Click here to enter text.

3.6. Floodplain and Flood Management

3.6.1. General Issue Statement

Historically, localized flooding within the watershed has damaged and threatened to damage private properties and public infrastructure. Hydrologic and hydraulic (H&H) model updates using updated rainfall data (i.e., NOAA Atlas 14) ~~rainfall data~~ indicate that there are now properties with inadequate freeboard, putting them at increased risk of flood damage. The BCWD recognizes that the risk of flooding now and into the future will increase as a result of climate trends and events. Flooding can subject properties to damage (including damage that may not be covered by insurance) and pose health risks when flooding intersects with private well overtopping.

These threats pose unique challenges in the watershed, which contains numerous landlocked basins. The ~~BCWD risks losing~~loss of flood storage areas through land and basin alterations. The loss of flood storage areas can increase the frequency, elevation, and duration of flooding and can result in increased impacts to infrastructure, property, ~~and~~ as well as the natural environment.

3.6.2. Relevance to the District

Flooding is a natural occurrence that is vital to the health of many ecosystems. Natural water bodies and constructed stormwater management facilities within the watershed function as flood storage areas. As Minnesota's climate continues to change, there will continue to be an increase in the frequency of flooding. During the next century, spring rainfall and annual precipitation are likely to increase, and severe rainstorms are likely to intensify. These wetter conditions will result in elevated groundwater levels, which limits stormwater infiltration, thereby increasing the rate and volume of runoff traveling downstream. In addition, ~~Alterations~~ alterations to the floodplain or outlets of water bodies or stormwater management facilities can change flooding characteristics and impact properties and natural resources. According to the landlocked basin analysis the BCWD performed in 2016 (using the updated NOAA Atlas 14 Precipitation-Frequency Atlas of the United States), the 33 basins within the watershed that are landlocked for the 100-year, 10-day event may be at an elevated risk for flooding if changes in adjacent land uses cause increased volumes of runoff to enter the basins. Additionally, existing or proposed structures in and around flood storage areas require protection from damage caused by flooding.

3.6.3. Sub-Issue Areas

Flood Prevention

Maintaining the hydrologic balance of the watershed is critical to addressing impacts of flooding. As precipitation patterns change, the watershed management approach must adapt to promote resiliency.

Protection of Flood Storage Areas

The natural process of flooding can threaten public safety, damage private property, and ~~become damaging to~~ structures if the areas that naturally store floodwaters are filled. Filling of flood storage areas (with earthen fill) increases the frequency of flooding and increases the water surface elevation of a flood.

Flood Mitigation and Management of Flood-Prone Areas

Areas prone to flooding as identified in the H/H model such as lands adjacent to lakes, streams, and wetlands or within landlocked basins should be managed to avoid impacts to infrastructure and

Click here to enter text.

structures. Development within these flood prone areas can remove critical stabilizing features, such as vegetation and shoreline structure. Instability along the shoreline of streams and lakes leads to negative ecological impacts, such as erosion and loss in biodiversity. Structures ~~can~~ should be placed where the risk of flooding is low in order to avoid damage.

Commented [AA91]: Can? Should? Must?
Michael noted that "must" was suggested but not fully accepted by the group

3.6.4. Policies, Goals, and Implementation

The policies, goals, and implementation items related to these sub-issue areas are summarized in the following tables. The sub-issue area is identified in a heading, followed by a related policy. The goals addressing that policy are lettered and stated, followed by the implementation items for that goal. This format is intended to clearly display how each policy and goal will be addressed.

Table 2~~53223~~. Floodplain Management Policies, Goals, and Implementation Activities

SUB-ISSUE:	~~Protection of Flood Storage Areas~~Flood Prevention		
POLICY:	**BCWD will collect, analyze and publish watershed flooding and rainfall data, including water elevations and other hydrological information to serve as a technical resource for District communities.~~The BCWD is committed to the protection of flood storage areas to reduce the impacts of flooding and promote recharge.~~**		
GOALS		**IMPLEMENTATION ITEM**	
A	Operate with the most current data on flooding and climate change impacts to water resources and infrastructure ~~Understand the impacts of climate change trends on local water resources and infrastructure.~~	1 ~~1~~	Conduct routine updates to ~~Re-run~~ the District's hydrologic & hydraulic model including ~~to~~ conducting flood risk assessments for current and future storm forecasts ~~on flood risk assessments~~, stormwater design~~s~~ performance, and to inform analysis of the BCWD rules. ~~include updated climate data (e.g., NOAA Atlas 14) as well as climate change projections. Update to NOAA Atlas 15 when it is available.~~*~~Addressed through administration of the BCWD regulatory standards and criteria.~~*
		2	Conduct flood hazard assessments and make the information available to local partners to support local decision-making. This includes involvement in local community comprehensive planning processes.
		~~3~~	Share stormwater models, associated reports, and feasibility studies with partners and permit applicants and provide technical assistance as requested.
		~~3~~ 4	Develop a community flood reporting campaign to ground-truth the H&H model and raise awareness about flooding.
POLICY:	**The BCWD will collaborate with property owners, watershed communities and state and federal agencies to reduce risk of flood damage.**		
GOALS		**IMPLEMENTATION ITEM**	
A	Ensure risk and responsibility are assigned to the entity best and most appropriately positioned to manage them.	1	Hold meetings with member communities and neighborhood groups to share data related to flooding with an emphasis on projected conditions
		2	Explore roles with member communities to lay foundation for a collaborative approach to stormwater and flood management (e.g., District will help solve flooding that crosses municipal boundaries).

Commented [CC92]: @Ryan Fleming What do you think about the goal? Should we modify what the Board approved in 2022 by including the alternative text?

Commented [RF93R92]: @Camilla Correll Can we combine the to say, "operate with the most current data on flooding and climate change impacts to water resources and infrastructure"? Otherwise, I think "current data on flooding" is broad enough to include also understanding impacts associated with anticipated climate change.

Click here to enter text.

Table 253223. Floodplain Management Policies, Goals, and Implementation Activities

		3	Engage emergency management professionals in floodplain mapping review and determine watershed role in flood preparedness through County emergency management plans.
POLICY:	**BCWD will plan and implement projects with public and private partners to increase flood resilience in the watershed through, for example, regional stormwater management.**		
GOALS		**IMPLEMENTATION ITEM**	
A	Increase the use of climate resilient strategies in the watershed	1	Encourage utilization of regional stormwater-management provisions in BCWD rules.
		2	Explore possible regional stormwater-management projects with municipal partners.
		3	Implement reuse within the Marketplace drainage area.
		4	Study the use of active management through approaches such as smart outlets (e.g. on Long Lake) and implement this technology if cost-beneficial.
POLICY:	**The BCWD will explore possible capital projects that provide flood storage and hazard mitigation.**		
GOALS		**IMPLEMENTATION ITEM**	
A	Contribute to the Lower St Croix 1W1P's runoff retention goal by increasing flood storage across the watershed by 0.4 inches. ~~Add flood storage in the watershed~~	1	Restore flood-storage capacity and construct, if feasible, additional flood-storage capacity in critical locations as identified in the Flood Hazard Assessment.
		2	Evaluate and implement revisions to future BCWD project designs to prioritize increasing watershed storage, reducing peak flows, improving vegetation health and density, increasing drought and flood protection and increasing other resilience-related functions.
SUB-ISSUE:	**Protection of Flood Storage Areas**		
POLICY:	**The BCWD is committed to the protection of flood storage areas to reduce the impacts of flooding and promote recharge.**		
GOALS		**IMPLEMENTATION ITEM**	
A	Ensure no net loss of flood storage capability within the watershed.	1	*Addressed through administration of the BCWD regulatory standards and criteria.*
		2	Conduct a flood sensitivity analysis for a 200-year impact on the freeboard
SUB-ISSUE:	**Flood Mitigation and Management of Flood Prone Areas**		
POLICY:	**The BCWD will continue to protect structures and natural communities from flooding exceeding natural water level fluctuations.**		
GOALS		**IMPLEMENTATION ITEM**	

Commented [AA94]: @Camilla Correll 1W1P identifies 0.16 inches or 7,900 acre-feet across the entire watershed in the next 10 years.

BCWD anticipates between 2018-2050 0.3-0.4 inches of increased runoff

Click here to enter text.

Table 25~~32~~23. Floodplain Management Policies, Goals, and Implementation Activities

A	Assess the potential for flooding properties when evaluating land management activities.	1	*Addressed through administration of the BCWD regulatory standards and criteria.*
		2	Expand mapping of flood intersections with infrastructure beyond the work completed to assess lakes.
		~~2~~ 3	Continue to monitor lake levels and shallow aquifer groundwater levels to evaluate conditions that may cause impacts to existing structures.
POLICY:	**The BCWD will collaborate with property owners, watershed communities and state and federal agencies to prepare for flooding.**		
GOALS		**IMPLEMENTATION ITEM**	
A	Balance prevention and mitigation efforts.	1	Consider changes to the rule language to allow mitigation without exacerbating onsite flood risk.
		2	Explore expansion of BCWD's cost-share program to include water quantity as well as water quality projects
B	Acquire at-risk properties with opportunities for public co-benefits associated with this Plan's goals.	1	Modify the land conservation program to include criteria that would allow the BCWD to determine whether or not to acquire properties or easements to allevitate existing or future flooding
C	Provide support to property owners' efforts to manage their flood risk.	1	Provide technical assistance to homeowners experiencing or at risk of flooding.
		2	Develop outreach and guidance materials related to flood-risk management and conduct community meetings to disseminate flood-risk assessment data and guidance.
		3	Develop a homeowner's packet for at-risk properties.
		4	Develop a request for proposals template homeowners seeking engineering design and construction services.
POLICY:	**The BCWD desires to minimize the risks of flooding associated with land alterations adjacent to landlocked basins.**		
GOALS		**IMPLEMENTATION ITEM**	
A	Minimize the risk of flooding to structures within landlocked basins.	1	*Addressed through administration of the BCWD regulatory standards and criteria.*
B	Minimize the risk of flooding on downstream properties when outlets are provided for landlocked basins.	~~2~~ 1	*Addressed through administration of the BCWD regulatory standards and criteria.*
		2	Plan and implement projects with public and private partners to support their efforts to prepare for flooding.
POLICY:	**The BCWD will maintain and enhance existing BCWD capital improvements that provide storage and hazard mitigation.**		

Click here to enter text.

Table 2532223. Floodplain Management Policies, Goals, and Implementation Activities

A	Maintain and enhance BCWD projects to provide additional flood- mitigation capacity.	1	Maintain the flood-risk mitigation functionality of Kismet basin and Trout-Habitat Preservation Project, and consider enhancing such capacity.
		2	Evaluate and implement changes to existing BCWD projects that provide opportunities for adaptive management, upscaling retrofits, and use of innovative technology to improve performance under a changing climate

Click here to enter text.

Table 263324. Floodplain Management Implementation Activities (from Table 23) addressed by Baseline Monitoring Program

Implementation activities where costs are identified under the Baseline Monitoring Program: - Continue to monitor lake levels and shallow aquifer groundwater levels to evaluate conditions that may cause impacts to existing structures - Costs identified in under the Baseline Monitoring Program. - Maintain BCWD weather station to collect local climate data for modeling efforts.

Kismet Basin Lake aerial

Click here to enter text.

3.7. Groundwater Management

3.7.1. General Issue Statement

Land-altering activities and climate change have the potential to impact groundwater resources as well as groundwater dependent natural resources. Without proper land-use and water resource management, the following impacts may occur: reduced groundwater recharge, reduced groundwater quality, alterations to drinking water supply, potential for groundwater flooding, and alterations to the functions and values of groundwater dependent natural resources.

Climate change is impacting groundwater . Research suggests climate change will impact groundwater recharge through reduced infiltration during high-intensity precipitation events. Emerging research suggests warmer surface waters infiltrating into groundwater have the potential to raise groundwater temperatures, impacting groundwater dependent natural resources.

3.7.2. Relevance to the District

The BCWD contains groundwater dependent natural resources which have the potential to be impacted by increasing development pressure in the watershed. While some of these resources are well known to the public, for example Brown's Creek, there are other unique resources that had not been identified until the North Washington Groundwater Study and the Natural Resource Inventory for the Brown's Creek watershed were performed.

The impairment of Brown's Creek, declining groundwater levels, and reduced baseflow in the creek highlight the need to protect, conserve and utilize the region's groundwater in ways that protect public health, support economic growth and development, maintain habitat and ecosystem health, and provide for recreational opportunities.

Historic high flooding in Kimbro Basin in summer 2020 exposed that there remain significant gaps in our understanding of how groundwater impacts the watershed. Developing a greater understanding of the watershed's groundwater resources plays a key role in monitoring change and providing more informe decision-making on how to manage groundwater and its dependent resources.

The Washington County Groundwater Plan (~~2014~~2025-~~2024~~2035) lists several actions that should be addressed by Watershed Management Organizations (WMOs) including BCWD outlined in Table 27.~~:~~

Table 27. Washington County Groundwater Plan Goal Alignment

Goal	Relevant Areas to the BCWD
Goal #1 Groundwater Quality	• PFAS Education and Awareness • Cost share funding for agricultural water quality BMPs • Utilize approved nutrient and bacterial total maximum daily loads (TMDLs) to identify areas for focused septic system maintenance and management. • Follow the MPCA Stormwater Manual and any guidance from MDH for safe placement of infiltration practices • Implement stormwater BMPs that are protective of groundwater, including safe and feasible water reuse.

Commented [AA95]: Support partner efforts to understand impacts to groundwater quality from stormwater infiltration

Groundwater monitoring in response to pumping/wells in north

Revising rules regarding infiltration

Commented [AA96]: Ask Jimmy - updating.

Fen protection plan.

Commented [AA97]: Consider whether this need to remain in the final version of the plan, or only the working plan.

Click here to enter text.

Goal #2 Groundwater Quantity	• Partner with the WCD and watersheds to support efforts for soil health. • Support stormwater retention, infiltration, and opportunities to replenish aquifer storage • Support and encourage safe and feasible water reuse. • Encourage regular and consistent updates to Atlas 14.
Goal #3 Groundwater Education	• Education on climate change impacts, adaptation, and mitigation in addition to groundwater and surface water interaction • Educate residents on BMPs that minimize GW contamination caused by use and storage of fertilizers, pesticides, and salt.
Goal #4 Groundwater Governance	• Participation in Lower St. Croix One Watershed One Plan partnership

3.7.3. Sub-Issue Areas

Management of Groundwater Quality

Groundwater supplies all of the drinking water within BCWD and Washington County. Pollution prevention is the key to maintaining this vital resource. The cleanup of aquifers is expensive, takes a long time, and is often not even possible with current technology. Ensuring that volume control and infiltration practices installed within the watershed will not lead to contamination of groundwater aquifers is important to the protection of drinking water sources.

Management of Groundwater Recharge and Supply

Drinking water supplies and groundwater dependent natural resources need a sustainable supply of groundwater in order to remain viable. Impervious surfaces can reduce the amount of water that infiltrates and recharges aquifers. Excessive groundwater withdrawals from wells can alter groundwater flow and limit the availability of groundwater for other purposes. Groundwater sustainability can generally be defined as groundwater withdrawals and natural discharges being equal to groundwater recharge, with no negative impacts to surface water bodies. Groundwater recharge occurs on a large scale throughout the watershed. In fact, some groundwater within the watershed boundaries may be recharged by areas outside the watershed.

The BCWD intends to proactively manage groundwater resources in the watershed rather than reactively responding to a crisis. Groundwater elevations and flow are controlled by long-term trends in climate, recharge, and groundwater withdrawal. By the time low groundwater elevations or discharges become a problem, it may be too late to implement a timely solution. The BCWD will not only monitor trends in groundwater elevations and water use, but also try to recognize and predict when and where issues could arise in the future and implement policies to avoid adverse effects on natural resources and water supplies.

Groundwater Flooding

Flooding of Groundwater Dependent Natural Resources (GDNRs) represents an emerging concern highlighted by historic flooding in Kimbro Basin in 2020. Managing groundwater flooding is a new area for the BCWD to consider as climate change continues to alter the water supply. Developing models that can more accurately anticipate groundwater flooding and monitoring groundwater levels will play

Click here to enter text.

an important role in informing the District's role in protecting properties from flooding and communicating the impacts of this type of flooding to watershed partners.

Management of Groundwater Dependent Natural Resources

The Brown's Creek Watershed District has been proactively managing its unique groundwater dependent natural resources since its inception in 1997. While Brown's Creek was the focal point initially, the BCWD has come to recognize the value in protecting the other high quality and highly sensitive groundwater dependent natural resources in the watershed, including:

- Wetlands
- Fens (rare wetlands with high pH)
- Springs and spring creeks
- Most lakes

Brown's Creek Watershed District should continue to protect these resources by recognizing when and where they are threatened. The BCWD will review options for strengthening its rules to ensure the sustainability of groundwater flow. Enforcement of the rules must be ongoing. Public education is critical to the widespread acceptance and compliance with the rules.

3.7.4. Policies, Goals, and Implementation

The policies, goals, and implementation items related to these sub-issue areas are summarized in the following tables. The sub-issue area is identified in a heading, followed by a related policy. The goals addressing that policy are lettered and stated, followed by the implementation items for that goal. This format is intended to clearly display how each policy and goal will be addressed.

Click here to enter text.

Table 283525. Groundwater Management Policies, Goals, and Implementation Activities

SUB-ISSUE:	Management of Groundwater Quality		
POLICY:	**The BCWD supports the protection of groundwater quality.**		
GOALS		**IMPLEMENTATION ITEM**	
A	Establish controls to reduce the potential for transport of pollutants into the groundwater.	**1**	Support well-sealing programs by Washington County and others by helping to identify unsealed wells and promote the program to residents in the BCWD.
		2	Rely on regulatory subsurface sewage treatment system (SSTS) programs of Washington County and MPCA to address potential contamination from septic systems. Support and promote Washington County financial assistance program for non-compliant SSTS, and work with the county as opportunities arise to implement other SSTS strategies from the Washington County Groundwater Plan, such as targeted inventories, and education efforts.
		3	Work with ~~Washington County~~EMWREP to develop an outreach plan to educate lawn care companies, golf courses, kennel operations, and county and LGU public works departments on how to use BMPs to minimize the effects on groundwater caused by the use and storage of fertilizers, pesticides, and road salt, while properly maintaining their properties.
		4	Work with ~~Washington County~~EMWREP to develop and implement an education program directed at homeowners outlining proper use and disposal of pharmaceuticals, lawn and garden chemicals, hazardous household waste, salt usage and storage, and management of pet waste (e.g. Unused Medications Disposal, Household Hazardous Waste Events).
		5	Support county and state government efforts to define, monitor, and educate the public about contaminants of emerging concern~~.~~ Impacting groundwater (e.g. PFAS).
		6	*Addressed through administration of the BCWD regulatory standards and criteria.*
B	Cooperate with the wellhead protection and source water assessment efforts of municipalities and others.	**1**	Share relevant data on groundwater resources and resource protection areas with municipalities for use in wellhead protection plans and source water assessments.
		2	Review wellhead protection plans and source water assessments for consistency with BCWD-identified areas of contamination concern and recharge protection.
		3	Update rules to minimize infiltration in ERAs and transportation corridors with highly vulnerable DWSMAs.
		4	Promote operational and programmatic best management practice resources intended to protect groundwater quality (e.g. secondary containment, safe salt storage, sealing unused wells, fertilizer and pesticide application management, dust suppressant treatment management, water softener maintenance, etc…)
SUB-ISSUE:	**Management of Groundwater Recharge and Supply**		
POLICY:	**The BCWD is committed to sustaining the quantity of groundwater within the watershed to support its groundwater resources in response to land use and climate change.**		
GOALS		**IMPLEMENTATION ITEM**	

Commented [CC98]: LSCR1W1P:
1A. Increase agricultural best management practices that improve soil health and reduce groundwater pollution.
1B. Reduce contamination from subsurface sewage treatment systems, household hazardous waste, pesticide use, leaky underground tanks, closed landfills, abandoned wells, etc.

Commented [AA99]: BWSR
- work with partners to plan for potential challenges related to quantity and quality
DNR
Increase communication re: risks of overuse and degradation, promote GW conservation; > coordination in communication activities between orgs w/ water mgmt responsibilities
Water harvest to reduce GW reliance
Maintain/enhance recharge
Homeowner septic system education
Chloride management.

Click here to enter text.

A	Work with state and other local partners to maintain or restore pre-settlement recharge conditions within the District and plan for emerging challenges related to groundwater quantity and quality.	1	Utilize USGS GW model to determine how best to implement impervious surface retrofit projects to benefit groundwater dependent natural resources.
		2	Continue to participate in the North and East Metro Groundwater Management Area Plan Project Advisory Team by attending meetings.
		3	Establish rules and policies for "no net loss" of recharge due to construction of impervious surfaces.
		4	Utilize the cost-share program to assist businesses, residents, and local governments to reduce their groundwater use and encourage reuse where feasible through ~~with~~ groundwater conservation and reuse BMPs.
			Support communication about the risks and consequences of groundwater overuse and degradation.
		5	*Addressed through administration of the BCWD regulatory standards and criteria.*
B	Reduce irrigation from the groundwater system through groundwater appropriations standards. ~~Address the utilization of groundwater through groundwater appropriation standards~~.	1	Review water appropriations permits applications and submit comments to the Department of Natural Resources.
		~~2~~	~~Work with Washington County and the MDNR to develop a regional water conservation plan.~~
		~~3~~	~~Consider amending Rules to include groundwater appropriations standards for wells being constructed in the vicinity of a GDNR by 2018.~~
C	Quantify, to the extent possible, the potential effects of groundwater appropriations on Brown's Creek and other groundwater-dependent natural resources.	1	Present investigation findings to the City of Stillwater, to the MNDNR, and to the Oak Glen Golf Course and consider whether a different pumping schedule could alleviate stress on the aquifers below Brown's Creek.
		2	Provide the USGS with new information so that the Groundwater Model can be updated every two years.
D	Gather information to support the District's understanding of groundwater quantities, groundwater quality, and groundwater flow.	1	Collect groundwater elevation data from residential wells, monitoring wells and high capacity wells at least annually. Install data recorders to collect more frequent measurements where possible. Share information with Washington County and MNDNR.
		2	Collect groundwater data in Brown's Creek to identify stretches that are gaining and losing groundwater every five years starting in 2018.
		3	Conduct groundwater chemistry monitoring and analysis near groundwater dependent natural resources (i.e. lakes) to provide data supporting groundwater flow analysis.
		4	Complete a dye trace (or other tracer such as stable isotopes) study to quantify groundwater flow into Brown's Creek by 2017.
		5	Conduct 10 soil borings or install 10 monitoring wells (piezometers) near the creek to better define the glacial geology in areas between the high capacity wells and Brown's Creek.
		6	Inventory seepage points along the creek and other GDNR every other year and compare to previous inventories.

Commented [AA101]: Karen noted not available at management scale, consider alternatives, discuss with Camilla

Commented [AA102]: Karen noted not a priority in review of 2017-2026 activities.

Commented [CC100]: From LSCR1W1P:
2A. Reduce or maintain groundwater consumption despite continued growth
2B. Increase infiltration and recharge in rural and urban areas

Commented [CC103]: From LSCR1W1P:
3A. Gather data needed to understand groundwater resources

Commented [AA104R103]: 3-7 and 10 not prioritized by the Board in 2017-2026; consider what should remain/remove through Board feedback and Implementation Plan.

Click here to enter text.

		7	In support of groundwater modeling efforts, conduct one pumping test per year on existing residential and golf course wells to obtain better local data on hydraulic conductivity of aquifers.
		8	Work with the MNDNR Observation Well program and others to install deep observation wells near Brown's Creek to monitor bedrock aquifers.
		9	Identify opportunities to partner on groundwater monitoring efforts with municipalities, other watershed districts, Washington County, and state agencies, such as PFAS monitoring.
		10	Develop a water budget for the district that includes surface water and groundwater interaction, an assessment of the geologic conditions, land use and groundwater contamination and climate change trends and impacts
SUB-ISSUE:	**Groundwater Flooding**		
POLICY:	**The BCWD is committed to understanding the conditions that can lead to groundwater flooding and communicate this to Washington County, LGUs, and property owners.**		
GOALS		**IMPLEMENTATION ITEM**	
A	Identify areas susceptible to groundwater flooding	**1**	Update the District's H/H model to Atlas 14
SUB-ISSUE:	**Management of Groundwater Dependent Natural Resources**		
POLICY:	**The BCWD is committed to sustaining and improving the function and value of groundwater dependent natural resources.**		
GOALS		**IMPLEMENTATION ITEM**	
A	Maintain or improve the function and value of groundwater dependent natural resources within the District.	~~1~~	~~Evaluate definition of groundwater dependent natural resources and associated contributing drainage area to assess the need to revise BCWD Rule language.~~
		~~2~~1	Develop GIS database of relevant current and historical groundwater dependent natural resources monitoring data and provide the database to the public via the District website.
		~~3~~2	Develop and implement an expanded education program for citizens and public officials on the interaction between groundwater and surface water, the value of and need to protect groundwater recharge areas and wetlands, an implementation of BMPs and LID and redevelopment strategies to protect groundwater resources.
		~~4~~3	Get permission from the owner of Indian Hills Golf Course and conduct baseline monitoring of the fen.
POLICY:	**The BCWD is committed to ensuring that activities within the watershed provide for groundwater recharge, provide thermal protection to Brown's Creek, & reduce volume related impacts to the watershed's water bodies.**		
GOALS		**IMPLEMENTATION ITEM**	

Commented [AA105]: Not determined necessary during the 2018/2019 revision.

Commented [AA106]: Not prioritized by EMWREP program in previous iteration of the Plan, however as the issue continues to evolve it may be worthwhile to get in front of communities to do outreach on the issue.

Click here to enter text.

A	Protect and maintain the quantity and quality of groundwater recharge	1	*Addressed through administration of the BCWD Regulatory standards and criteria.*
B	Identify and implement methods to provide thermal protection to Brown's Creek to achieve the thermal loading reduction identified in the Brown's Creek TMDL Implementation Plan	1	**SEE IMPLEMENTATION ACTIVITIES IDENTIFIED UNDER BROWN'S CREEK MANAGEMENT (TABLE 61)**
C	Reduce volume-related impacts to the watershed's water bodies (e.g. stormwater impacts such as wetland bounce and duration)	1	Promote stormwater reuse by working with local businesses, local units of government and Washington County to incorporate BMPs into new development or redevelopment projects.
		2	*Addressed through administration of the BCWD Regulatory standards and criteria.*

Click here to enter text.

Table 293626. Projected Expenditures (in 1,000's) for Groundwater Management Practices

Implementation Activities	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	10-Yr. Total
Work with Washington County to develop an outreach plan to educate land care companies, golf courses, kennel operations, and county and LGU public works departments on how to use BMPs to minimize the effects on groundwater caused by the use and storage of fertilizers, pesticides, and road salt, while properly maintaining their properties.	--	--	--	--	3	--	--	--	--	--	3
Work with Washington County to develop and implement an education program directed at homeowners outlining proper use and disposal of lawn and garden chemicals, salt usage and storage, and management of pet waste.	--	--	--	--	3	--	--	--	--	--	3
Utilize USGS GW model to determine how best to implement impervious surface retrofit projects to benefit groundwater dependent natural resources.	--	2	--	--	--	--	--	--	--	--	2
Continue to participate in the North and East Metro Groundwater Management Area Plan Project Advisory Team by attending meetings.	1	1	--	--	--	--	--	--	--	--	2
Establish rules and policies for "no net loss" of recharge due to construction of impervious surfaces.	5	5	--	--	--	--	--	--	--	--	10
Review water appropriations permit applications and submit comments to the Department of Natural Resources.	1	1	1	1	1	1	1	1	1	1	10
Work with Washington County and/or to MDNR to develop a regional water conservation plan.	--	--	--	--	5	--	--	--	--	--	5

Click here to enter text.

Implementation Activities	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	10-Yr. Total
Consider amending Rules to include groundwater appropriations standards for wells being constructed in the vicinity of a GDNR by 2018.	5	--	--	--	--	--	--	--	--	--	5
Present investigation findings to the City of Stillwater and to Oak Glen Golf Course and consider whether a revised pumping schedule could alleviate stress on the aquifers below Brown's Creek by meeting with them individually.	7	--	--	--	--	--	--	--	--	--	7
Provide the USGS with new information so that Groundwater Model can be updated every two years.	--	10	--	10	--	10	--	10	--	10	50
Collect groundwater elevation data from residential wells, monitoring wells and high capacity wells at least annually. Install data recorders to collect more frequent measurements where possible. Share information with Washington County and MNDNR.	5	5	5	5	5	5	5	5	5	5	50
Collect groundwater data in Brown's Creek to identify stretches that are gaining and losing groundwater every five years starting in 2018.	--	5	--	--	--	--	5	--	--	--	10
Conduct groundwater chemistry monitoring and analysis near groundwater dependent natural resources (i.e. lakes) to provide data supporting groundwater flow analysis.	--	--	12	--	--	--	--	--	--	--	12
Complete a dye trace (or other tracer such as stable isotopes) study to quantify groundwater flow into Brown's Creek by 2020.	--	--	--	20	--	--	--	--	--	--	20
Conduct 10 soil borings or install 10 monitoring wells (piezometers) near the creek to better define the glacial geology in areas between the	--	--	7	7	7	--	--	--	--	--	21

Click here to enter text.

Implementation Activities	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	10-Yr. Total
high capacity wells and Brown's Creek.											
Inventory seepage points along the creek and other GDNR every other year and compare to previous inventories.	--	1.5	--	1.5	--	1.5	--	1.5	--	1.5	7.5
In support of groundwater modeling efforts, conduct one pumping test per year on existing residential and golf course wells to obtain better local data on hydraulic conductivity of aquifers.	--	--	8	8	8	8	8	--	--	--	40
Work with the MNDNR Observation Well program and others to install deep observation wells near Brown's Creek to monitor bedrock aquifers.	1	1	1	1	1	--	--	--	--	--	5
Evaluate definition of groundwater dependent natural resources and associated contributing drainage area to assess the need to revise BCWD Rule language.	3	'--	'--	'--	'--	'--	'--	'--	'--	'--	3
Develop GIS database of relevant current and historical groundwater dependent natural resources monitoring data and provide the database to the public via the District website.	--	--	--	--	--	3	--	--	--	--	3
Develop and implement an expanded education program for citizens and public officials on the interaction between groundwater and surface water, the value of and need to protect groundwater recharge areas and wetlands, an implementation of BMPs and LID and redevelopment strategies to protect groundwater resources.	--	--	--	--	1	1	1	--	--	--	3
Total for Groundwater Management	**28**	**31.5**	**34**	**53.5**	**34**	**29.5**	**20**	**17.5**	**6**	**17.5**	**271.5**

Click here to enter text.

Table 3037727. Groundwater Management Implementation Activities from Table 25 addressed by Administrative and/or Project Development Program

Support well sealing programs by Washington County and others by helping to identify unsealed wells and promote the program to residents in the BCWD.
Rely on regulatory subsurface sewage treatment system (SSTS) programs of Washington County and MPCA to address potential contamination from septic systems. Support and promote Washington County financial assistance program for non-compliant SSTS, and work with the county as opportunities arise to implement other SSTS strategies from the Washington County Groundwater Plan, such as targeted inventories, and education efforts.
Share relevant data on groundwater resources and resource protection areas with municipalities for use in wellhead protection plans and source water assessments.
Review wellhead protection plans and source water assessments for consistency with BCWD-identified areas of contamination concern and recharge protection.
Identify opportunities to partner on groundwater monitoring efforts with municipalities, other watershed districts, Washington County, and state agencies.

Table 3138728 Groundwater Management Implementation Activities from Table 25 addressed by East Metro Water Resource Education Program

Support county and state government efforts to define, monitor, and educate the public about contaminants of emerging concern.

Table 3239729. Groundwater Management Implementation Activities from Table 25 where implementation costs covered under another Issue Category

Implementation Activity	Issue Category where implementation cost is identified (Table #)
Utilize the cost-share program to assist with groundwater conservation BMPs.	Stormwater Management (Table 5)