process. The goal was to allow a process for residents and other stakeholders to directly influence the issues, strategies, and actions documented in the District's Plan. The process not only solicited information for District staff and Managers to interpret at the start of the Plan development process (IAP2 "consult" level), but provided ongoing communication for stakeholders to respond to District interpretation of their comments. The District's strategy goes above and beyond the required stakeholder engagement activities identified in Minnesota Statutes chapter 103B and Minnesota Rules chapter 8410. Figure 2-2 illustrates the District's plan development process and identifies public engagement steps and iteration processes.

2.2.1 Plan Update Notification Letter

At the start of 2015, the District notified the cities and state plan review agencies of the Plan update, consistent with the requirements of Minnesota Rules chapter 8410. The notification letter solicited input from these entities regarding key issues to be addressed in the Plan update and served as the start of the District's public input process. The District received responses to the notification letter from the following:

- City of Eden Prairie
- City of Minnetonka
- Metropolitan Council
- Minnesota Board of Water and Soil Resources (BWSR)
- Minnesota Department of Agriculture (MDA)
- Minnesota Department of Natural Resources (MDNR)

For example, the following comment from city of Minnetonka was received: *"The City would like to coordinate education and outreach efforts targeted towards Minnetonka residents for the purposes of promoting the District's cost share initiatives, raising awareness, and engaging the citizen base."*

FIGURE 2-2

STAKEHOLDER INVOLVEMENT DURING RPBCWD PLAN DEVELOPMENT



2.2.2 Issue Identification Workshops

The District's public and stakeholder input process is documented in Appendix A. Public and stakeholder involvement activities seeking input on watershed issues to be addressed in the Plan included the following:

- **Issue identification workshops** – Between March and May 2016, the District conducted six issues identification workshops. The purpose of these workshops was to identify water resource management issues and concerns to be addressed by the District Plan. These workshops targeted the Citizen Advisory Committee, Technical Advisory Committee, Board of Managers, District staff, and watershed residents, as follows:
 - March 21, 2016 – Citizen Advisory Committee workshop
 - March 23, 2016 – Technical Advisory Committee workshop
 - April 11, 2016 – Board of Managers and District staff workshop
 - May 11, 2016 – Bluff Creek Watershed public workshop
 - May 18, 2016 – Riley Creek Watershed public workshop
 - May 24, 2016 – Purgatory Creek Watershed public workshop



TAC members identifying concerns related to creeks in RPBCWD.

The Freshwater Society facilitated the workshops. Each meeting was conducted in the same format:

- **Introduction** – Each meeting began with a brief introduction to the District and the work it performs.
- **Issue identification** – Participants were divided into small groups (3-6 people) and each group was assigned a water resource type: lakes, creeks, wetlands, groundwater, and other. Groups were asked to share and write down their concerns about each resource type; the other group was included to capture any concerns that might not fall into one of the identified resource types. Groups then rotated to other resource types and were asked to “star” (using stickers) the already-identified concerns with

which they agreed, and identify any new concerns. This process continued until all small groups had commented on each resource type.

- **Prioritization process** – Following the issue identification exercise, the District Administrator delivered a short presentation describing how the District prioritizes projects. The small groups were asked to discuss the process and write down criteria or strategies they thought would be most effective in prioritizing projects.

All papers from the public meetings were collected and transcribed for analysis preserving the relationship between the comment, the commenting party (e.g., CAC, residents, etc.) and the resource group (e.g., lakes, creeks, etc.).

Following the stakeholder input activities described above, District staff organized and coded all comments received from the public, state review agencies, cities, managers, CAC, TAC, managers, and District staff. Comments were categorized according to topic area (at three levels of increasing specificity (e.g., (1) water quality, (2) pollution, (3) nutrients) and the applicable resource (e.g., lakes, wetlands).

In July 2016, the District distributed the coded results of the stakeholder input activities to all participants to solicit feedback on the comments and District coding. The District performed minor revisions to the comment coding based on feedback received from stakeholders who participated in the process (see Appendix A).

2.2.3 Online Resident Survey

In addition to the stakeholder engagement events described in Section 2.2.4, the District hosted an online survey seeking input from residents. The survey was hosted on the District website from February to June, 2016. The survey contained 23 questions about how residents use and value water resources, resident concerns about water resources, and residents' willingness take action to protect water resources. The District advertised the survey at several community events. Ultimately, over 400 residents participated in the survey.

District staff summarized the full results of the survey in a Survey Summary Report. This was published on our website, social media, distributed to cities and other partners (Appendix A). Key survey results were summarized in a two-page graphic distributed at District events and published in local newspapers.

2.2.4 Watershed Outreach Workshop

As part of its stakeholder engagement process, the District solicited additional public input on the District's education and outreach strategies. An October 24, 2016 notice to local papers and cities invited stakeholders to participate in the workshop. The District also used its email list serve, conventional mailings, as well as social media, and in-person conversations to invite stakeholders to the workshop. Participants



included conservation organizations, homeowners associations, lake associations, city commissions, teachers, students, and the District's CAC.

The watershed outreach workshop was held on November 17. District staff summarized the results of the workshop and provided that information to participants for feedback. The District has incorporated the results of the workshop (Appendix A) into its Education and Outreach Plan included as Appendix B to this Plan.



Residents discussing education and outreach at the November 17, 2016 watershed

2.2.5 Teacher Survey

The District also engaged with teachers in the District through a brief survey to identify support needs for water education. The aim of this survey was to determine resources that would best support the work of local educators in teaching water resources. The survey was open for a two month period. District staff summarized the results of the survey (Appendix A) and utilized this information as part of building the Education and Outreach Plan (Appendix B).

2.3 Issue Identification and Prioritization

The District's public engagement strategy yielded over 500 stakeholder comments (in addition to online survey responses). Comments were organized into the following issue areas for organizational purposes:

- Administration
- Data Collection
- Education and Outreach
- Planning
- Regulation
- Water Quality
- Water Quantity

Teacher Comments:

"This might be a great way for our classroom to partner with the community."

"With 160 students per day, and a super small budget, a field trip is hard. I would attend Professional Development opportunity, if it wasn't costly, during the summer. Mostly filling out this survey, is just to get on your e-mail list, in case you offer good information. Thank you for everything that you do."

"Bluff Creek runs directly through our green space at Chan high. Each spring we do Biotic and abiotic tests concerning water quality in this creek. Any maps of our watershed would be useful. thanks for asking!!"

These topics are described generally within this section. Major themes identified by the public engagement process are highlighted. Many comments provided by stakeholders apply to multiple topic areas for the various water resources types. For organizational purposes, comments are categorized according to the topic area most closely tied to the comment and with consideration for the intent of the comment, as observed by District staff during the workshops. A complete list of comments, cross-referenced to the above topic areas, are included in Appendix A.

2.3.1 Administration

The District is a local unit of government responsible for performing its statutory duties, and exercising its statutory authorities, with finite resources. The extent to which the District may implement projects and programs to achieve its goals is limited by the availability of funding. The District is challenged to achieve its goals through efficient and effective operation. This requires making informed and sound management decisions and balancing responsibilities among the District Administrator and staff, cities, cooperating agencies, and consultants.

The District is funded by public dollars collected via an ad valorem tax levy. The District has a duty to its taxpayers to spend its funds in a responsible manner that considers the relative benefits, per dollar, of its actions. The benefits of effective water resource management are difficult to quantify in dollars (e.g., increased wildlife habitat or recreational use).

Specific administrative matters identified in the public engagement process include:

- Meeting educational needs with limited resources
- Workload and how to get it done: staff, volunteers, contractors; balancing the work
- Lack of funding
- More detailed communication with cities about monthly District meeting agendas

The District seeks to address these and other administrative challenges through its administration strategies described in Section 3.2.1.

2.3.2 Data Collection

Data collection is an important role critical to the pursuit of District goals. Effective and efficient watershed management requires decisions that are informed and supported by sound science. Accurate monitoring data allows the District to identify potential water resource management issues (e.g., lake water quality) and track changes over time. Additionally, research, modeling, and feasibility studies allow the District to identify factors contributing to water resource management issues and develop targeted solutions. This process requires continued data collection, as well as accurate and unbiased interpretation of that data using best professional judgement.



Staff Josh Maxwell monitoring the carp population on Lotus Lake

The public engagement process identified a broad range of matters related to data collection. Key data collection issues include:

- Additional studies addressing emerging issues (e.g., impacts of climate change, groundwater-surface water connectivity, groundwater sustainability)
- Developing methods to track/evaluate performance of projects
- Coordinating with other agencies to develop and share data
- Understanding the condition of natural resources through resource assessments and inventories:
 - Wetlands
 - Groundwater
 - Lakes
 - Creeks

The District seeks to address these and other data collection challenges through its data collection strategies described in Section 3.2.2.

2.3.3 Education and Outreach

Public education and outreach plays an important role in protecting water resources. Education and outreach provide opportunities for the District to raise awareness of its role in managing water resources and increase public confidence in its expertise. The District and cities also use education and outreach to raise awareness of the impact that individuals, businesses, and organizations can have on the watershed, both positive and negative. Education and outreach provide opportunities for the District to develop watershed stewards who demonstrate and promote watershed best management practices.

The District received almost 200 comments regarding education and outreach through the District's initial public engagement activities. Due to the significant amount of comments, the District performed additional engagement activities specifically addressing education and outreach. Common themes identified through the public input process include:

- Raising awareness of our water resources
- Engaging the public in district activities
- Increasing water stewardship
- Building capacity through volunteer programs and other engagement programs.

Below are some highlights of some of the topics that have been identified in the initial public input process:

- Building awareness of watershed best management practices/harmful practices
- Increasing knowledge of wetlands, ecosystems, and invasive species
- Increasing knowledge of groundwater resources and groundwater sustainability
- Balancing water resources protection with recreational access and opportunities
- Building capacity for residents to practice and promote good watershed stewardship
- Providing cost-share opportunities for residents, home and lake associations, and others to implement best management practices
- Increasing communication between the District and residents regarding District activities.

In our additional engagement activities, education and outreach topics fell into three broad categories:

- How does water work?
- Local watershed information
- What can I do?



Watershed outreach map showing where participants came from.

District staff also identified subtopics such as invasive species, pollution, water quality trends and resource access. The most frequent subtopic was metrics, which was defined as the way water quality or project successes are measured.

The District seeks to address these and other education and outreach opportunities through its education and outreach strategies described in Section 3.2.3 and the District's Education and Outreach Plan (see Appendix B).

2.3.4 Planning

Effective watershed management requires planning to ensure that District projects, programs, and actions achieve the greatest possible benefit. Thoughtful evaluation and prioritization of projects and activities are necessary to deliver targeted benefits from limited resources. Transparent and defensible project prioritization methods are also critical for building partnerships and stakeholder trust.

Achieving long-term benefits requires consideration for possible future political, environmental, and social conditions that may affect project performance, stakeholder support, or participation. District actions must be compatible with the plans of the city in which they are located (e.g., land use, redevelopment). Similarly, projects must be designed to function under future climate conditions (e.g., changes in precipitation, groundwater levels).

The public engagement process identified nearly 150 comments addressing planning issues and opportunities. Major themes related to planning include:

- Developing a transparent, fair, and objective project prioritization methodology
- Addressing/planning for climate change in District actions, programs, and projects
- Expanding and leveraging partnerships to achieve goals
- Evaluating past performance to inform future planning

The District seeks to address these and other planning challenges through its planning strategies described in Section 3.2.4 and the District's project prioritization methodology (Section 4.0).

In addition, the District conducted community resilience workshops focusing on our changing climate in early 2017. Through the workshops, the following climate hazards were identified as top concerns:

- Extreme precipitation
- Drought
- Extreme heat
- Warmer Winters

Participants identified recommendations to help curb climate impacts to society, the environment, and the built infrastructure. The District will use these recommendations and incorporate them into District programs and projects. The factsheet on the following pages summarize the Districts resilience workshops.

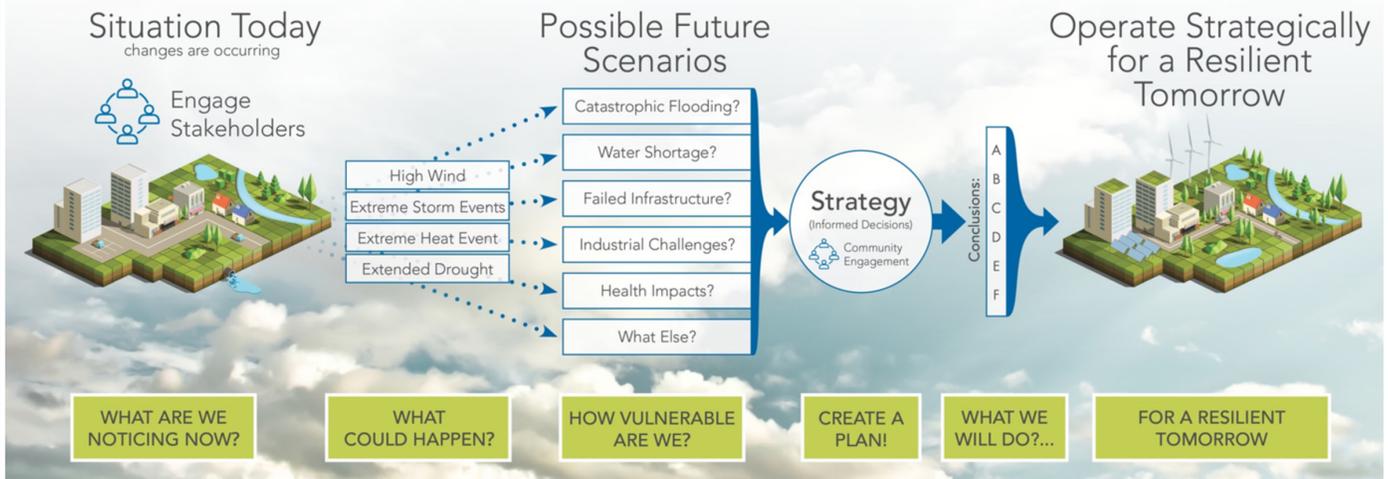
RPBCWD IS PREPARING!

Making Adaptation Plans for Minnesota's Changing Climate

Riley Purgatory Bluff Creek Watershed District participated in a workshop series to identify opportunities to build resilience related to local climate change. Climate change is one of the greatest challenges facing society today. In Minnesota, there is a risk due to increases in extreme heat, extreme rainfall, higher summertime dew points, warmer winters, and the intensity of severe storms. Outcomes from the workshop are being used to inform recommendations in the Riley Purgatory Bluff Creek Watershed District Ten Year Plan.



Preparing for our Changing Climate



The Climate Adaptation Planning Process The workshop series walked RPBCWD participants through the first three stages of climate planning, shown above. The workshop began the process of brainstorming strategies to address RPBCWD's climate concerns to be incorporated into the District's Ten Year Plan. Implementation and operation of solutions to follow.

WORKSHOP SPONSORS



RPBCWD's Top Climate Hazards

Climate hazards are natural events or patterns related to climate change that can cause harm to people, infrastructure, and the environment. Workshop participants identified the following four hazards as the ones of most concern in Riley Purgatory Bluff Creek Watershed District:



Extreme Precipitation

An increase in large storm events is documented in Minnesota. Riley Purgatory Bluff Creek Watershed District experienced this issue in June of 2014. Duluth's staggering 2012 extreme precipitation event demonstrated the serious impacts of such storms.



Drought

Climatologists point out that within Minnesota's normal range of weather extremes is the drought of the dustbowl days in the 1930s. Although there is no recent trend for drought (except for 2012), Riley Purgatory Bluff Creek Watershed District can expect drought to occur again. Long-term predictions of greater than ten years show an increased likelihood of drought.



Extreme Heat

Although not currently experiencing abnormal heat events, Riley Purgatory Bluff Creek Watershed District is experiencing greater summer humidity, which pushes up the heat index and makes it harder to cool off. Extreme heat is predicted for the not-too-distant future.



Warmer Winters

Riley Purgatory Bluff Creek Watershed District is currently experiencing an increase in winter nighttime low temperatures. Consequences include better survival of invasive species and the loss of winter recreational activities as snow and ice season shortens.

Climate Impacts & Recommendations for RPBCWD

Participants of the workshops focused on three sectors of the community and impacts from locally changing climate:

- 1 Impacts to Society
- 2 Impacts to the Environment
- 3 Impacts to Built Infrastructure

Participants listed solutions to these impacts and set priorities. The top ranked priorities for actions to bolster resilience are listed below.

SOCIETY

Primary areas of concern for people in Riley Purgatory Bluff Creek Watershed District include impacts to vulnerable populations such as the elderly, disadvantaged children, and the disabled in times of emergency. Also of importance is maintaining access routes to nursing homes and hospitals during emergency events. A dwindling drinking water supply may become an issue during times of drought.



Source: Milwaukee Community Journal

WORKSHOP RECOMMENDATIONS

Protecting RPBCWD's People:

- Continue to work with cities to alert them of potential flooding of streets during extreme storm events — Be certain that routes for emergency vehicles (especially to hospitals) remain open.
- Establish an education program to make citizens aware of the causes of aquifer drawdown and how to prevent future drinking water shortages — Create education and incentive programs that encourage the storage and reuse of stormwater. Work where possible to promote state regulations that allow for the use of grey water within and outside of buildings.
- Translate EMS emergency response instructions into different languages spoken within the District — Work with organizations such as the non-profit PROP to access and educate vulnerable populations on District and climate related issues.



ENVIRONMENT

Primary impacts of concern to the environment in Riley Purgatory Bluff Creek Watershed District include aquifer drawdown with increased water demand as the population grows and during dry periods. It is suggested that implementing rainwater gardens across the District along with other forms of green infrastructure (such as a robust urban tree canopy) will allow for water to soak into the ground and recharge the aquifer, while trees will help keep the city cool during hot summers. Invasive plant and animal species such as buckthorn, curly-leaf pondweed, and zebra mussels are a concern because of their complete takeover of their environment and elimination of biodiversity. Another concern includes warming lake temperatures.



WORKSHOP RECOMMENDATIONS

Protecting RPBCWD's Natural Environment:

- Educate citizens about the issue of local aquifer draw-down — Encourage potable water conservation, especially through the reduction of lawn irrigation. Consider implementing stormwater and grey water reuse systems where they make sense.
- Educate constituents on the impacts of warming lakes through warmer winter minimum temperatures — Discuss impacts on water quality, recreation, and fish habitat. Consider mitigation programs.
- Conduct a study to identify slopes along the Minnesota River valley that are vulnerable to failure — Create an action plan to protect people, structures, and infrastructure in high risk areas.
- Continue to conduct public education on problematic invasive plant and animal species — Partner with environmental agencies and cities to control the most destructive species.



3

INFRASTRUCTURE

Primary impacts of concern to the built infrastructure in Riley Purgatory Bluff Creek Watershed District include providing protection to homes in areas of high risk from landslide and flooding. There is also a concern of future damage to culverts at critical road crossings during extreme weather events, as well as interest in addressing erosion within Riley creek.



Source: Spiel On Line



WORKSHOP RECOMMENDATIONS

Protecting RPBCWD's Built Infrastructure:

- **Repair erosion damage at points within Riley creek where stormsewers enter the channel** — Also, continue to promote the use of BMPs such as pavement reduction, implementation of rainwater gardens and stormwater reuse systems to reduce the volume of water flowing into the creek via stormsewers.
- **Conduct a study to identify culverts at greatest risk of damage during extreme storm events** — Work with cities to replace the most vulnerable culverts in the District.
- **Recognize that aging stormwater ponds are losing storage capacity because of sediment accumulation** — Continue to identify those ponds that have lost the greatest amount of stormwater storage and assist in the revitalization of these ponds.
- **Conduct a study in conjunction with local municipalities of those slopes vulnerable to landslides due to saturated soils** — Assist them in protecting homes along the slopes.
- **Continue to work with home owners in areas expected to flood in the future to help them prepare for potential extreme weather situation**



Moving Forward

Riley Purgatory Bluff Creek Watershed District is in the planning process to adapt to Minnesota's changing climate and the multiple impacts that the community will experience. Proactive planning is the economically efficient route to climate adaptation, rather than reacting to the impacts of heat, storms, ice, and warm winters as they occur.



The purpose of the workshops was to build relationships across the community, create a shared knowledge base, and harvest potential strategies. They were intended to be the first of many community conversations to make RPBCWD resilient in the face of climate change. This planning effort is being used to inform Riley Purgatory Bluff Creek Watershed District's Ten Year Plan, which is in the works.

2.3.5 Regulation

The District is one of several government entities with water resource management responsibilities and regulatory authority within the watershed (Figure 1-3). In accordance with Minnesota Statutes section 103D.341, the District has adopted rules, first adopted in 1973 and last revised in 2014, to ensure that land-disturbing activities do not degrade water quality, increase risk of flooding, or otherwise negatively affect water resources. Consistent enforcement and periodic evaluation of District rules is critical to protect valuable resources while not placing unnecessary burdens on developers, residents, and cities.



Temporary and permanent erosion control measures are essential to reducing pollution in runoff

Overlapping permitting and stormwater management authorities may allow for specialization of resources and expertise, but can also create the potential for redundant and less efficient processes. Communication between the District and other units of government, especially its cities, is necessary to identify areas where efficiency may be increased as well as areas where additional effort is needed to prevent concerns from going unaddressed.

Responses to the Plan update notification letter and public engagement workshops yielded several comments related to regulation issues and opportunities. Key regulation comments identified include:

- Promoting and enforcing buffer requirements
- Protecting high quality wetlands
- Documenting and complying with stormwater maintenance requirements
- Coordinating the development review and approval process between the District and cities

The District seeks to address these and other regulation challenges through its regulation strategies described in Section 3.2.5 and the District's rules and permitting program (Section 9.4).

2.3.6 Water Resource

Comments identified through the District’s public engagement strategy addressing specific water quality and water quantity matters (e.g., flooding) are generally categorized as “water resource” issues and are described in greater detail in the following sections.

2.3.6.1 Water Quality

Improving and protecting water quality is a primary focus of the District. The District received approximately 130 comments related to water quality. Water quality comments are further subdivided into concerns addressing:

- Pollution
- Habitat
- Erosion

These topics are described in greater detail in the following sections, along with common comments received during the public engagement process.

Pollution

Pollutants are discharged to surface waters via either point sources or non-point sources. Point sources discharge pollutants to receiving surface waters at a specific point from a specific identifiable source. Non-point source pollution cannot be traced to a single source or pipe. Instead, pollutants are carried from land to water in stormwater or snowmelt runoff, in seepage through the soil, and in atmospheric transport.

For most waterbodies, non-point source runoff—especially stormwater runoff—is a major contributor of pollutants. Pollutants may include phosphorus, sediment, chlorides, oil, grease, chemicals (including hydrocarbons), nutrients, metals, litter, and pathogens, which can severely reduce water quality.

For example, in lakes, ponds, and wetlands, phosphorus is typically the pollutant of major concern. Land use changes resulting in increased imperviousness (e.g., urbanization) or land disturbance (e.g., urbanization, construction, or agricultural practices) result in increased amounts of phosphorus carried in stormwater runoff. In addition to watershed (stormwater runoff) sources, other possibly significant sources of phosphorus include atmospheric deposition, internal loading (e.g., release from anoxic

sediments, algae die-off, aquatic plant die-back, and fish-disturbed sediment), and non-functioning subsurface sewage treatment systems (SSTS).

As phosphorus loads increase, it is likely that water quality degradation will accelerate, resulting in unpleasant consequences such as profuse algae growth or algal blooms. Algal blooms, overabundant aquatic plants, and nuisance/exotic species, such as Eurasian watermilfoil, purple loosestrife, and curlyleaf pondweed, will flourish and interfere with ecological function as well as recreational and aesthetic uses of waterbodies. Phosphorus loadings must often be reduced to control or reverse water quality degradation.

Comments related to pollutants provided during the District's public engagement process include:

- Reducing the use and environmental impact of chlorides (e.g., road salt)
- Concern over loading of nutrients to creeks, lakes, and wetlands from stormwater runoff
- Retrofitting of stormwater infrastructure and using redevelopment opportunities to improve water quality



Stormwater discharging from Lake Susan Park Pond into Riley Creek

The District seeks to address these and other pollution challenges through its water quality strategies described in Section 3.2.6.2.

Habitat

Diverse wetland systems, shoreland areas, and natural spaces are critical components of a healthy hydrologic system and positively affect soil systems, groundwater and surface water quality and quantity, wildlife, fisheries, aesthetics, and recreation. Wetlands and shoreland areas provide valuable habitat for many types of wildlife including waterfowl, songbirds, raptors, mammals, fish, and many species of amphibians. Maintaining and improving wildlife viability requires that water resources and land management activities consider the habitat benefits of affected areas.

Wetlands and shoreland areas are important for protecting and maintaining downstream water quality and the ecological integrity of the communities that inhabit these areas. Overloading wetlands beyond their natural capacity with sediment, nutrients, or other pollutants can diminish their effectiveness in providing water quality benefits. The benefits of wetlands and shoreland may also be compromised by hydrologic alterations, the presence or absence of vegetated buffers, exotic and invasive species, habitat loss, and erosion and sedimentation.

The effectiveness of wetland communities for wildlife habitat, and for human appreciation, is greatly increased when they are physically or functionally connected with other native communities. Development of land and other human activities can affect the hydrology, pollutant loading, and connectivity of wetlands and shoreland areas. Numerous wetlands within the District have already been affected by hydrologic alterations, both direct and indirect.

Comments related to habitat provided during the District's public engagement process include:

- Establishing and maintaining vegetated buffers
- Managing aquatic invasive plants
- Establishing healthy fisheries and managing invasive fish species
- Preserving and restoring connectivity between natural areas and greenspace



Rapid AIS response by hand-pulling watermilfoil from Staring Lake

The District seeks to address these and other habitat challenges through its water quality strategies described in Section 3.2.6.2.

Erosion

Sediment is a major contributor to water pollution. Stormwater runoff from streets, parking lots, and other impervious surfaces carries suspended sediment consisting of fine particles of soil, dust, and dirt. Abundant amounts of suspended sediment are carried by stormwater runoff from actively eroding areas. Although erosion and sedimentation are natural processes, they are often accelerated by human activities, especially during construction activities. The increased stormwater runoff rates and volumes cause increased soil erosion, which releases significant amounts of sediment

that may enter water resources. Erosion also results in channelization of stormwater flow, increasing the rate of stormwater runoff and further accelerating erosion. Erosion in developed areas may increase risk to structures due to slope failures.

Regardless of its source, erosion and sediment deposition decreases water depth, degrades water quality, smothers fish and wildlife habitat, and degrades aesthetics. Sediment deposition can also wholly or partially block culverts, manholes, storm sewers, etc., causing flooding. Sediment deposition in detention ponds and wetlands also reduces the storage volume capacity, resulting in higher flood levels and/or reducing the amount of water quality treatment provided. As erosion and sedimentation increase, the stormwater management systems (e.g., ponds, pipes) require more frequent maintenance, repair, and/or modification to ensure they will function as designed.

Comments related to erosion provided during the District's public engagement process include:

- Understanding the impact of shallow groundwater and development on bluff and steep slope stability
- Stabilizing streambanks and restoring channel meandering
- Reducing sediment loading to creeks, lakes, and wetlands

The District seeks to address these and other erosion challenges through its water quality strategies described in Section 3.2.6.2.



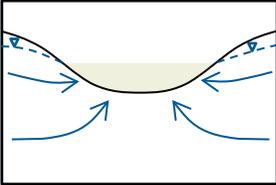
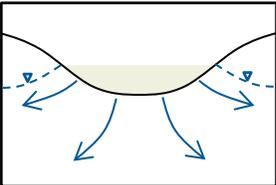
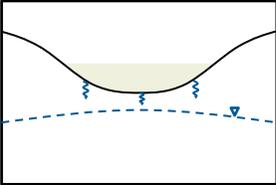
Measuring severe bank erosion along Bluff Creek

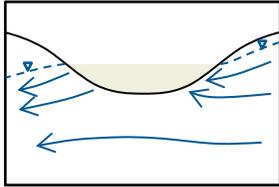
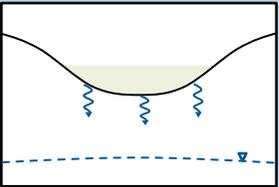
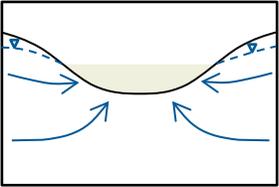
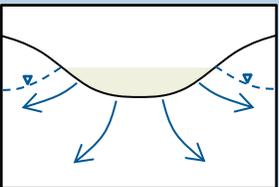
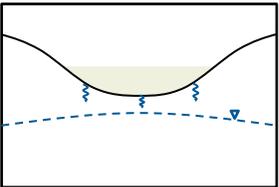
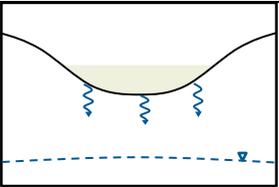
2.3.6.2 Groundwater

Maintaining clean, safe groundwater supplies is critical to human and environmental health and to the economic and social vitality of communities. Cities in the District rely on groundwater for municipal drinking water. Groundwater can be contaminated by commercial and industrial waste disposal, landfills, leaking underground storage tanks, subsurface sewage treatment systems (SSTS), mining operations, accidental spills, feedlots, and fertilizer/pesticide applications.

Surface water resources and groundwater resources are interdependent (Table 2-1). There is significant temporal and spatial variability in these relationships, and these relationships are extremely difficult to quantify. The interaction of groundwater and surface water can have negative consequences on either resource. Contaminated groundwater discharged to surface waters may have a direct impact on surface water quality and/or habitat. Declines in groundwater levels, which can take tens to thousands of years to recharge, may result in decreased baseflow to streams, which can in turn result in decreased water quality and ecosystem function. Decreased baseflow is especially problematic for streams supporting fish populations (e.g., trout streams), as decreased baseflow may result in higher stream temperatures. Lower water levels in lakes may limit recreational use, reduce habitat areas, and result in increased growth of aquatic plants including invasive species (via an increased littoral zone).

Table 2-1 Groundwater/surface water interaction classes

Type	Description		Qualifiers
Discharge lake/wetland	Mostly receives groundwater inflow		Connected to groundwater, surface water elevation below regional water table
Recharge lake/wetland or Indeterminate	Connected to groundwater. Mostly loses water as seepage to groundwater		Groundwater connection is indeterminate, regional water table lower than surface water elevation. Uncertainty in regional water table make it difficult to distinguish between features that are connected and those that are disconnected to groundwater.
	Disconnected to groundwater. Water table slightly below lake bottom. Fluctuations in the water table can affect the flow dynamics out of lake.		

Type	Description		Qualifiers
Flow-through lake/wetland	Groundwater flow both into and out of lake/ wetland		Connected to groundwater, surface water elevation above or equal to regional water table
Perched lake/wetland with deep water table	Water table deep below feature. Loss of water into the unsaturated zone. Change in water table has no effect on feature		Disconnected from groundwater
Gaining Stream	Groundwater flow into stream		Connected to groundwater, surface water elevation below regional water table
Losing Stream or Indeterminate	Mostly loses water to aquifer system		Groundwater connection is indeterminate, regional water table lower than surface water elevation. Uncertainty in regional water table makes it difficult to distinguish between features that are connected and those that are disconnected from groundwater.
	Water table slightly below stream bottom. Loss of water to the unsaturated zone. Fluctuations in the water table can affect the flow dynamics out of the stream.		
Perched Stream with deep water table	Water table deep below stream bottom. Loses water to the unsaturated zone. Change in water table has no effect on stream.		Disconnected from groundwater

Prevention of groundwater contamination through best management practices is critical. Once contaminated, groundwater may remain contaminated for long periods of time. Groundwater clean-up is expensive and technically complex, even when feasible. Increased public awareness of the importance of drinking water protection to the

public's general health and well-being is critical to promote practices that protect the quantity and quality of groundwater. Appropriate application of infiltration practices must consider potential negative consequences in areas with vulnerable groundwater resources.

Comments related to groundwater provided during the District's public engagement process include:

- Understanding and mapping groundwater-surface water interaction, including groundwater impacts on creek baseflow
- Protecting groundwater resources from contamination from chloride, nutrients, and other pollutants
- Implementing practices to promote groundwater conservation (e.g., infiltration, water reuse, reduce irrigation/sprinkling)

The District seeks to address these and other groundwater challenges through its groundwater strategies described in Section 3.2.6.3.

2.3.6.3 Water Quantity

Managing the risk of flooding is a primary focus of the District. In a natural, undeveloped setting, the ground is often pervious, which means that water (including stormwater runoff) can infiltrate into the soil. Land development dramatically changes how stormwater runoff moves in the local watershed, as ground surfaces become covered with impervious materials (e.g., asphalt and concrete) that prevent infiltration of water into the soil. As a result, the rate and volume of stormwater runoff from the site increases. If the land drains to basins, the additional volume of runoff can increase the water level and flood level of the basin. If the land drains to a stream, the additional runoff volume can cause the stream to flow full for longer durations, which increases the potential for erosion and flooding. Further, the reduced amount of infiltration means less water is being recharged into the groundwater system, which can result in decreased baseflows in creeks and streams and, potentially, a loss to the long-term sustainability of groundwater drinking supplies.

Although both high-water levels (flooding) and low-water levels are of concern to watershed residents and public officials/staff, more concern and attention is usually paid to flooding because it is a greater threat to public health and safety and can result in

significant economic losses. Flooding may cause other damages that are harder to quantify, including the following:

- Flooding of roads so they are impassable to emergency vehicles and residents
- Shoreline erosion
- Destruction of riparian habitats and vegetation such as grass, shrubs, trees, etc.
- Unavailability of recreational facilities for use by the public (e.g., inundation of shoreline) and/or restricted recreational use of waterbodies, trails, and golf courses
- More strain on budgets and personnel for repairing flood-damaged facilities and controlling public use of facilities during flooding events
- Alterations to the mix and diversity of wildlife species as a result of inundation of habitats



Street flooding in the District during an August 2016 rainfall event

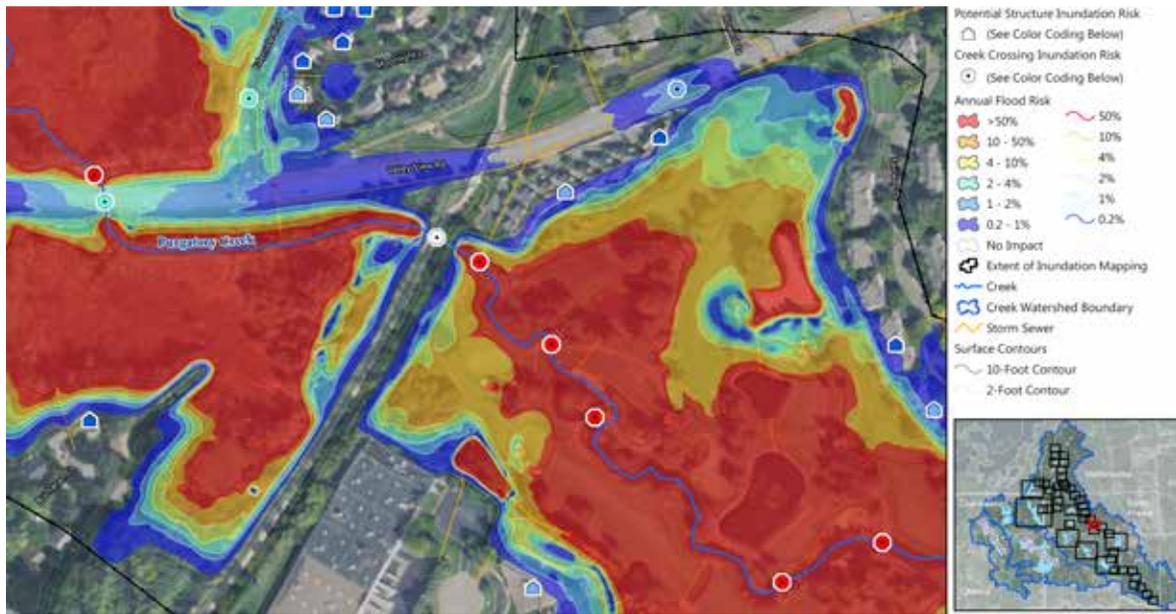
As development and redevelopment occur within the watershed, appropriate rate and volume controls are necessary to avoid creating future flooding issues or exacerbating existing flooding issues. The negative impacts of flooding may be further minimized by thoughtful management of the floodplain (i.e., the area inundated during or after a storm event of particular frequency). This management may be achieved through regulation, education, and other activities. Understanding the hydrologic response of the watershed to large precipitation events is critical to estimating inundated areas and evaluating strategies to reduce flood risk or damages.

The District received numerous comments regarding water quantity and flooding. These comments identified the following issues:

- Addressing flooding due to increasing precipitation (Atlas 14 and the impact of climate change)

- Understanding baseflow and the potential impacts from hydrologic alteration, climate change, and groundwater.
- Loading of nutrients to creeks, lakes, and wetlands from stormwater runoff
- Protecting and updating public infrastructure
- Increasing upstream storage opportunities to reduce flood risk

The District seeks to address these and other water quantity challenges through its water quantity strategies described in Section 3.2.6.



District's risk mapping highlights potential areas with different probabilities of flooding in any given year in order to continue addressing water quantity challenges.

2.4 Issue Prioritization and Incorporation into Goals and Strategies

Following the six issue identification workshops and summary of the collected comments, District staff presented the results of the ongoing public engagement strategy to the TAC, CAC, and Board of Managers at three separate workshops. At the workshops, each group identified priority or significant issues through a qualitative analysis. District staff considered the results from the issue prioritization workshops, along with the results of the prior public engagement activities in developing draft goals and strategies to address priority issues. Public input considered in this process included responses to the Plan notification letter, results of the online survey, and coded comments provided during the District's six stakeholder engagement workshops. Draft goals and strategies were provided to the TAC, CAC, and Board of Managers for review

and comment in three additional workshops. The final District goals and strategies are included in Section 3.0 of this plan. All strategies included in this Plan may be linked back to the issue(s) addressed by that strategy and to the stakeholder comment(s) that originally identified those issues as a priority for the District to address in the next 10 years.

Stakeholder Meeting (see Section 3.2)	Comment, question, or general issue	Resource Type (if applicable)	Issue Category (see Section 3.3)	Issue Subcategory (if applicable)	Applicable District Strategies (see Section 4.0)		
					Strategy 1	Strategy 2 (if applicable)	Strategy 3 (if applicable)
Purgatory	Storm water ponds testing: which are monitored?	Wetlands	Education & Outreach	Awareness	EO 54	DC 52	
Board	Protect cranberry bogs and wild rice	Wetlands	Education & Outreach	Stewardship	EO 57		
Board	promote sustainable landscape and land use to conserve groundwater: capture, retain and let water infiltrate where it falls (recharge). Drought-tolerant plants use less groundwater	Groundwater	Water Resources	Groundwater	Ground 51	WQuan 53	
Purgatory	We are not in favor of the delisting of Red Rock: Bakers, Satterness, Ktrells, Richardson, Lien	Lakes	Education & Outreach	Public Engagement	EO 56		
Board	Water use restrictions: lawn watering and drip irrigation	Groundwater	Water Resources	Groundwater	Ground 51		
Board	Shoreline protection and improvement	Lakes	Education & Outreach	Stewardship	EO 57		
Riley	Training professionals on impacts of everyday activities: lawn mowing, etc.: speaking with city maintenance	Other	Education & Outreach	Awareness	EO 54	EO 51	EO 58
Riley	Climate change considerations: how to implement into Planning and management	Other	Planning	Climate Change	Plan 52		
Riley	No-net-loss of aquifers: how do we do this?	Groundwater	Water Resources	Groundwater	Ground 51	WQuan 53	
Board	Draft plan such that we can take advantage of new funding opportunities as they		Planning	Prioritization	Plan 56	Plan 510	
TAC	Inventory of existing wetlands: woodland wetlands	Wetlands	Data Collection	Inventory	DC 51		
TAC	Partnerships; engage volunteers and enforce rules	Other	Education & Outreach	Building Capacity	EO 58		
CAC	who is monitoring wells?	Groundwater	Education & Outreach	Awareness	EO 54	Reg 51	Ground 52

Sample of matrix illustrating how stakeholder comments identified from the various engagement components are linked to District strategies.