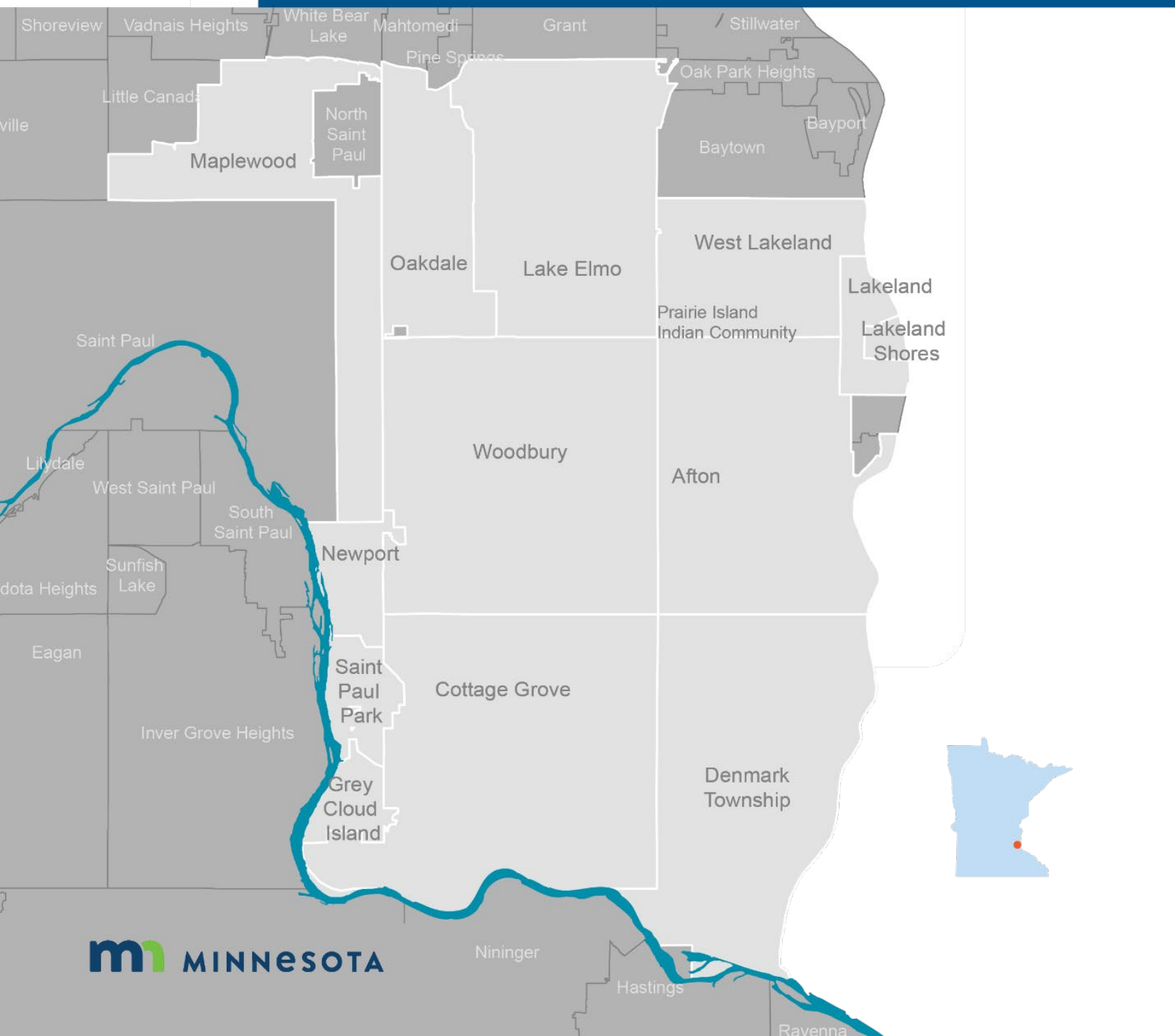
Conceptual Drinking Water Supply Plan

Long-term options for the East Metropolitan area.



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Document number: c-pfc1-23

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Contents

Glossary

3M Grant for Water Quality and Sustainability Fund (Grant) – Under terms of the Settlement, an $850 million Grant was provided by 3M to the State to be used to enhance the quality, quantity, and sustainability of the drinking water in the East Metropolitan Area; to restore and enhance natural resources and outdoor recreational opportunities; and to reimburse the State for certain other expenses.

2007 Consent Order – An agreement between 3M and the MPCA requiring 3M to investigate and take remedial actions to address releases and threatened releases of PFAS from the 3M Cottage Grove Site, the 3M Oakdale Disposal Site, and the 3M Woodbury Disposal Site; and to reimburse the Minnesota Pollution Control Agency (MPCA) for its costs to oversee the remediation actions taken under the Consent Order to help provide safe drinking water to affected homes and communities (e.g., installation of temporary or permanent treatment).

2018 Agreement and Order (Settlement) – An agreement to settle the State's Natural Resources Damage lawsuit against 3M for $850 million. Minnesota's Attorney General sued 3M in 2010, alleging that the company's disposal of PFAS had damaged and continues to damage drinking water and natural resources in the East Metropolitan Area. After legal and other expenses were paid, about $720 million is available to finance drinking water and natural resource projects in this region. The MPCA and the Minnesota Department of Natural Resources (DNR) are Co-Trustees of these funds.

Alignment – Location of water lines relative to other infrastructure, typically roadways.

Aquifer – An underground layer of water-bearing permeable rock; rock fractures; or loose, unpacked materials (gravel, sand, or silt). In a water-table (unconfined) aquifer, the water table (upper water surface) rises and falls with the amount of water in the aquifer. In a confined aquifer, layers of impermeable material both above and below cause the water to be under pressure, so that when the aquifer is penetrated by a well, the water will rise above the top of the aquifer (artesian condition).

Aquitard – An underground layer that has low permeability and limits, but does not completely prevent the flow of water to or from an adjacent aquifer.

Booster pump station – A pump station located within the water supply system that is designed to boost the pressure of water within a long pipeline.

Capital costs – One-time costs to build or rebuild infrastructure, including water treatment plants, wells, distribution systems, and other facilities.

Centralized system – A centralized water treatment approach for a given service that treats water at a single treatment facility in a central location and then distributes the water via a dedicated water distribution network across the service area.

Citizen-Business Group – One of three work groups to help the MPCA and the DNR identify and recommend priorities and projects for Settlement funding. This group is composed of the MPCA; the DNR; and about 15 citizen, business, and nongovernmental representatives who live or work in the East Metropolitan Area. One representative from the Government and 3M Working Group serves as a liaison to this group.

Conceptual Drinking Water Supply Plan (Conceptual Plan) – This plan, developed from a strategic planning effort as a step toward addressing the goal of Priority 1 of the Settlement, which is to ensure safe drinking water in sufficient supply to residents and businesses in the East Metropolitan Area to meet current and future needs. The Conceptual Plan presents a recommendation consisting of sets of conceptual projects (called scenarios) that, when combined, address drinking water quality and quantity issues for the 14 communities currently known to be affected by per- and polyfluoroalkyl substances (PFAS) contamination in the East Metropolitan Area. This Conceptual Plan will be used to guide the development and implementation of projects to be funded under the Grant.

Conceptual projects – Project ideas developed by the work groups, members of the public, and the Co-Trustees to address PFAS-related drinking water quality and quantity issues in the East Metropolitan Area. These conceptual projects are consistent with the water supply improvement options, but provide more detail, such as information on project location(s), project component(s), and PFAS treatment technologies.

Conceptual site model (CSM) – A simplified set of assumptions, data, and information that was used to develop a picture of how the groundwater system functions as the basis for developing the more detailed groundwater model.

Co-Trustees – The MPCA and DNR. Under the Minnesota Environmental Response and Liability Act (MERLA), the State on Minnesota (State) is the Trustee for all natural resources in the State, including air, water, and wildlife. The Governor's Executive Order 19-29 (inclusive of 11-09) designated the Commissioners of the MPCA and DNR as Co-Trustees for natural resources under MERLA and other laws.

Decentralized system – A decentralized water treatment approach that may rely on multiple treatment facilities at various locations to serve communities/neighborhoods in a given service area. Typically, these treatment facilities are far enough apart that it mitigates the cost and/or water quality concerns of a centralized treatment facility. On a much smaller scale, a decentralized system may also rely on point-of-entry treatment systems (POETSs) or point-of-use treatments (POUTs) that are installed at individual homes or businesses to achieve potable water.

Distribution line – A smaller diameter line, typically between 6 and 16 inches, that supplies water to consumers.

Distribution system – The portion of a water supply network that conveys potable water from transmission lines to water consumers and provides for residential, commercial, industrial, and fire-fighting water demand requirements. A distribution system can contain distribution lines, booster pump stations, pressure-reducing valves, and storage facilities such as water storage tanks or towers.

Drinking water distribution model – A comprehensive representation of the current and planned drinking water supply infrastructure in the East Metropolitan Area, used to support the evaluation of scenarios in this Conceptual Plan. The model includes information on drinking water supply infrastructure (e.g., connections, demand, water use, available water supply, system pressures, layouts and locations of infrastructure) as well as private and non-community public supply well data.

Drinking Water Supply Technical Subgroup (Subgroup 1) – One of the three work groups; composed of technical experts and formed to analyze options, deliver assessments, and provide advice for long-term options for drinking water supply and treatment to the Government and 3M Working Group, and the Citizen-Business Group.

East Metropolitan Area – Communities to the east of the Minneapolis/St. Paul Metropolitan Area that have been affected by PFAS releases from the 3M Company (3M) source areas. Currently includes the cities of Afton, Cottage Grove, Lake Elmo, Lakeland, Lakeland Shores, Maplewood, Newport, Oakdale, St. Paul Park, and Woodbury; the townships of Denmark, Grey Cloud Island, and West Lakeland; and the Prairie Island Indian Community.

EPA Health Advisory Levels (HALs) – Non-enforceable and non-regulatory technical guidance for state agencies and other public health officials on health effects, analytical methodologies, and treatment technologies associated with drinking water contamination. HALs are based on non-cancer health effects for different lengths of exposure (1 day, 10 days, or a lifetime). In 2016, the U.S. Environmental Protection Agency (EPA) released HALs for perfluorooctanoic acid (PFOA) and perfluorooctane sulfonate (PFOS).

Government and 3M Working Group – One of three work groups to help the Co-Trustees identify and recommend priorities and projects for Settlement funding. The formation of a working group consisting of representatives from the MPCA, the DNR, Washington County, the East Metropolitan Area communities, and 3M to identify and recommend projects was a requirement of the 2018 Agreement and Order (Settlement). One representative from the Citizen-Business Group serves as a liaison to this group.

Granular activated carbon (GAC) – GAC is made from raw organic materials (such as coconut shells or coal) that are high in carbon. Heat, in the absence of oxygen, is used to increase (activate) the surface area of the carbon, which is why these filters are sometimes referred to as “charcoal” filters. The activated carbon removes certain chemicals that are dissolved in water passing through a filter containing GAC, by trapping (adsorbing) the chemical onto the GAC.

Groundwater Management Area – A designation created by the Minnesota legislature as a tool for the DNR to address difficult groundwater-related resource challenges. Within these areas, the DNR may limit total annual water appropriations and uses to ensure sustainable use of groundwater that protects ecosystems, water quality, and the ability of future generations to meet their own needs. Washington County, along with Ramsey County and portions of Anoka and Hennepin Counties, falls within the North and East Metropolitan Groundwater Management Area.

Groundwater model – A numerical, three-dimensional representation of the groundwater aquifers in the East Metropolitan Area used to support the evaluation of scenarios in this Conceptual Plan. The purpose of the groundwater model is to provide insight into the current groundwater flow system, and predict impacts to flow paths and groundwater resources through the year 2040 from the proposed scenarios. These flow paths and quantity estimates are based on projected groundwater recharge/precipitation rates, surface water elevations, and pumping volumes of the proposed scenarios.

Health advisory – Notice from MDH that a drinking water supply has exceeded health-based guidance values developed by MDH.

Health-based value (HBV) – A health-based water guidance value developed by the Minnesota Department of Health (MDH) using the same scientific methods as health risk limits (HRLs), including peer review. Like an HRL, it is the concentration of a water contaminant, or a mixture of contaminants, that, based on current knowledge, can be consumed with little or no risk to health by the most exposed and sensitive individuals in a population. HBVs are developed to provide water guidance between rule-making cycles for chemicals that may have been recently detected in the water or for which new health information has become available.

Health risk index (HRI; health index, HI) – An indicator of the combined risk of exposure to PFAS compounds that cause the same health effects. It is determined by calculating the concentration of each PFAS compound divided by its HRL or HBV, and adding the resulting ratios. An HI equal to or greater than one indicates possible combined effects. The HRI is referred to interchangeably throughout the document as the health risk index, the health index, the HI, or the HRI. While HRI and HI are terms used for every chemical, the Conceptual Plan always uses them in reference to PFAS contamination. See the definition for PFAS for more information.

Health risk limit (HRL) – A health-based water guidance value developed by MDH that has been promulgated through the Minnesota rule-making process, which includes peer review and public input. It is the concentration of a groundwater contaminant, or a mixture of contaminants, that, based on current knowledge, can be consumed with little or no risk to health by the most exposed and sensitive individuals in a population.

High-service pumps – Pumps located at the water treatment facility that deliver large volumes of treated, potable water to the water supply system.

Horizontal directional drilling – A minimal impact trenchless method of installing underground utilities such as pipe, conduit, or cables in a relatively shallow arc or radius along a prescribed underground path using a surface-launched drilling rig.

Ion exchange (IX) – IX processes are reversible chemical reactions for removing dissolved ions from a solution and replacing them with other similarly charged ions. In water treatment, it is primarily used for softening, where calcium and magnesium ions are removed from water; however, it is being used more frequently for the removal of other dissolved ionic species.

Jack and bore – A method of horizontal boring construction for installing casing or steel pipes under roads or railways. Construction crews drill a hole underground horizontally between two points (the sending and receiving pits) without disturbing the surface in between. This is accomplished by using an auger boring machine that inserts casing pipe as it moves through the earth while simultaneously removing the soil from within the casing pipe.

Maximum contaminant level (MCL) – The maximum level of a contaminant allowed in water delivered from a public water supply. MCLs are set by EPA through a scientific process that evaluates the health impacts of the contaminant and the technology and cost required for prevention, monitoring, and/or treatment. States are allowed to enforce lower (i.e., stricter) standards than MCLs, but are not allowed to enforce higher (i.e., less strict) standards.

Metropolitan Council – The regional policy-making body, planning agency, and provider of essential services for the Twin Cities metropolitan region, including transportation, wastewater, water supply planning, growth planning, parks and trails, and affordable housing. The Minnesota Legislature established the Metropolitan Council in 1967; it has 17 members who are appointed by the Governor.

Municipal supply well – A drinking water well that serves as a source of water for a municipal water system.

Municipal water system – Refers to an existing municipality's drinking or potable water treatment and distribution system.

Non-community public supply well – A well that provides water to the public in places other than their homes – where people work, gather, and play (e.g., schools, offices, factories, childcare centers, or parks) – and is part of a non-community public water system (see definition below).

Non-community public water system – A drinking water system that supplies water from private water supply well(s) on a year-round basis to:

- A residential development with six or more private residences (e.g., apartment buildings, private subdivisions, condominiums, townhouse complexes, mobile home parks), or
- A mobile home park or campground with six or more sites with a water service hookup.

Non-municipal well – A well that is considered non-municipal in this Conceptual Plan, and includes domestic, irrigation, commercial, and non-community public water supply wells.

Operations and maintenance (O&M) – All work activities necessary to operate and maintain all water treatment and supply facilities from the source of water through the distribution systems.

Per- and polyfluoroalkyl substances (PFAS) – A family of synthetic chemicals, initially developed by 3M, used to make products that resist heat, oil, stains, grease, and water. They are extremely resistant to breakdown in the environment, accumulate in humans and animals, and are "emerging contaminants" that are the focus of active research and study. Specific chemicals within the PFAS family include perfluorooctanoic acid (PFOA), perfluorooctane sulfonate (PFOS), perfluorohexane sulfonate (PFHxS), perfluorobutane sulfonate (PFBS), and perfluorobutanoic acid (PFBA).

Point-of-entry treatment system (POETS) – Water treatment system installed on the water line as it enters an individual home, business, school, or other building. These systems treat all the water entering the building.

Point-of-use treatment (POUT) – Water treatment system installed on the water line at the point of use, such as a faucet.

Pressure-reducing stations – Locations within the water supply system where a pressure-reducing valve has been installed.

Pressure-reducing valves – A valve fitted in a pipe system, which, in spite of varying pressures on the inlet side (inlet pressure), ensures that a certain pressure on the outlet side (outlet pressure) is not exceeded, thus protecting the components and equipment on the outlet side.

Priority 1 – The first priority of the Grant is to enhance the quality, quantity, and sustainability of drinking water in the East Metropolitan Area. The goal of this highest-priority work is to ensure safe drinking water in sufficient supply to residents and businesses in the East Metropolitan Area to meet their current and future water needs. Examples of projects in this first priority may include, but are not limited to, the development of alternative drinking water sources for municipalities and individual households (including, but not limited to, creation or relocation of municipal wells), the treatment of existing water supplies, water conservation and efficiency, open-space acquisition, and groundwater recharge (including projects that encourage, enhance, and assist groundwater recharge). For individual households, projects may include, but are not limited to, connecting those residences to municipal water supplies, providing individual treatment systems, or constructing new wells.

Priority 2 – The second priority of the Settlement is to restore and enhance aquatic resources, wildlife, habitat, fishing, resource improvement, and outdoor recreational opportunities in the East Metropolitan Area and in downstream areas of the Mississippi and St. Croix Rivers. The Co-Trustees have immediate access to $20 million in Settlement funds for projects in this priority category. After the safe drinking water goals of the first priority have been reasonably achieved, all remaining Settlement funds will then be available for natural resource restoration and enhancement projects.

Priority 3 – If funds remain after the first two priority goals have been met, the Grant can be used for statewide environmental improvement projects. Only projects in categories such as statewide water resources, habitat restoration, open space preservation, recreation improvements, or other sustainability projects would be eligible.

Private well – A domestic drinking water well that is not part of a public water system. The quality and safety of water from private wells are not regulated by the federal Safe Drinking Water Act, nor in most cases by state laws.

Public supply well – A drinking water well that serves as a source of water for a public water system.

Public water system – A regulatory term under the federal Safe Drinking Water Act for a drinking water supply system that serves at least 15 homes or 25 people for at least 60 days a year.

Recharge – Water added to the aquifer from the surface through the unsaturated (dry or vadose) zone in the uppermost soils through processes called infiltration and percolation following any precipitation (rain or snow) event.

Regional water supply system – A water system that supplies potable water to more than one community or water system.

Scenarios – Sets of conceptual projects that consider water supply, distribution, and demand, and are evaluated in this Conceptual Plan using drinking water distribution and groundwater models.

Small community water system – A private and voluntary water system that serves neighborhood-sized clusters of residences.

Special Well Boring and Construction Area (SWBCA) – A mechanism that provides for controls on the drilling or alteration of wells in an area where groundwater contamination has resulted or may result in risks to public health. The purposes of an SWBCA are to inform the public of potential health risks in areas of groundwater contamination, provide for the construction of safe water supplies, and prevent the spread of contamination due to the improper drilling of wells or borings.

Sustainability – Responsible interaction with the environment to provide, improve, and protect the drinking water for future generations by lessening environmental impacts, thoughtfully managing demands, and empowering conservation through education and targeted projects. Minnesota Statute § 103G.287, subd. 5, describes groundwater sustainability as the development and use of groundwater resources to meet current and future beneficial uses without causing unacceptable environmental or socioeconomic consequences.

Transmission line – A large-diameter pipeline designed to convey large volumes of water at higher pressures from a source (typically a water treatment facility) to a distribution system for use. Water transmission lines are typically larger in diameter (greater than 16 inches), and consumers are not typically placed on transmission lines because of their high velocities and pressures.

Watershed districts – Special government entities that monitor and regulate the use of water within certain watersheds in Minnesota, rather than within political boundaries, which were first authorized by the legislature in 1955.

Water storage tank – A water storage facility consisting of a cylindrical tank that has a base elevation at the existing ground surface. Storage facilities provide sufficient water volume to meet peak hour water demands.

Water storage tower – An elevated water storage facility (also referred to as a water tower) that supports a water storage tank with a base elevation above the existing ground surface to provide sufficient pressure to the water distribution system, and to provide emergency storage for fire protection.

Water supply improvement options – A reasonable range of options that could improve drinking water quality and quantity, including both centralized and decentralized systems, which are evaluated against a set of screening criteria in this Conceptual Plan to determine their relevance to the individual communities in the East Metropolitan Area.

Water supply system – A system for the treatment, transmission, storage, and distribution of water from source to consumers (e.g., homes, commercial establishments, industry, irrigation facilities, and public agencies for water).

Work groups – Three groups formed by the Co-Trustees to help identify and recommend priorities and projects for Settlement funding: the Government and 3M Working Group, the Citizen-Business Group, and the Drinking Water Supply Technical Subgroup.

Acronyms and abbreviations

AACE	Association for the Advancement of Cost Engineering
Abt	Abt Associates
ADD	average daily demand
CAD	computer-aided design
Conceptual Plan	Conceptual Drinking Water Supply Plan
CSM	conceptual site model
DNR	Minnesota Department of Natural Resources
EPA	United States Environmental Protection Agency
GAC	granular activated carbon
GIS	geographic information system
Grant	3M Grant for Water Quality and Sustainability Fund
GWTP	groundwater treatment plant
HAL	EPA Health Advisory Level
HBV	health-based value
HI	health index (used interchangeably with HRI)
HRI	health risk index (used interchangeably with HI)
HRL	health risk limit
IX	ion exchange
MCES	Metropolitan Council Environmental Services
MCL	maximum contaminant level
MDH	Minnesota Department of Health
MERLA	Minnesota Environmental Response and Liability Act
mgd	million gallons per day
MGS	Minnesota Geological Survey
MPCA	Minnesota Pollution Control Agency
N/A	not applicable
NPS	National Park Service
O&M	operations and maintenance
PFAS	per- and polyfluoroalkyl substances
PFBA	perfluorobutanoic acid
PFBS	perfluorobutane sulfonate
PFHxS	perfluorohexane sulfonate
PFOA	perfluorooctanoic acid
PFOS	perfluorooctane sulfonate
POETS	point-of-entry treatment system
POUT	point-of-use treatment
QA/QC	quality assurance/quality control
Settlement	2018 Agreement and Order
SPRWS	St. Paul Regional Water Services
State	State of Minnesota
Subgroup 1	Drinking Water Supply Technical Subgroup
SWBCA	Special Well Boring and Construction Area

SWTP	surface water treatment plant
3M	3M Company
2007 Consent Order	2007 Settlement Agreement and Consent Order
TCE	trichloroethylene
VOC	volatile organic compound
Wood	Wood Environment & Infrastructure Solutions, Inc.

Appendix G. Scenario evaluation

This appendix provides the detailed results of the scenario evaluations. Each scenario consists of a set of conceptual projects, that when combined, addresses drinking water quality and quantity issues for the 14 communities currently known to be affected by per- and polyfluoroalkyl substances (PFAS) contamination in the East Metropolitan Area of the Twin Cities. The scenarios were evaluated using a set of evaluation criteria, as presented below.

G.1 Recommended scenarios

Community-Specific Scenario A.1 (HI ≥ 0.5, GAC), Community-Specific Scenario A.1 (HI ≥ 0.3, GAC), and Community Specific Scenario C.1 described below are part of the three recommended options discussed in detail in Chapter 7. The evaluations for those three scenarios are presented first, followed by all the other scenarios.

G.1.1 Scenario A.1 (HI ≥ 0.5, GAC) – Recommended Option 1

Table G.1 summarizes the ratings against the applicable evaluation criteria, including the rationale for each rating.

Table G.1. Evaluation Criteria of the Community-Specific Scenario A1, HI ≥ 0.5, GAC.

Criteria	Priority	Rating	Rationale
Implementation criteria			
3. Has a high probability of success (i.e., project outcomes are achieved)	High	+	• All technologies and approaches are standard and well-established as being reliable for drinking water systems
5. Provides long-term benefits [e.g., sustainability of water supply, longevity of infrastructure, etc.; assuming all necessary operations and maintenance (O&M) activities are conducted]	High	+	• Groundwater modeling shows that anticipated 2040 pumping for proposed new wells can be sustained by the aquifers in drought conditions • Infrastructure in this scenario is expected to have a standard lifespan of roughly 50 years
6. Provides multiple benefits (e.g., benefits to the aquifer, benefits to multiple communities)	Low	-	• Negligible ancillary benefits
7a. Addresses future water needs (e.g., population growth)	Medium	+	• Meets 2040 maximum daily demand
7b. Addresses future unknown/uncertain conditions (e.g., new contaminants, movement of contaminants, changing HBVs, climate change impacts)	High	O	• Treatment removes PFAS to detection limits, so wells that receive treatment would very likely remain below any future HBVs or HRLs • Many homes on private wells are connected to municipal water systems with treated groundwater • Wells with HI<0.5 do not receive treatment/hook-up and may require treatment with future plume movement or changes in HBVs or HRLs

Criteria	Priority	Rating	Rationale
8. Has low risk of adverse impacts from remedial actions (e.g., those conducted under the Consent Order or other known remedies)	Medium	+	• The groundwater model was used to locate wells such that they are unlikely to be significantly impacted or harmed by remedial actions
9. Has low risk of unintended adverse health impacts (e.g., change in water corrosiveness, generation of disinfection byproducts)	Medium	+	• There is low likelihood of bacterial contamination in new GAC treatment plants; chlorination would be required. • Expansion of distribution systems is relatively minor and carries only low likelihood of health impacts associated with disinfection byproducts and potential loss of chlorine residual
10. Minimizes adverse environmental impacts (e.g., movement of contaminants, additional contamination, physical harm to the environment, generation of waste)	Medium	-	• Significantly more impact on Medium-High and Medium value areas identified by the Wildlife Action Network • Small generation of waste that can be handled by incineration or reactivation of the carbon • Continued impact on White Bear Lake
11. Minimizes adverse social impacts (e.g., construction impacts such as noise and poor air quality, disproportionate impact to disadvantaged communities)	Medium	+	• Construction would affect fewer residential and total parcels than other scenarios
Cost criteria			
13. Is cost-effective (Metrics may include: $ per household, $ per gallon treated; cost to include capital and O&M)	Medium	+	• Total 20-year cost does not exceed available funds • Of scenarios that do not exceed available funds, this one is below the median cost
14. Has low long-term O&M costs	Medium	+	• Long-term annual O&M is among the lowest across all scenarios
Other criteria			
18. Is consistent with regional planning (e.g., Metropolitan Council planning, Washington County planning, regional aquifer planning)	Medium	+	• In general, consists of projects developed in collaboration with the communities and are consistent with the community planning, which is approved by Met Council
19. Is consistent with local planning (e.g., city comprehensive plans)	Medium	+	• In general, consists of projects developed in collaboration with the communities • Projects have been determined to be consistent with the communities existing long-term water supply plans and current efforts

Criteria	Priority	Rating	Rationale
20. Is generally acceptable to the public (as reflected by public feedback on the preliminary results summary and input by the work groups)	High	+	• Consists of projects suggested by communities and generally supported in public feedback • In general, public feedback expressed a preference for the more conservative HI threshold included in this scenario

G.1.2 Scenario A.1 (HI ≥ 0.3, GAC) – Recommended Option 2

Table G.2 summarizes the ratings against the applicable evaluation criteria, including the rationale for each rating.

Table G.2. Evaluation Criteria of the Community-Specific Scenario A1, HI ≥ 0.3, GAC.

Criteria	Priority	Rating	Rationale
Implementation criteria			
3. Has a high probability of success (i.e., project outcomes are achieved)	High	+	• All technologies and approaches are standard and well-established as being reliable for drinking water systems
5. Provides long-term benefits [e.g., sustainability of water supply, longevity of infrastructure, etc.; assuming all necessary operations and maintenance (O&M) activities are conducted]	High	+	• Groundwater modeling shows that anticipated 2040 pumping for proposed new wells can be sustained by the aquifers in drought conditions • Infrastructure in this scenario is expected to have a standard lifespan of roughly 50 years
6. Provides multiple benefits (e.g., benefits to the aquifer, benefits to multiple communities)	Low	-	• Negligible ancillary benefits
7a. Addresses future water needs (e.g., population growth)	Medium	+	• Meets 2040 maximum daily demand
7b. Addresses future unknown/uncertain conditions (e.g., new contaminants, movement of contaminants, changing HBVs, climate change impacts)	High	+	• Treatment removes PFAS to detection limits, so wells that receive treatment would very likely remain below any future HBVs or HRLs • Many homes on private wells are connected to municipal water systems with treated groundwater • With HI<0.3 there are fewer wells that do not receive treatment/hook-up and may require treatment with future plume movement or changes in HBVs or HRLs
8. Has low risk of adverse impacts from remedial actions (e.g., those conducted under the Consent Order or other known remedies)	Medium	+	• The groundwater model was used to locate wells such that they are unlikely to be significantly impacted or harmed by remedial actions

Criteria	Priority	Rating	Rationale
9. Has low risk of unintended adverse health impacts (e.g., change in water corrosiveness, generation of disinfection byproducts)	Medium	+	• There is low likelihood of bacterial contamination in new GAC treatment plants; chlorination would be required. • Expansion of distribution systems is relatively minor and carries only low likelihood of health impacts associated with disinfection byproducts and potential loss of chlorine residual
10. Minimizes adverse environmental impacts (e.g., movement of contaminants, additional contamination, physical harm to the environment, generation of waste)	Medium	-	• Significantly more impact on Medium-High and Medium value areas identified by the Wildlife Action Network • Small generation of waste that can be handled by incineration or reactivation of the carbon • Continued impact on White Bear Lake
11. Minimizes adverse social impacts (e.g., construction impacts such as noise and poor air quality, disproportionate impact to disadvantaged communities)	Medium	+	• Construction would affect fewer residential and total parcels than other scenarios
Cost criteria			
13. Is cost-effective (Metrics may include: $ per household, $ per gallon treated; cost to include capital and O&M)	Medium	+	• Total 20-year cost does not exceed available funds • Of scenarios that do not exceed available funds, this one is below the median cost
14. Has low long-term O&M costs	Medium	+	• Long-term annual O&M is among the lowest across all scenarios
Other criteria			
18. Is consistent with regional planning (e.g., Metropolitan Council planning, Washington County planning, regional aquifer planning)	Medium	+	• In general, consists of projects developed in collaboration with the communities and are consistent with the community planning, which is approved by Met Council
19. Is consistent with local planning (e.g., city comprehensive plans)	Medium	+	• In general, consists of projects developed in collaboration with the communities • Projects have been determined to be consistent with the communities existing long-term water supply plans and current efforts
20. Is generally acceptable to the public (as reflected by public feedback on the preliminary results summary and input by the work groups)	High	+	• Consists of projects suggested by communities and generally supported in public feedback • In general, public feedback expressed a preference for the more conservative HI threshold included in this scenario

G.1.3 Scenario C.1 (SPRWS, HI ≥ 0.5, GAC) – Recommended Option 3

Table G.3 summarizes the ratings against the applicable evaluation criteria, including the rationale for each rating.

Table G.3. Evaluation Criteria of the Community-Specific Scenario SPWRS, HI ≥ 0.5, GAC.

Criteria	Priority	Rating	Rationale
Implementation criteria			
3. Has a high probability of success (i.e., project outcomes are achieved)	High	+	• All technologies and approaches are standard and well-established as being reliable for drinking water systems
5. Provides long-term benefits [e.g., sustainability of water supply, longevity of infrastructure, etc.; assuming all necessary operations and maintenance (O&M) activities are conducted]	High	+	• Groundwater modeling shows that anticipated 2040 pumping for proposed new wells can be sustained by the aquifers in drought conditions • SPRWS can sustainably support anticipated demands for Oakdale and Lake Elmo • Infrastructure in this scenario is expected to have a standard lifespan of roughly 50 years
6. Provides multiple benefits (e.g., benefits to the aquifer, benefits to multiple communities)	Low	-	• Negligible ancillary benefits
7a. Addresses future water needs (e.g., population growth)	Medium	+	• Meets 2040 maximum daily demand
7b. Addresses future unknown/uncertain conditions (e.g., new contaminants, movement of contaminants, changing HBVs, climate change impacts)	High	+	• Treatment removes PFAS to detection limits, so wells that receive treatment would very likely remain below any future HBVs or HRLs • Many homes on private wells are connected to municipal water systems with treated groundwater • Wells with HI<0.3 do not receive treatment/hook-up and may require treatment with future plume movement or changes in HBVs or HRLs • Homes connected to SPRWS receive water with much less PFAS concentrations
8. Has low risk of adverse impacts from remedial actions (e.g., those conducted under the Consent Order or other known remedies)	Medium	+	• The groundwater model was used to locate wells such that they are unlikely to be significantly impacted or harmed by remedial actions • SPRWS is unlikely to be impacted or harmed by remedial actions

Criteria	Priority	Rating	Rationale
9. Has low risk of unintended adverse health impacts (e.g., change in water corrosiveness, generation of disinfection byproducts)	Medium	O	• Serving Oakdale and Lake Elmo with SPRWS will bring an increase in disinfection byproducts (DBPs); SPRWS meets EPA requirements for DBPs, but levels are higher than current groundwater-based systems • Despite inclusion of corrosion control measures, conversion to surface water brings risk of increasing corrosion of water mains and service lines, which may contain lead; this may result in lead contamination for some customers • Surface water sources may be more likely to contain additional contaminants that may raise health concerns in the future (e.g., pharmaceuticals) • There is low likelihood of bacterial contamination in new GAC treatment plants; chlorination would be required. • Expansion of distribution systems is relatively minor and carries only low likelihood of health impacts associated with disinfection byproducts and potential loss of chlorine residual
10. Minimizes adverse environmental impacts (e.g., movement of contaminants, additional contamination, physical harm to the environment, generation of waste)	Medium	-	• Significantly more impact on Medium-High and Medium value areas identified by the Wildlife Action Network • Small generation of waste that can be handled by incineration or reactivation of the carbon • Continued impact on White Bear Lake
11. Minimizes adverse social impacts (e.g., construction impacts such as noise and poor air quality, disproportionate impact to disadvantaged communities)	Medium	+	• Construction would affect fewer residential and total parcels than other scenarios
Cost criteria			
13. Is cost-effective (Metrics may include: $ per household, $ per gallon treated; cost to include capital and O&M)	Medium	O	• Total 20-year cost does not exceed available funds • Of scenarios that do not exceed available funds, this one is above the median cost
14. Has low long-term O&M costs	Medium	O	• Long-term annual O&M is in in the middle range across all scenarios

Criteria	Priority	Rating	Rationale
Other criteria			
18. Is consistent with regional planning (e.g., Metropolitan Council planning, Washington County planning, regional aquifer planning)	Medium	O	• In general, consists of projects developed in collaboration with the communities and are consistent with the community planning, which is approved by Met Council • SPRWS serving Oakdale & Lake Elmo diverges from the Met Council approved community water plans
19. Is consistent with local planning (e.g., city comprehensive plans)	Medium	O	• Consists of projects developed in collaboration with the communities, except for SPRWS serving Oakdale and Lake Elmo • Most projects have been determined to be consistent with the communities existing long-term water supply plans and current efforts
20. Is generally acceptable to the public (as reflected by public feedback on the preliminary results summary and input by the work groups)	High	O	• Public feedback raised concerns regarding reliance on SPRWS but communities do accept the use of SPRWS as a contingency and public feedback supported the more conservative HI threshold

G.2 Other revised scenarios

G.2.1 Revised Community Scenario A, HI>1, GAC

Table G.4 summarizes the ratings against the applicable evaluation criteria, including the rationale for each rating.

Table G.4. Evaluation Criteria of the Community-Specific Scenario A, HI>1, GAC.

Criteria	Priority	Rating	Rationale
Implementation criteria			
3. Has a high probability of success (i.e., project outcomes are achieved)	High	+	• All technologies and approaches are standard and well-established as being reliable for drinking water systems
5. Provides long-term benefits [e.g., sustainability of water supply, longevity of infrastructure, etc.; assuming all necessary operations and maintenance (O&M) activities are conducted]	High	+	• Groundwater modeling shows that anticipated 2040 pumping for proposed new wells can be sustained by the aquifers in drought conditions • Infrastructure in this scenario is expected to have a standard lifespan of roughly 50 years
6. Provides multiple benefits (e.g., benefits to the aquifer, benefits to multiple communities)	Low	-	• Negligible ancillary benefits
7a. Addresses future water needs (e.g., population growth)	Medium	+	• Meets 2040 maximum daily demand

Criteria	Priority	Rating	Rationale
7b. Addresses future unknown/uncertain conditions (e.g., new contaminants, movement of contaminants, changing HBVs, climate change impacts)	High	O	• Treatment removes PFAS to detection limits, so wells that receive treatment would very likely remain below any future HBVs or HRLs • Many homes on private wells are connected to municipal water systems with treated groundwater • Wells with HI<1 do not receive treatment/hook-up and may require treatment with future plume movement or changes in HBVs or HRLs
8. Has low risk of adverse impacts from remedial actions (e.g., those conducted under the Consent Order or other known remedies)	Medium	+	• The groundwater model was used to locate wells such that they are unlikely to be significantly impacted or harmed by remedial actions
9. Has low risk of unintended adverse health impacts (e.g., change in water corrosiveness, generation of disinfection byproducts)	Medium	+	• There is low likelihood of bacterial contamination in new GAC treatment plants; chlorination would be required. • Expansion of distribution systems is relatively minor and carries only low likelihood of health impacts associated with disinfection byproducts and potential loss of chlorine residual
10. Minimizes adverse environmental impacts (e.g., movement of contaminants, additional contamination, physical harm to the environment, generation of waste)	Medium	-	• Significantly more impact on Medium-High and Medium value areas identified by the Wildlife Action Network • Small generation of waste that can be handled by incineration or reactivation of the carbon • Continued impact on White Bear Lake
11. Minimizes adverse social impacts (e.g., construction impacts such as noise and poor air quality, disproportionate impact to disadvantaged communities)	Medium	+	• Construction would affect fewer residential and total parcels than other scenarios
Cost criteria			
13. Is cost-effective (Metrics may include: $ per household, $ per gallon treated; cost to include capital and O&M)	Medium	+	• Total 20-year cost does not exceed available funds • Of scenarios that do not exceed available funds, this one is below the median cost
14. Has low long-term O&M costs	Medium	+	• Long-term annual O&M is among the lowest across all scenarios
Other criteria			
18. Is consistent with regional planning (e.g., Metropolitan Council planning, Washington County planning, regional aquifer planning)	Medium	+	• In general, consists of projects developed in collaboration with the communities and are consistent with the community planning, which is approved by Met Council

Criteria	Priority	Rating	Rationale
19. Is consistent with local planning (e.g., city comprehensive plans)	Medium	+	• In general, consists of projects developed in collaboration with the communities • Projects have been determined to be consistent with the communities existing long-term water supply plans and current efforts
20. Is generally acceptable to the public (as reflected by public feedback on the preliminary results summary and input by the work groups)	High	O	• In general, public feedback expressed a preference for a more conservative HI threshold

G.2.2 Revised Community Scenario, A HI>0, GAC

Table G.5 summarizes the ratings against the applicable evaluation criteria, including the rationale for each rating.

Table G.5. Evaluation Criteria of the Community-Specific Scenario A, HI>0, GAC.

Criteria	Priority	Rating	Rationale
Implementation criteria			
3. Has a high probability of success (i.e., project outcomes are achieved)	High	+	• All technologies and approaches are standard and well-established as being reliable for drinking water systems
5. Provides long-term benefits [e.g., sustainability of water supply, longevity of infrastructure, etc.; assuming all necessary operations and maintenance (O&M) activities are conducted]	High	+	• Groundwater modeling shows that Groundwater modeling shows that anticipated 2040 pumping for proposed new wells can be sustained by the aquifers in drought conditions • Infrastructure in this scenario is expected to have a standard lifespan of roughly 50 years
6. Provides multiple benefits (e.g., benefits to the aquifer, benefits to multiple communities)	Low	-	• Negligible ancillary benefits
7a. Addresses future water needs (e.g., population growth)	Medium	+	• Meets 2040 maximum daily demand
7b. Addresses future unknown/uncertain conditions (e.g., new contaminants, movement of contaminants, changing HBVs, climate change impacts)	High	+	• Treatment removes PFAS to detection limits, so wells that receive treatment would very likely remain below any future HBVs or HRLs • Many homes on private wells are connected to municipal water systems with treated groundwater • Nearly all wells receive treatment/hook-up and as a result would not be affected by future plume movement or changes in HBVs or HRLs
8. Has low risk of adverse impacts from remedial actions (e.g., those conducted under the Consent Order or other known remedies)	Medium	+	• The groundwater model was used to locate wells such that they are unlikely to be significantly impacted or harmed by remedial actions

Criteria	Priority	Rating	Rationale
9. Has low risk of unintended adverse health impacts (e.g., change in water corrosiveness, generation of disinfection byproducts)	Medium	+	• There is low likelihood of bacterial contamination in new GAC treatment plants; chlorination would be required. • Expansion of distribution systems is relatively minor and carries only low likelihood of health impacts associated with disinfection byproducts and potential loss of chlorine residual
10. Minimizes adverse environmental impacts (e.g., movement of contaminants, additional contamination, physical harm to the environment, generation of waste)	Medium	-	• Significantly more impact on Medium-High and Medium value areas identified by the Wildlife Action Network • Small generation of waste that can be handled by incineration or reactivation of the carbon • Continued impact on White Bear Lake
11. Minimizes adverse social impacts (e.g., construction impacts such as noise and poor air quality, disproportionate impact to disadvantaged communities)	Medium	+	• Construction would affect fewer residential and total parcels than other scenarios
Cost criteria			
13. Is cost-effective (Metrics may include: $ per household, $ per gallon treated; cost to include capital and O&M)	Medium	O	• Total 20-year cost does not exceed available funds • Of scenarios that do not exceed available funds, this one is above the median cost
14. Has low long-term O&M costs	Medium	-	• Long-term annual O&M is among the highest across all scenarios
Other criteria			
18. Is consistent with regional planning (e.g., Metropolitan Council planning, Washington County planning, regional aquifer planning)	Medium	+	• In general, consists of projects developed in collaboration with the communities and are consistent with the community planning, which is approved by Met Council
19. Is consistent with local planning (e.g., city comprehensive plans)	Medium	+	• In general, consists of projects developed in collaboration with the communities • Projects have been determined to be consistent with the communities existing long-term water supply plans and current efforts
20. Is generally acceptable to the public (as reflected by public feedback on the preliminary results summary and input by the work groups)	High	+	• In general, public feedback expressed a preference for the more conservative HI threshold included in this scenario

G.2.3 Revised Community Scenario A, HI>1, IX

Table G.6 summarizes the ratings against the applicable evaluation criteria, including the rationale for each rating.

Table G.6. Evaluation Criteria of the Community-Specific Scenario A, HI>1, IX.

Criteria	Priority	Rating	Rationale
Implementation criteria			
3. Has a high probability of success (i.e., project outcomes are achieved)	High	+	• IX is not yet approved by MDH but is in pilot-testing; IX is a well-established technology used throughout the country • All other technologies and approaches are standard and well-established as being reliable for drinking water systems
5. Provides long-term benefits [e.g., sustainability of water supply, longevity of infrastructure, etc.; assuming all necessary operations and maintenance (O&M) activities are conducted]	High	+	• Groundwater modeling shows that anticipated 2040 pumping for proposed new wells can be sustained by the aquifers in drought conditions • Infrastructure in this scenario is expected to have a standard lifespan of roughly 50 years
6. Provides multiple benefits (e.g., benefits to the aquifer, benefits to multiple communities)	Low	-	• Negligible ancillary benefits
7a. Addresses future water needs (e.g., population growth)	Medium	+	• Meets 2040 maximum daily demand
7b. Addresses future unknown/uncertain conditions (e.g., new contaminants, movement of contaminants, changing HBVs, climate change impacts)	High	O	• Treatment removes PFAS to detection limits, so wells that receive treatment would very likely remain below any future HBVs or HRLs • Many homes on private wells are connected to municipal water systems with treated groundwater • Wells with HI<1 do not receive treatment/hook-up and may require treatment with future plume movement or changes in HBVs or HRLs
8. Has low risk of adverse impacts from remedial actions (e.g., those conducted under the Consent Order or other known remedies)	Medium	+	• The groundwater model was used to locate wells such that they are unlikely to be significantly impacted or harmed by remedial actions
9. Has low risk of unintended adverse health impacts (e.g., change in water corrosiveness, generation of disinfection byproducts)	Medium	+	• There is some risk of corrosivity issues with IX but it is usually minor and easy to manage with existing techniques • Expansion of distribution systems is relatively minor and carries only low likelihood of health impacts associated with disinfection byproducts and potential loss of chlorine residual.

Criteria	Priority	Rating	Rationale
10. Minimizes adverse environmental impacts (e.g., movement of contaminants, additional contamination, physical harm to the environment, generation of waste)	Medium	-	• Significantly more impact on Medium-High and Medium value areas identified by the Wildlife Action Network • Small generation of waste that can be handled by incineration • Continued impact on White Bear Lake
11. Minimizes adverse social impacts (e.g., construction impacts such as noise and poor air quality, disproportionate impact to disadvantaged communities)	Medium	+	• Construction would affect fewer residential and total parcels than other scenarios
Cost criteria			
13. Is cost-effective (Metrics may include: $ per household, $ per gallon treated; cost to include capital and O&M)	Medium	+	• Total 20-year cost does not exceed available funds • Of scenarios that do not exceed available funds, this one is below the median cost
14. Has low long-term O&M costs	Medium	+	• Long-term annual O&M is among the lowest across all scenarios
Other criteria			
18. Is consistent with regional planning (e.g., Metropolitan Council planning, Washington County planning, regional aquifer planning)	Medium	+	• In general, consists of projects developed in collaboration with the communities and are consistent with the community planning, which is approved by Met Council
19. Is consistent with local planning (e.g., city comprehensive plans)	Medium	+	• In general, consists of projects developed in collaboration with the communities • Projects have been determined to be consistent with the communities existing long-term water supply plans and current efforts
20. Is generally acceptable to the public (as reflected by public feedback on the preliminary results summary and input by the work groups)	High	O	• In general, public feedback expressed a preference for a more conservative HI threshold

G.2.4 Revised Community Scenario A, HI>0, IX

Table G.7 summarizes the ratings against the applicable evaluation criteria, including the rationale for each rating.

Table G.7. Evaluation Criteria of the Community-Specific Scenario A, HI>0, IX.

Criteria	Priority	Rating	Rationale
Implementation criteria			
3. Has a high probability of success (i.e., project outcomes are achieved)	High	+	• IX is not yet approved by MDH but is in pilot-testing; IX is a well-established technology used throughout the country • All other technologies and approaches are standard and well-established as being reliable for drinking water systems

Criteria	Priority	Rating	Rationale
5. Provides long-term benefits [e.g., sustainability of water supply, longevity of infrastructure, etc.; assuming all necessary operations and maintenance (O&M) activities are conducted]	High	+	• Groundwater modeling shows that anticipated 2040 pumping for proposed new wells can be sustained by the aquifers in drought conditions • Infrastructure in this scenario is expected to have a standard lifespan of roughly 50 years
6. Provides multiple benefits (e.g., benefits to the aquifer, benefits to multiple communities)	Low	-	• Negligible ancillary benefits
7a. Addresses future water needs (e.g., population growth)	Medium	+	• Meets 2040 maximum daily demand
7b. Addresses future unknown/uncertain conditions (e.g., new contaminants, movement of contaminants, changing HBVs, climate change impacts)	High	+	• Treatment removes PFAS to detection limits, so wells that receive treatment would very likely remain below any future HBVs or HRLs • Many homes on private wells are connected to municipal water systems with treated groundwater • Nearly all wells receive treatment/hook-up and as a result would not be affected by future plume movement or changes in HBVs or HRLs
8. Has low risk of adverse impacts from remedial actions (e.g., those conducted under the Consent Order or other known remedies)	Medium	+	• The groundwater model was used to locate wells such that they are unlikely to be significantly impacted or harmed by remedial actions
9. Has low risk of unintended adverse health impacts (e.g., change in water corrosiveness, generation of disinfection byproducts)	Medium	+	• There is some risk of corrosivity issues with IX but it is usually minor and easy to manage with existing techniques • Expansion of distribution systems is relatively minor and carries only low likelihood of health impacts associated with disinfection byproducts and potential loss of chlorine residual.
10. Minimizes adverse environmental impacts (e.g., movement of contaminants, additional contamination, physical harm to the environment, generation of waste)	Medium	-	• Significantly more impact on Medium-High and Medium value areas identified by the Wildlife Action Network • Small generation of waste that can be handled by incineration • Continued impact on White Bear Lake
11. Minimizes adverse social impacts (e.g., construction impacts such as noise and poor air quality, disproportionate impact to disadvantaged communities)	Medium	+	• Construction would affect fewer residential and total parcels than other scenarios

Criteria	Priority	Rating	Rationale
Cost criteria			
13. Is cost-effective (Metrics may include: $ per household, $ per gallon treated; cost to include capital and O&M)	Medium	O	• Total 20-year cost does not exceed available funds • Of scenarios that do not exceed available funds, this roughly at the median cost
14. Has low long-term O&M costs	Medium	O	• Long-term annual O&M is in the middle range among all scenarios
Other criteria			
18. Is consistent with regional planning (e.g., Metropolitan Council planning, Washington County planning, regional aquifer planning)	Medium	+	• In general, consists of projects developed in collaboration with the communities and are consistent with the community planning, which is approved by Met Council
19. Is consistent with local planning (e.g., city comprehensive plans)	Medium	+	• In general, consists of projects developed in collaboration with the communities • Projects have been determined to be consistent with the communities existing long-term water supply plans and current efforts
20. Is generally acceptable to the public (as reflected by public feedback on the preliminary results summary and input by the work groups)	High	+	• In general, public feedback expressed a preference for the more conservative HI threshold included in this scenario

G.2.5 Revised Community Scenario B, HI>1, GAC

Table G.8 summarizes the ratings against the applicable evaluation criteria, including the rationale for each rating.

Table G.8. Evaluation Criteria of the Community-Specific Scenario B, HI>1, GAC.

Criteria	Priority	Rating	Rationale
Implementation criteria			
3. Has a high probability of success (i.e., project outcomes are achieved)	High	+	• All technologies and approaches are standard and well-established as being reliable for drinking water systems
5. Provides long-term benefits [e.g., sustainability of water supply, longevity of infrastructure, etc.; assuming all necessary operations and maintenance (O&M) activities are conducted]	High	+	• Groundwater modeling shows that anticipated 2040 pumping for proposed new wells can be sustained by the aquifers in drought conditions • SPRWS can sustainably support anticipated demands for Oakdale • Infrastructure in this scenario is expected to have a standard lifespan of roughly 50 years
6. Provides multiple benefits (e.g., benefits to the aquifer, benefits to multiple communities)	Low	-	• Negligible ancillary benefits

Criteria	Priority	Rating	Rationale
7a. Addresses future water needs (e.g., population growth)	Medium	+	• Meets 2040 maximum daily demand
7b. Addresses future unknown/uncertain conditions (e.g., new contaminants, movement of contaminants, changing HBVs, climate change impacts)	High	O	• Treatment removes PFAS to detection limits, so wells that receive treatment would very likely remain below any future HBVs or HRLs • Many homes on private wells are connected to municipal water systems with treated groundwater • Wells with HI<1 do not receive treatment/hook-up and may require treatment with future plume movement or changes in HBVs or HRLs
8. Has low risk of adverse impacts from remedial actions (e.g., those conducted under the Consent Order or other known remedies)	Medium	+	• The groundwater model was used to locate wells such that they are unlikely to be significantly impacted or harmed by remedial actions • SPRWS is unlikely to be impacted or harmed by remedial actions
9. Has low risk of unintended adverse health impacts (e.g., change in water corrosiveness, generation of disinfection byproducts)	Medium	O	• Serving Oakdale with SPRWS will bring an increase in disinfection byproducts (DBPs); SPRWS meets EPA requirements for DBPs, but levels are higher than current groundwater-based systems • Despite inclusion of corrosion control measures, conversion to surface water brings risk of increasing corrosion of water mains and service lines, which may contain lead; this may result in lead contamination for some customers • Surface water sources may be more likely to contain additional contaminants that may raise health concerns in the future (e.g., pharmaceuticals) • There is low likelihood of bacterial contamination in new GAC treatment plants; chlorination would be required.
10. Minimizes adverse environmental impacts (e.g., movement of contaminants, additional contamination, physical harm to the environment, generation of waste)	Medium	-	• Significantly more impact on Medium-High and Medium value areas identified by the Wildlife Action Network • Small generation of waste that can be handled by incineration or reactivation of the carbon • Continued impact on White Bear Lake
11. Minimizes adverse social impacts (e.g., construction impacts such as noise and poor air quality, disproportionate impact to disadvantaged communities)	Medium	+	• Construction would affect fewer residential and total parcels than other scenarios

Criteria	Priority	Rating	Rationale
Cost criteria			
13. Is cost-effective (Metrics may include: $ per household, $ per gallon treated; cost to include capital and O&M)	Medium	O	• Total 20-year cost does not exceed available funds • Of scenarios that do not exceed available funds, this one is above the median cost
14. Has low long-term O&M costs	Medium	O	• Long-term annual O&M is in the middle range among all scenarios
Other criteria			
18. Is consistent with regional planning (e.g., Metropolitan Council planning, Washington County planning, regional aquifer planning)	Medium	O	• In general, consists of projects developed in collaboration with the communities and are consistent with the community planning, which is approved by Met Council • SPRWS serving Oakdale diverges from the Met Council approved community water plans
19. Is consistent with local planning (e.g., city comprehensive plans)	Medium	O	• Consists of projects developed in collaboration with the communities, except for SPRWS serving Oakdale • Most projects have been determined to be consistent with the communities existing long-term water supply plans and current efforts
20. Is generally acceptable to the public (as reflected by public feedback on the preliminary results summary and input by the work groups)	High	O	• Public feedback raised concerns regarding reliance on SPRWS but communities do accept the use of SPRWS as a contingency

G.2.6 Revised Community Scenario B, HI>1, IX

Table G.9 summarizes the ratings against the applicable evaluation criteria, including the rationale for each rating.

Table G.9. Evaluation Criteria of the Community-Specific Scenario B, HI>1, GAC.

Criteria	Priority	Rating	Rationale
Implementation criteria			
3. Has a high probability of success (i.e., project outcomes are achieved)	High	+	• IX is not yet approved by MDH but is in pilot-testing; IX is a well-established technology used throughout the country • All other technologies and approaches are standard and well-established as being reliable for drinking water systems

Criteria	Priority	Rating	Rationale
5. Provides long-term benefits [e.g., sustainability of water supply, longevity of infrastructure, etc.; assuming all necessary operations and maintenance (O&M) activities are conducted]	High	+	• Groundwater modeling shows that anticipated 2040 pumping for proposed new wells can be sustained by the aquifers in drought conditions • SPRWS can sustainably support anticipated demands for Oakdale • Infrastructure in this scenario is expected to have a standard lifespan of roughly 50 years
6. Provides multiple benefits (e.g., benefits to the aquifer, benefits to multiple communities)	Low	-	• Negligible ancillary benefits
7a. Addresses future water needs (e.g., population growth)	Medium	+	• Meets 2040 maximum daily demand
7b. Addresses future unknown/uncertain conditions (e.g., new contaminants, movement of contaminants, changing HBVs, climate change impacts)	High	O	• Treatment removes PFAS to detection limits, so wells that receive treatment would very likely remain below any future HBVs or HRLs • Many homes on private wells are connected to municipal water systems with treated groundwater • Wells with HI<1 do not receive treatment/hook-up and may require treatment with future plume movement or changes in HBVs or HRLs
8. Has low risk of adverse impacts from remedial actions (e.g., those conducted under the Consent Order or other known remedies)	Medium	+	• The groundwater model was used to locate wells such that they are unlikely to be significantly impacted or harmed by remedial actions • SPRWS is unlikely to be impacted or harmed by remedial actions
9. Has low risk of unintended adverse health impacts (e.g., change in water corrosiveness, generation of disinfection byproducts)	Medium	O	• Serving Oakdale with SPRWS will bring an increase in disinfection byproducts (DBPs); SPRWS meets EPA requirements for DBPs, but levels are higher than current groundwater-based systems • Despite inclusion of corrosion control measures, conversion to surface water brings risk of increasing corrosion of water mains and service lines, which may contain lead; this may result in lead contamination for some customers • Surface water sources may be more likely to contain additional contaminants that may raise health concerns in the future (e.g., pharmaceuticals) • There is low likelihood of bacterial contamination in new GAC treatment plants; chlorination would be required.

Criteria	Priority	Rating	Rationale
10. Minimizes adverse environmental impacts (e.g., movement of contaminants, additional contamination, physical harm to the environment, generation of waste)	Medium	-	• Significantly more impact on Medium-High and Medium value areas identified by the Wildlife Action Network • Small generation of waste that can be handled by incineration • Continued impact on White Bear Lake
11. Minimizes adverse social impacts (e.g., construction impacts such as noise and poor air quality, disproportionate impact to disadvantaged communities)	Medium	+	• Construction would affect fewer residential and total parcels than other scenarios
Cost criteria			
13. Is cost-effective (Metrics may include: $ per household, $ per gallon treated; cost to include capital and O&M)	Medium	O	• Total 20-year cost does not exceed available funds • Of scenarios that do not exceed available funds, this one is above the median cost
14. Has low long-term O&M costs	Medium	O	• Long-term annual O&M is in the middle range across all scenarios
Other criteria			
18. Is consistent with regional planning (e.g., Metropolitan Council planning, Washington County planning, regional aquifer planning)	Medium	O	• In general, consists of projects developed in collaboration with the communities and are consistent with the community planning, which is approved by Met Council • SPRWS serving Oakdale diverges from the Met Council approved community water plan
19. Is consistent with local planning (e.g., city comprehensive plans)	Medium	O	• Consists of projects developed in collaboration with the communities, except for SPRWS serving Oakdale • Most projects have been determined to be consistent with the communities existing long-term water supply plans and current efforts
20. Is generally acceptable to the public (as reflected by public feedback on the preliminary results summary and input by the work groups)	High	O	• Public feedback raised concerns regarding reliance on SPRWS but communities do accept the use of SPRWS as a contingency

G.2.7 Revised Community Scenario B, HI>0, GAC

Table G.10 summarizes the ratings against the applicable evaluation criteria, including the rationale for each rating.

Table G.10. Evaluation Criteria of the Community-Specific Scenario B, HI>0, GAC.

Criteria	Priority	Rating	Rationale
Implementation criteria			
3. Has a high probability of success (i.e., project outcomes are achieved)	High	+	• All technologies and approaches are standard and well-established as being reliable for drinking water systems
5. Provides long-term benefits [e.g., sustainability of water supply, longevity of infrastructure, etc.; assuming all necessary operations and maintenance (O&M) activities are conducted]	High	+	• Groundwater modeling shows that anticipated 2040 pumping for proposed new wells can be sustained by the aquifers in drought conditions • SPRWS can sustainably support anticipated demands for Oakdale • Infrastructure in this scenario is expected to have a standard lifespan of roughly 50 years
6. Provides multiple benefits (e.g., benefits to the aquifer, benefits to multiple communities)	Low	-	• Negligible ancillary benefits
7a. Addresses future water needs (e.g., population growth)	Medium	+	• Meets 2040 maximum daily demand
7b. Addresses future unknown/uncertain conditions (e.g., new contaminants, movement of contaminants, changing HBVs, climate change impacts)	High	+	• Treatment removes PFAS to detection limits, so wells that receive treatment would very likely remain below any future HBVs or HRLs • Many homes on private wells are connected to municipal water systems with treated groundwater • Nearly all wells receive treatment/hook-up and as a result would not be affected by future plume movement or changes in HBVs or HRLs
8. Has low risk of adverse impacts from remedial actions (e.g., those conducted under the Consent Order or other known remedies)	Medium	+	• The groundwater model was used to locate wells such that they are unlikely to be significantly impacted or harmed by remedial actions • SPRWS is unlikely to be impacted or harmed by remedial actions

Criteria	Priority	Rating	Rationale
9. Has low risk of unintended adverse health impacts (e.g., change in water corrosiveness, generation of disinfection byproducts)	Medium	O	• Serving Oakdale with SPRWS will bring an increase in disinfection byproducts (DBPs); SPRWS meets EPA requirements for DBPs, but levels are higher than current groundwater-based systems • Despite inclusion of corrosion control measures, conversion to surface water brings risk of increasing corrosion of water mains and service lines, which may contain lead; this may result in lead contamination for some customers • Surface water sources may be more likely to contain additional contaminants that may raise health concerns in the future (e.g., pharmaceuticals) • There is low likelihood of bacterial contamination in new GAC treatment plants; chlorination would be required.
10. Minimizes adverse environmental impacts (e.g., movement of contaminants, additional contamination, physical harm to the environment, generation of waste)	Medium	-	• Significantly more impact on Medium-High and Medium value areas identified by the Wildlife Action Network • Small generation of waste that can be handled by incineration or reactivation of the carbon • Continued impact on White Bear Lake
11. Minimizes adverse social impacts (e.g., construction impacts such as noise and poor air quality, disproportionate impact to disadvantaged communities)	Medium	+	• Construction would affect fewer residential and total parcels than other scenarios
Cost criteria			
13. Is cost-effective (Metrics may include: $ per household, $ per gallon treated; cost to include capital and O&M)	Medium	-	• Total 20-year cost exceeds available funds
14. Has low long-term O&M costs	Medium	-	• Long-term annual O&M is among the highest across all scenarios
Other criteria			
18. Is consistent with regional planning (e.g., Metropolitan Council planning, Washington County planning, regional aquifer planning)	Medium	O	• In general, consists of projects developed in collaboration with the communities and are consistent with the community planning, which is approved by Met Council • SPRWS serving Oakdale diverges from the Met Council approved community water plans

Criteria	Priority	Rating	Rationale
19. Is consistent with local planning (e.g., city comprehensive plans)	Medium	O	• Consists of projects developed in collaboration with the communities, except for SPRWS serving Oakdale • Most projects have been determined to be consistent with the communities existing long-term water supply plans and current efforts
20. Is generally acceptable to the public (as reflected by public feedback on the preliminary results summary and input by the work groups)	High	O	• Public feedback raised concerns regarding reliance on SPRWS but communities do accept the use of SPRWS as a contingency

G.2.8 Revised Community Scenario B, HI>0, IX

Table G.11 summarizes the ratings against the applicable evaluation criteria, including the rationale for each rating.

Table G.11. Evaluation Criteria of the Community-Specific Scenario B, HI>0, IX.

Criteria	Priority	Rating	Rationale
Implementation criteria			
3. Has a high probability of success (i.e., project outcomes are achieved)	High	+	• IX is not yet approved by MDH but is in pilot-testing; IX is a well-established technology used throughout the country • All other technologies and approaches are standard and well-established as being reliable for drinking water systems
5. Provides long-term benefits [e.g., sustainability of water supply, longevity of infrastructure, etc.; assuming all necessary operations and maintenance (O&M) activities are conducted]	High	+	• Groundwater modeling shows that anticipated 2040 pumping for proposed new wells can be sustained by the aquifers in drought conditions • SPRWS can sustainably support anticipated demands for Oakdale • Infrastructure in this scenario is expected to have a standard lifespan of roughly 50 years
6. Provides multiple benefits (e.g., benefits to the aquifer, benefits to multiple communities)	Low	-	• Negligible ancillary benefits
7a. Addresses future water needs (e.g., population growth)	Medium	+	• Meets 2040 maximum daily demand

Criteria	Priority	Rating	Rationale
7b. Addresses future unknown/uncertain conditions (e.g., new contaminants, movement of contaminants, changing HBVs, climate change impacts)	High	+	• Treatment removes PFAS to detection limits, so wells that receive treatment would very likely remain below any future HBVs or HRLs • Many homes on private wells are connected to municipal water systems with treated groundwater • Nearly all wells receive treatment/hook-up and as a result would not be affected by future plume movement or changes in HBVs or HRLs
8. Has low risk of adverse impacts from remedial actions (e.g., those conducted under the Consent Order or other known remedies)	Medium	+	• The groundwater model was used to locate wells such that they are unlikely to be significantly impacted or harmed by remedial actions • SPRWS is unlikely to be impacted or harmed by remedial actions
9. Has low risk of unintended adverse health impacts (e.g., change in water corrosiveness, generation of disinfection byproducts)	Medium	O	• Serving Oakdale with SPRWS will bring an increase in disinfection byproducts (DBPs); SPRWS meets EPA requirements for DBPs, but levels are higher than current groundwater-based systems • Despite inclusion of corrosion control measures, conversion to surface water brings risk of increasing corrosion of water mains and service lines, which may contain lead; this may result in lead contamination for some customers • Surface water sources may be more likely to contain additional contaminants that may raise health concerns in the future (e.g., pharmaceuticals) • There is low likelihood of bacterial contamination in new GAC treatment plants; chlorination would be required. • Expansion of distribution systems is relatively minor and carries only low likelihood of health impacts associated with disinfection byproducts and potential loss of chlorine residual
10. Minimizes adverse environmental impacts (e.g., movement of contaminants, additional contamination, physical harm to the environment, generation of waste)	Medium	-	• Significantly more impact on Medium-High and Medium value areas identified by the Wildlife Action Network • Small generation of waste that can be handled by incineration • Continued impact on White Bear Lake

Criteria	Priority	Rating	Rationale
11. Minimizes adverse social impacts (e.g., construction impacts such as noise and poor air quality, disproportionate impact to disadvantaged communities)	Medium	+	• Construction would affect fewer residential and total parcels than other scenarios
Cost criteria			
13. Is cost-effective (Metrics may include: $ per household, $ per gallon treated; cost to include capital and O&M)	Medium	-	• Total 20-year cost does not exceed available funds
14. Has low long-term O&M costs	Medium	-	• Long-term annual O&M is among the highest across all scenarios
Other criteria			
18. Is consistent with regional planning (e.g., Metropolitan Council planning, Washington County planning, regional aquifer planning)	Medium	O	• In general, consists of projects developed in collaboration with the communities and are consistent with the community planning, which is approved by Met Council • SPRWS serving Oakdale diverges from the Met Council approved community water plans
19. Is consistent with local planning (e.g., city comprehensive plans)	Medium	O	• Consists of projects developed in collaboration with the communities, except for SPRWS serving Oakdale • Most projects have been determined to be consistent with the communities existing long-term water supply plans and current efforts
20. Is generally acceptable to the public (as reflected by public feedback on the preliminary results summary and input by the work groups)	High	O	• Public feedback raised concerns regarding reliance on SPRWS but communities do accept the use of SPRWS as a contingency

G.2.9 Revised Community Scenario C, HI>1, GAC

Table G.12 summarizes the ratings against the applicable evaluation criteria, including the rationale for each rating.

Table G.12. Evaluation Criteria of the Community-Specific Scenario C, HI>1, GAC.

Criteria	Priority	Rating	Rationale
Implementation criteria			
3. Has a high probability of success (i.e., project outcomes are achieved)	High	+	• All technologies and approaches are standard and well-established as being reliable for drinking water systems
5. Provides long-term benefits [e.g., sustainability of water supply, longevity of infrastructure, etc.; assuming all necessary operations and maintenance (O&M) activities are conducted]	High	+	• Groundwater modeling shows that anticipated 2040 pumping for proposed new wells can be sustained by the aquifers in drought conditions • SPRWS can sustainably support anticipated demands for Oakdale and Lake Elmo • Infrastructure in this scenario is expected to have a standard lifespan of roughly 50 years
6. Provides multiple benefits (e.g., benefits to the aquifer, benefits to multiple communities)	Low	-	• Negligible ancillary benefits
7a. Addresses future water needs (e.g., population growth)	Medium	+	• Meets 2040 maximum daily demand
7b. Addresses future unknown/uncertain conditions (e.g., new contaminants, movement of contaminants, changing HBVs, climate change impacts)	High	O	• Treatment removes PFAS to detection limits, so wells that receive treatment would very likely remain below any future HBVs or HRLs • Many homes on private wells are connected to municipal water systems with treated groundwater • Wells with HI<1 do not receive treatment/hook-up and may require treatment with future plume movement or changes in HBVs or HRLs
8. Has low risk of adverse impacts from remedial actions (e.g., those conducted under the Consent Order or other known remedies)	Medium	+	• The groundwater model was used to locate wells such that they are unlikely to be significantly impacted or harmed by remedial actions • SPRWS is unlikely to be impacted or harmed by remedial actions

Criteria	Priority	Rating	Rationale
9. Has low risk of unintended adverse health impacts (e.g., change in water corrosiveness, generation of disinfection byproducts)	Medium	O	• Serving Oakdale and Lake Elmo with SPRWS will bring an increase in disinfection byproducts (DBPs); SPRWS meets EPA requirements for DBPs, but levels are higher than current groundwater-based systems • Despite inclusion of corrosion control measures, conversion to surface water brings risk of increasing corrosion of water mains and service lines, which may contain lead; this may result in lead contamination for some customers • Surface water sources may be more likely to contain additional contaminants that may raise health concerns in the future (e.g., pharmaceuticals) • There is low likelihood of bacterial contamination in new GAC treatment plants; chlorination would be required. • Expansion of distribution systems is relatively minor and carries only low likelihood of health impacts associated with disinfection byproducts and potential loss of chlorine residual
10. Minimizes adverse environmental impacts (e.g., movement of contaminants, additional contamination, physical harm to the environment, generation of waste)	Medium	-	• Significantly more impact on Medium-High and Medium value areas identified by the Wildlife Action Network • Small generation of waste that can be handled by incineration or reactivation of the carbon • Continued impact on White Bear Lake
11. Minimizes adverse social impacts (e.g., construction impacts such as noise and poor air quality, disproportionate impact to disadvantaged communities)	Medium	+	• Construction would affect fewer residential and total parcels than other scenarios
Cost criteria			
13. Is cost-effective (Metrics may include: $ per household, $ per gallon treated; cost to include capital and O&M)	Medium	+	• Total 20-year cost does not exceed available funds • Of scenarios that do not exceed available funds, this one is below the median cost
14. Has low long-term O&M costs	Medium	O	• Long-term annual O&M is in the middle range across all scenarios

Criteria	Priority	Rating	Rationale
Other criteria			
18. Is consistent with regional planning (e.g., Metropolitan Council planning, Washington County planning, regional aquifer planning)	Medium	O	• In general, consists of projects developed in collaboration with the communities and are consistent with the community planning, which is approved by Met Council • SPRWS serving Oakdale & Lake Elmo diverges from the Met Council approved community water plans
19. Is consistent with local planning (e.g., city comprehensive plans)	Medium	O	• Consists of projects developed in collaboration with the communities, except for SPRWS serving Oakdale and Lake Elmo • Most projects have been determined to be consistent with the communities existing long-term water supply plans and current efforts
20. Is generally acceptable to the public (as reflected by public feedback on the preliminary results summary and input by the work groups)	High	O	• Public feedback raised concerns regarding reliance on SPRWS but communities do accept the use of SPRWS as a contingency

G.2.10 Revised Community Scenario C, HI>1, IX

Table G.13 summarizes the ratings against the applicable evaluation criteria, including the rationale for each rating.

Table G.13. Evaluation Criteria of the Community-Specific Scenario C, HI>1, IX.

Criteria	Priority	Rating	Rationale
Implementation criteria			
3. Has a high probability of success (i.e., project outcomes are achieved)	High	+	• IX is not yet approved by MDH but is in pilot-testing; IX is a well-established technology used throughout the country • All other technologies and approaches are standard and well-established as being reliable for drinking water systems
5. Provides long-term benefits [e.g., sustainability of water supply, longevity of infrastructure, etc.; assuming all necessary operations and maintenance (O&M) activities are conducted]	High	+	• Groundwater modeling shows that anticipated 2040 pumping for proposed new wells can be sustained by the aquifers in drought conditions • SPRWS can sustainably support anticipated demands for Oakdale and Lake Elmo • Infrastructure in this scenario is expected to have a standard lifespan of roughly 50 years
6. Provides multiple benefits (e.g., benefits to the aquifer, benefits to multiple communities)	Low	-	• Negligible ancillary benefits

Criteria	Priority	Rating	Rationale
7a. Addresses future water needs (e.g., population growth)	Medium	+	• Meets 2040 maximum daily demand
7b. Addresses future unknown/uncertain conditions (e.g., new contaminants, movement of contaminants, changing HBVs, climate change impacts)	High	O	• Treatment removes PFAS to detection limits, so wells that receive treatment would very likely remain below any future HBVs or HRLs • Many homes on private wells are connected to municipal water systems with treated groundwater • Wells with HI<1 do not receive treatment/hook-up and may require treatment with future plume movement or changes in HBVs or HRLs
8. Has low risk of adverse impacts from remedial actions (e.g., those conducted under the Consent Order or other known remedies)	Medium	+	• The groundwater model was used to locate wells such that they are unlikely to be significantly impacted or harmed by remedial actions • SPRWS is unlikely to be impacted or harmed by remedial actions
9. Has low risk of unintended adverse health impacts (e.g., change in water corrosiveness, generation of disinfection byproducts)	Medium	O	• Serving Oakdale and Lake Elmo with SPRWS will bring an increase in disinfection byproducts (DBPs); SPRWS meets EPA requirements for DBPs, but levels are higher than current groundwater-based systems • Despite inclusion of corrosion control measures, conversion to surface water brings risk of increasing corrosion of water mains and service lines, which may contain lead; this may result in lead contamination for some customers • Surface water sources may be more likely to contain additional contaminants that may raise health concerns in the future (e.g., pharmaceuticals) • There is low likelihood of bacterial contamination in new GAC treatment plants; chlorination would be required. • Expansion of distribution systems is relatively minor and carries only low likelihood of health impacts associated with disinfection byproducts and potential loss of chlorine residual
10. Minimizes adverse environmental impacts (e.g., movement of contaminants, additional contamination, physical harm to the environment, generation of waste)	Medium	O	• Significantly more impact on Medium-High and Medium value areas identified by the Wildlife Action Network • Small generation of waste that can be handled by incineration • Reduced impact on White Bear Lake

Criteria	Priority	Rating	Rationale
11. Minimizes adverse social impacts (e.g., construction impacts such as noise and poor air quality, disproportionate impact to disadvantaged communities)	Medium	+	• Construction would affect fewer residential and total parcels than other scenarios
Cost criteria			
13. Is cost-effective (Metrics may include: $ per household, $ per gallon treated; cost to include capital and O&M)	Medium	+	• Total 20-year cost does not exceed available funds • Of scenarios that do not exceed available funds, this one is below the median cost
14. Has low long-term O&M costs	Medium	+	• Long-term annual O&M is among the lowest across all scenarios
Other criteria			
18. Is consistent with regional planning (e.g., Metropolitan Council planning, Washington County planning, regional aquifer planning)	Medium	O	• In general, consists of projects developed in collaboration with the communities and are consistent with the community planning, which is approved by Met Council • SPRWS serving Oakdale & Lake Elmo diverges from the Met Council approved community water plans
19. Is consistent with local planning (e.g., city comprehensive plans)	Medium	O	• Consists of projects developed in collaboration with the communities, except for SPRWS serving Oakdale and Lake Elmo • Most projects have been determined to be consistent with the communities existing long-term water supply plans and current efforts
20. Is generally acceptable to the public (as reflected by public feedback on the preliminary results summary and input by the work groups)	High	O	• Public feedback raised concerns regarding reliance on SPRWS but communities do accept the use of SPRWS as a contingency

G.2.11 Revised Community Scenario C, HI>0, GAC

Table G.14 summarizes the ratings against the applicable evaluation criteria, including the rationale for each rating.

Table G.14. Evaluation Criteria of the Community-Specific Scenario C, HI>0, GAC.

Criteria	Priority	Rating	Rationale
Implementation criteria			
3. Has a high probability of success (i.e., project outcomes are achieved)	High	+	• All technologies and approaches are standard and well-established as being reliable for drinking water systems
5. Provides long-term benefits [e.g., sustainability of water supply, longevity of infrastructure, etc.; assuming all necessary operations and maintenance (O&M) activities are conducted]	High	+	• Groundwater modeling shows that anticipated 2040 pumping for proposed new wells can be sustained by the aquifers in drought conditions • SPRWS can sustainably support anticipated demands for Oakdale and Lake Elmo • Infrastructure in this scenario is expected to have a standard lifespan of roughly 50 years
6. Provides multiple benefits (e.g., benefits to the aquifer, benefits to multiple communities)	Low	-	• Negligible ancillary benefits
7a. Addresses future water needs (e.g., population growth)	Medium	+	• Meets 2040 maximum daily demand
7b. Addresses future unknown/uncertain conditions (e.g., new contaminants, movement of contaminants, changing HBVs, climate change impacts)	High	+	• Treatment removes PFAS to detection limits, so wells that receive treatment would very likely remain below any future HBVs or HRLs • Many homes on private wells are connected to municipal water systems with treated groundwater • Nearly all wells receive treatment/hook-up and as a result would not be affected by future plume movement or changes in HBVs or HRLs
8. Has low risk of adverse impacts from remedial actions (e.g., those conducted under the Consent Order or other known remedies)	Medium	+	• The groundwater model was used to locate wells such that they are unlikely to be significantly impacted or harmed by remedial actions • SPRWS is unlikely to be impacted or harmed by remedial actions

Criteria	Priority	Rating	Rationale
9. Has low risk of unintended adverse health impacts (e.g., change in water corrosiveness, generation of disinfection byproducts)	Medium	O	• Serving Oakdale and Lake Elmo with SPRWS will bring an increase in disinfection byproducts (DBPs); SPRWS meets EPA requirements for DBPs, but levels are higher than current groundwater-based systems • Despite inclusion of corrosion control measures, conversion to surface water brings risk of increasing corrosion of water mains and service lines, which may contain lead; this may result in lead contamination for some customers • Surface water sources may be more likely to contain additional contaminants that may raise health concerns in the future (e.g., pharmaceuticals) • There is low likelihood of bacterial contamination in new GAC treatment plants; chlorination would be required. • Expansion of distribution systems is relatively minor and carries only low likelihood of health impacts associated with disinfection byproducts and potential loss of chlorine residual
10. Minimizes adverse environmental impacts (e.g., movement of contaminants, additional contamination, physical harm to the environment, generation of waste)	Medium	O	• Significantly more impact on Medium-High and Medium value areas identified by the Wildlife Action Network • Small generation of waste that can be handled by incineration or reactivation of the carbon • Reduced impact on White Bear Lake
11. Minimizes adverse social impacts (e.g., construction impacts such as noise and poor air quality, disproportionate impact to disadvantaged communities)	Medium	+	• Construction would affect fewer residential and total parcels than other scenarios
Cost criteria			
13. Is cost-effective (Metrics may include: $ per household, $ per gallon treated; cost to include capital and O&M)	Medium	O	• Total 20-year cost does not exceed available funds • Of scenarios that do not exceed available funds, this one is above the median cost
14. Has low long-term O&M costs	Medium	-	• Long-term annual O&M is among the highest across all scenarios

Criteria	Priority	Rating	Rationale
Other criteria			
18. Is consistent with regional planning (e.g., Metropolitan Council planning, Washington County planning, regional aquifer planning)	Medium	O	• In general, consists of projects developed in collaboration with the communities and are consistent with the community planning, which is approved by Met Council • SPRWS serving Oakdale & Lake Elmo diverges from the Met Council approved community water plans
19. Is consistent with local planning (e.g., city comprehensive plans)	Medium	O	• Consists of projects developed in collaboration with the communities, except for SPRWS serving Oakdale and Lake Elmo • Most projects have been determined to be consistent with the communities existing long-term water supply plans and current efforts
20. Is generally acceptable to the public (as reflected by public feedback on the preliminary results summary and input by the work groups)	High	O	• Public feedback raised concerns regarding reliance on SPRWS but communities do accept the use of SPRWS as a contingency

G.2.12 Revised Community Scenario C, HI>0, IX

Table G.15 summarizes the ratings against the applicable evaluation criteria, including the rationale for each rating.

Table G.15. Evaluation Criteria of the Community-Specific Scenario C, HI>0, IX.

Criteria	Priority	Rating	Rationale
Implementation criteria			
3. Has a high probability of success (i.e., project outcomes are achieved)	High	+	• IX is not yet approved by MDH but is in pilot-testing; IX is a well-established technology used throughout the country • All other technologies and approaches are standard and well-established as being reliable for drinking water systems
5. Provides long-term benefits [e.g., sustainability of water supply, longevity of infrastructure, etc.; assuming all necessary operations and maintenance (O&M) activities are conducted]	High	+	• Groundwater modeling shows that anticipated 2040 pumping for proposed new wells can be sustained by the aquifers in drought conditions • SPRWS can sustainably support anticipated demands for Oakdale and Lake Elmo • Infrastructure in this scenario is expected to have a standard lifespan of roughly 50 years
6. Provides multiple benefits (e.g., benefits to the aquifer, benefits to multiple communities)	Low	-	• Negligible ancillary benefits

Criteria	Priority	Rating	Rationale
7a. Addresses future water needs (e.g., population growth)	Medium	+	• Meets 2040 maximum daily demand
7b. Addresses future unknown/uncertain conditions (e.g., new contaminants, movement of contaminants, changing HBVs, climate change impacts)	High	+	• Treatment removes PFAS to detection limits, so wells that receive treatment would very likely remain below any future HBVs or HRLs • Many homes on private wells are connected to municipal water systems with treated groundwater • Nearly all wells receive treatment/hook-up and as a result would not be affected by future plume movement or changes in HBVs or HRLs
8. Has low risk of adverse impacts from remedial actions (e.g., those conducted under the Consent Order or other known remedies)	Medium	+	• The groundwater model was used to locate wells such that they are unlikely to be significantly impacted or harmed by remedial actions • SPRWS is unlikely to be impacted or harmed by remedial actions
9. Has low risk of unintended adverse health impacts (e.g., change in water corrosiveness, generation of disinfection byproducts)	Medium	O	• Serving Oakdale and Lake Elmo with SPRWS will bring an increase in disinfection byproducts (DBPs); SPRWS meets EPA requirements for DBPs, but levels are higher than current groundwater-based systems • Despite inclusion of corrosion control measures, conversion to surface water brings risk of increasing corrosion of water mains and service lines, which may contain lead; this may result in lead contamination for some customers • Surface water sources may be more likely to contain additional contaminants that may raise health concerns in the future (e.g., pharmaceuticals) • There is low likelihood of bacterial contamination in new GAC treatment plants; chlorination would be required. • Expansion of distribution systems is relatively minor and carries only low likelihood of health impacts associated with disinfection byproducts and potential loss of chlorine residual
10. Minimizes adverse environmental impacts (e.g., movement of contaminants, additional contamination, physical harm to the environment, generation of waste)	Medium	O	• Significantly more impact on Medium-High and Medium value areas identified by the Wildlife Action Network • Small generation of waste that can be handled by incineration • Reduced impact on White Bear Lake

Criteria	Priority	Rating	Rationale
11. Minimizes adverse social impacts (e.g., construction impacts such as noise and poor air quality, disproportionate impact to disadvantaged communities)	Medium	+	• Construction would affect fewer residential and total parcels than other scenarios
Cost criteria			
13. Is cost-effective (Metrics may include: $ per household, $ per gallon treated; cost to include capital and O&M)	Medium	-	• Total 20-year cost exceeds available funds
14. Has low long-term O&M costs	Medium	-	• Long-term annual O&M is among the highest across all scenarios
Other criteria			
18. Is consistent with regional planning (e.g., Metropolitan Council planning, Washington County planning, regional aquifer planning)	Medium	O	• In general, consists of projects developed in collaboration with the communities and are consistent with the community planning, which is approved by Met Council • SPRWS serving Oakdale & Lake Elmo diverges from the Met Council approved community water plans
19. Is consistent with local planning (e.g., city comprehensive plans)	Medium	O	• Consists of projects developed in collaboration with the communities, except for SPRWS serving Oakdale and Lake Elmo • Most projects have been determined to be consistent with the communities existing long-term water supply plans and current efforts
20. Is generally acceptable to the public (as reflected by public feedback on the preliminary results summary and input by the work groups)	High	O	• Public feedback raised concerns regarding reliance on SPRWS but communities do accept the use of SPRWS as a contingency

G.2.13 Revised Community Scenario D, HI>1, GAC

Table G.16 summarizes the ratings against the applicable evaluation criteria, including the rationale for each rating.

Table G.16. Evaluation Criteria of the Community-Specific Scenario C, HI>1, GAC.

Criteria	Priority	Rating	Rationale
Implementation criteria			
3. Has a high probability of success (i.e., project outcomes are achieved)s	High	+	• All technologies and approaches are standard and well-established as being reliable for drinking water systems
5. Provides long-term benefits [e.g., sustainability of water supply, longevity of infrastructure, etc.; assuming all necessary operations and maintenance (O&M) activities are conducted]	High	+	• Groundwater modeling shows that anticipated 2040 pumping for proposed new wells can be sustained by the aquifers in drought conditions • Infrastructure in this scenario is expected to have a standard lifespan of roughly 50 years
6. Provides multiple benefits (e.g., benefits to the aquifer, benefits to multiple communities)	Low	-	• Negligible ancillary benefits
7a. Addresses future water needs (e.g., population growth)	Medium	+	• Meets 2040 maximum daily demand
7b. Addresses future unknown/uncertain conditions (e.g., new contaminants, movement of contaminants, changing HBVs, climate change impacts)	High	O	• Treatment removes PFAS to detection limits, so wells that receive treatment would very likely remain below any future HBVs or HRLs • Many homes on private wells are connected to municipal water systems with treated groundwater • Wells with HI<1 do not receive treatment/hook-up and may require treatment with future plume movement or changes in HBVs or HRLs
8. Has low risk of adverse impacts from remedial actions (e.g., those conducted under the Consent Order or other known remedies)	Medium	+	• The groundwater model was used to locate wells such that they are unlikely to be significantly impacted or harmed by remedial actions
9. Has low risk of unintended adverse health impacts (e.g., change in water corrosiveness, generation of disinfection byproducts)	Medium	+	• There is low likelihood of bacterial contamination in new GAC treatment plants; chlorination would be required. • Expansion of distribution systems is relatively minor and carries only low likelihood of health impacts associated with disinfection byproducts and potential loss of chlorine residual

Criteria	Priority	Rating	Rationale
10. Minimizes adverse environmental impacts (e.g., movement of contaminants, additional contamination, physical harm to the environment, generation of waste)	Medium	O	• Significantly more impact on Medium-High and Medium value areas identified by the Wildlife Action Network • Small generation of waste that can be handled by incineration or reactivation of the carbon • Reduced impact on White Bear Lake
11. Minimizes adverse social impacts (e.g., construction impacts such as noise and poor air quality, disproportionate impact to disadvantaged communities)	Medium	+	• Construction would affect fewer residential and total parcels than other scenarios
Cost criteria			
13. Is cost-effective (Metrics may include: $ per household, $ per gallon treated; cost to include capital and O&M)	Medium	O	• Total 20-year cost does not exceed available funds • Of scenarios that do not exceed available funds, this one is above the median cost
14. Has low long-term O&M costs	Medium	+	• Long-term annual O&M is among the lowest for the all scenarios • Rating does not currently take into account cost-sharing or any other contributions from communities to long-term O&M
Other criteria			
18. Is consistent with regional planning (e.g., Metropolitan Council planning, Washington County planning, regional aquifer planning)	Medium	+	• In general, consists of projects developed in collaboration with the communities and are consistent with the community planning, which is approved by Met Council
19. Is consistent with local planning (e.g., city comprehensive plans)	Medium	O	• Consists of projects developed in collaboration with the communities, except for SPRWS serving Oakdale • Most projects have been determined to be consistent with the communities existing long-term water supply plans and current efforts
20. Is generally acceptable to the public (as reflected by public feedback on the preliminary results summary and input by the work groups)	High	O	• Public feedback raised concerns regarding reliance on SPRWS but communities do accept the use of SPRWS as a contingency

G.2.14 Revised Community Scenario D, HI>1, IX

Table G.17 summarizes the ratings against the applicable evaluation criteria, including the rationale for each rating.

Table G.17. Evaluation Criteria of the Community-Specific Scenario D, HI>1, IX.

Criteria	Priority	Rating	Rationale
Implementation criteria			
3. Has a high probability of success (i.e., project outcomes are achieved)s	High	+	• IX is not yet approved by MDH but is in pilot-testing; IX is a well-established technology used throughout the country • All other technologies and approaches are standard and well-established as being reliable for drinking water systems
5. Provides long-term benefits [e.g., sustainability of water supply, longevity of infrastructure, etc.; assuming all necessary operations and maintenance (O&M) activities are conducted]	High	+	• Groundwater modeling shows that anticipated 2040 pumping for proposed new wells can be sustained by the aquifers in drought conditions • Infrastructure in this scenario is expected to have a standard lifespan of roughly 50 years
6. Provides multiple benefits (e.g., benefits to the aquifer, benefits to multiple communities)	Low	-	• Negligible ancillary benefits
7a. Addresses future water needs (e.g., population growth)	Medium	+	• Meets 2040 maximum daily demand
7b. Addresses future unknown/uncertain conditions (e.g., new contaminants, movement of contaminants, changing HBVs, climate change impacts)	High	O	• Treatment removes PFAS to detection limits, so wells that receive treatment would very likely remain below any future HBVs or HRLs • Many homes on private wells are connected to municipal water systems with treated groundwater • Wells with HI<1 do not receive treatment/hook-up and may require treatment with future plume movement or changes in HBVs or HRLs
8. Has low risk of adverse impacts from remedial actions (e.g., those conducted under the Consent Order or other known remedies)	Medium	+	• The groundwater model was used to locate wells such that they are unlikely to be significantly impacted or harmed by remedial actions
9. Has low risk of unintended adverse health impacts (e.g., change in water corrosiveness, generation of disinfection byproducts)	Medium	+	• There is some risk of corrosivity issues with IX but it is usually minor and easy to manage with existing techniques • Expansion of distribution systems is relatively minor and carries only low likelihood of health impacts associated with disinfection byproducts and potential loss of chlorine residual.

Criteria	Priority	Rating	Rationale
10. Minimizes adverse environmental impacts (e.g., movement of contaminants, additional contamination, physical harm to the environment, generation of waste)	Medium	O	• Significantly more impact on Medium-High and Medium value areas identified by the Wildlife Action Network • Small generation of waste that can be handled by incineration • Reduced impact on White Bear Lake
11. Minimizes adverse social impacts (e.g., construction impacts such as noise and poor air quality, disproportionate impact to disadvantaged communities)	Medium	+	• Construction would affect fewer residential and total parcels than other scenarios
Cost criteria			
13. Is cost-effective (Metrics may include: $ per household, $ per gallon treated; cost to include capital and O&M)	Medium	+	• Total 20-year cost does not exceed available funds • Of scenarios that do not exceed available funds, this one is below the median cost
14. Has low long-term O&M costs	Medium	+	• Long-term annual O&M is among the lowest for the all scenarios • Rating does not currently take into account cost-sharing or any other contributions from communities to long-term O&M
Other criteria			
18. Is consistent with regional planning (e.g., Metropolitan Council planning, Washington County planning, regional aquifer planning)	Medium	+	• In general, consists of projects developed in collaboration with the communities and are consistent with the community planning, which is approved by Met Council
19. Is consistent with local planning (e.g., city comprehensive plans)	Medium	O	• Consists of projects developed in collaboration with the communities, except for SPRWS serving Oakdale and Lake Elmo • Most projects have been determined to be consistent with the communities existing long-term water supply plans and current efforts
20. Is generally acceptable to the public (as reflected by public feedback on the preliminary results summary and input by the work groups)	High	O	• Public feedback raised concerns regarding reliance on SPRWS but communities do accept the use of SPRWS as a contingency

G.2.15 Revised Community Scenario D, HI>0, GAC

Table G.18 summarizes the ratings against the applicable evaluation criteria, including the rationale for each rating.

Table G.18. Evaluation Criteria of the Community-Specific Scenario D, HI>0, GAC.

Criteria	Priority	Rating	Rationale
Implementation criteria			
3. Has a high probability of success (i.e., project outcomes are achieved)s	High	+	• All technologies and approaches are standard and well-established as being reliable for drinking water systems
5. Provides long-term benefits [e.g., sustainability of water supply, longevity of infrastructure, etc.; assuming all necessary operations and maintenance (O&M) activities are conducted]	High	+	• Groundwater modeling shows that anticipated 2040 pumping for proposed new wells can be sustained by the aquifers in drought conditions • Infrastructure in this scenario is expected to have a standard lifespan of roughly 50 years
6. Provides multiple benefits (e.g., benefits to the aquifer, benefits to multiple communities)	Low	-	• Negligible ancillary benefits
7a. Addresses future water needs (e.g., population growth)	Medium	+	• Meets 2040 maximum daily demand
7b. Addresses future unknown/uncertain conditions (e.g., new contaminants, movement of contaminants, changing HBVs, climate change impacts)	High	O	• Treatment removes PFAS to detection limits, so wells that receive treatment would very likely remain below any future HBVs or HRLs • Many homes on private wells are connected to municipal water systems with treated groundwater • Nearly all wells receive treatment/hook-up and as a result would not be affected by future plume movement or changes in HBVs or HRLs
8. Has low risk of adverse impacts from remedial actions (e.g., those conducted under the Consent Order or other known remedies)	Medium	+	• The groundwater model was used to locate wells such that they are unlikely to be significantly impacted or harmed by remedial actions
9. Has low risk of unintended adverse health impacts (e.g., change in water corrosiveness, generation of disinfection byproducts)	Medium	+	• There is low likelihood of bacterial contamination in new GAC treatment plants; chlorination would be required. • Expansion of distribution systems is relatively minor and carries only low likelihood of health impacts associated with disinfection byproducts and potential loss of chlorine residual

Criteria	Priority	Rating	Rationale
10. Minimizes adverse environmental impacts (e.g., movement of contaminants, additional contamination, physical harm to the environment, generation of waste)	Medium	O	• Significantly more impact on Medium-High and Medium value areas identified by the Wildlife Action Network • Small generation of waste that can be handled by incineration or reactivation of the carbon • Continued impact on White Bear Lake
11. Minimizes adverse social impacts (e.g., construction impacts such as noise and poor air quality, disproportionate impact to disadvantaged communities)	Medium	+	• Construction would affect fewer residential and total parcels than other scenarios
Cost criteria			
13. Is cost-effective (Metrics may include: $ per household, $ per gallon treated; cost to include capital and O&M)	Medium	+	• Total 20-year cost does not exceed available funds • Of scenarios that do not exceed available funds, this one is above the median cost
14. Has low long-term O&M costs	Medium	+	• Long-term annual O&M is among the highest for all the scenarios • Rating does not currently take into account cost-sharing or any other contributions from communities to long-term O&M
Other criteria			
18. Is consistent with regional planning (e.g., Metropolitan Council planning, Washington County planning, regional aquifer planning)	Medium	+	• In general, consists of projects developed in collaboration with the communities and are consistent with the community planning, which is approved by Met Council
19. Is consistent with local planning (e.g., city comprehensive plans)	Medium	O	• Consists of projects developed in collaboration with the communities, except for SPRWS serving Oakdale and Lake Elmo • Most projects have been determined to be consistent with the communities existing long-term water supply plans and current efforts
20. Is generally acceptable to the public (as reflected by public feedback on the preliminary results summary and input by the work groups)	High	O	• Public feedback raised concerns regarding reliance on SPRWS but communities do accept the use of SPRWS as a contingency

G.2.16 Revised Community Scenario D, HI>0, IX

Table G.19 summarizes the ratings against the applicable evaluation criteria, including the rationale for each rating.

Table G.19. Evaluation Criteria of the Community-Specific Scenario D HI>0, IX.

Criteria	Priority	Rating	Rationale
Implementation criteria			
3. Has a high probability of success (i.e., project outcomes are achieved)s	High	+	• IX is not yet approved by MDH but is in pilot-testing; IX is a well-established technology used throughout the country • All other technologies and approaches are standard and well-established as being reliable for drinking water systems
5. Provides long-term benefits [e.g., sustainability of water supply, longevity of infrastructure, etc.; assuming all necessary operations and maintenance (O&M) activities are conducted]	High	+	• Groundwater modeling shows that anticipated 2040 pumping for proposed new wells can be sustained by the aquifers in drought conditions • Infrastructure in this scenario is expected to have a standard lifespan of roughly 50 years
6. Provides multiple benefits (e.g., benefits to the aquifer, benefits to multiple communities)	Low	-	• Negligible ancillary benefits
7a. Addresses future water needs (e.g., population growth)	Medium	+	• Meets 2040 maximum daily demand
7b. Addresses future unknown/uncertain conditions (e.g., new contaminants, movement of contaminants, changing HBVs, climate change impacts)	High	+	• Treatment removes PFAS to detection limits, so wells that receive treatment would very likely remain below any future HBVs or HRLs • Many homes on private wells are connected to municipal water systems with treated groundwater • Nearly all wells receive treatment/hook-up and as a result would not be affected by future plume movement or changes in HBVs or HRLs
8. Has low risk of adverse impacts from remedial actions (e.g., those conducted under the Consent Order or other known remedies)	Medium	+	• The groundwater model was used to locate wells such that they are unlikely to be significantly impacted or harmed by remedial actions
9. Has low risk of unintended adverse health impacts (e.g., change in water corrosiveness, generation of disinfection byproducts)	Medium	+	• There is some risk of corrosivity issues with IX but it is usually minor and easy to manage with existing techniques • Expansion of distribution systems is relatively minor and carries only low likelihood of health impacts associated with disinfection byproducts and potential loss of chlorine residual.

Criteria	Priority	Rating	Rationale
10. Minimizes adverse environmental impacts (e.g., movement of contaminants, additional contamination, physical harm to the environment, generation of waste)	Medium	O	• Significantly more impact on Medium-High and Medium value areas identified by the Wildlife Action Network • Small generation of waste that can be handled by incineration • Reduced impact on White Bear Lake
11. Minimizes adverse social impacts (e.g., construction impacts such as noise and poor air quality, disproportionate impact to disadvantaged communities)	Medium	+	• Construction would affect fewer residential and total parcels than other scenarios
Cost criteria			
13. Is cost-effective (Metrics may include: $ per household, $ per gallon treated; cost to include capital and O&M)	Medium	O	• Total 20-year cost does not exceed available funds • Of scenarios that do not exceed available funds, this one is above the median cost
14. Has low long-term O&M costs	Medium	+	• Long-term annual O&M is among the lowest for the all scenarios • Rating does not currently take into account cost-sharing or any other contributions from communities to long-term O&M
Other criteria			
18. Is consistent with regional planning (e.g., Metropolitan Council planning, Washington County planning, regional aquifer planning)	Medium	+	• In general, consists of projects developed in collaboration with the communities and are consistent with the community planning, which is approved by Met Council
19. Is consistent with local planning (e.g., city comprehensive plans)	Medium	O	• Consists of projects developed in collaboration with the communities, except for SPRWS serving Oakdale and Lake Elmo • Most projects have been determined to be consistent with the communities existing long-term water supply plans and current efforts
20. Is generally acceptable to the public (as reflected by public feedback on the preliminary results summary and input by the work groups)	High	O	• Public feedback raised concerns regarding reliance on SPRWS but communities do accept the use of SPRWS as a contingency

G.3 Original Community-specific scenarios

The sections below provide the detailed evaluations of the community-specific scenario, separated by treatment technology. The community-specific scenario with granular activated carbon (GAC) is presented in Section G.3.1., while the version with ion exchange (IX) is presented in Section G.3.2.

G.3.1 Original Community-Specific Scenario 1A – GAC

Table G.20 summarizes the ratings against the applicable evaluation criteria, including the rationale for each rating.

Table G.20. Evaluation of the Community-Specific Scenario 1A – GAC.

Criteria	Priority	Rating	Rationale
Implementation criteria			
3. Has a high probability of success (i.e., project outcomes are achieved)	High	+	• All technologies and approaches are standard and well-established as being reliable for drinking water systems
5. Provides long-term benefits [e.g., sustainability of water supply, longevity of infrastructure, etc.; assuming all necessary operations and maintenance (O&M) activities are conducted]	High	+	• Groundwater modeling shows that anticipated 2040 pumping can be sustained by the aquifers in drought conditions • Infrastructure in this scenario is expected to have a standard lifespan of roughly 50 years
6. Provides multiple benefits (e.g., benefits to the aquifer, benefits to multiple communities)	Low	-	• Relatively little disruption to existing drinking water systems and infrastructure • Negligible additional benefits
7a. Addresses future water needs (e.g., population growth)	Medium	+	• Meets 2040 maximum daily demand
7b. Addresses future unknown/uncertain conditions (e.g., new contaminants, movement of contaminants, changing HBVs, climate change impacts)	High	O	• Treatment removes PFAS to detection limits, so wells that receive treatment would very likely remain below any future HBVs or HRLs • Many homes on private wells are connected to municipal water systems with treated groundwater • By treating wells with a HI equal to or greater than 0.5, this scenario leaves relatively few, but some, wells without treatment and vulnerable to future changes in HBVs/HRLs or PFAS plume movement
8. Has low risk of adverse impacts from remedial actions (e.g., those conducted under the Consent Order or other known remedies)	Medium	+	• The groundwater model was used to locate wells such that they are unlikely to be significantly impacted or harmed by remedial actions

Criteria	Priority	Rating	Rationale
9. Has low risk of unintended adverse health impacts (e.g., change in water corrosiveness, generation of disinfection byproducts)	Medium	+	• Low likelihood of bacterial contamination of GAC treatment systems; chlorination would be required • Low likelihood of increase in disinfection byproducts and loss of chlorine residual due to modest expansion of distribution systems
10. Minimizes adverse environmental impacts (e.g., movement of contaminants, additional contamination, physical harm to the environment, generation of waste)	Medium	-	• Significantly more impact on Medium-High and Medium value areas identified by the Wildlife Action Network • Small generation of waste that can be handled by incineration or reactivation of the carbon • Continued impact on White Bear Lake
11. Minimizes adverse social impacts (e.g., construction impacts such as noise and poor air quality, disproportionate impact to disadvantaged communities)	Medium	+	• Construction would affect fewer residential and total parcels than other scenarios
Cost criteria			
13. Is cost-effective (Metrics may include: $ per household, $ per gallon treated; cost to include capital and O&M)	Medium	-	• Total 20-year cost exceeds available funds
14. Has low long-term O&M costs	Medium	O	• Long-term annual O&M is above the median for scenarios when outliers are removed from the analysis • Rating does not currently take into account cost-sharing or any other contributions from communities to long-term O&M
Other criteria			
18. Is consistent with regional planning (e.g., Metropolitan Council planning, Washington County planning, regional aquifer planning)	Medium	+	• In general, consists of projects developed in collaboration with the communities and are consistent with the community planning, which is approved by the Metropolitan Council
19. Is consistent with local planning (e.g., city comprehensive plans)	Medium	+	• In general, consists of projects developed in collaboration with the communities • In general, most projects have been determined to be consistent with the communities existing long-term water supply plans and current efforts
20. Is generally acceptable to the public (as reflected by public feedback on the preliminary results summary and input by the work groups)	High	+	• In general, public feedback reflected that this scenario consists of projects developed in collaboration with the communities

G.3.2 Original Community-Specific Scenario 1A – IX

Table G.21 summarizes the ratings against the applicable evaluation criteria, including the rationale for each rating.

Table G.21. Evaluation of the Community-Specific Scenario 1A – IX.

Criteria	Priority	Rating	Rationale
Implementation criteria			
3. Has a high probability of success (i.e., project outcomes are achieved)	High	+	• IX is not yet approved by the Minnesota Department of Health (MDH) but is in pilot-testing; IX is a well-established technology used throughout the country • All other technologies and approaches are standard and well-established as being reliable for drinking water systems
5. Provides long-term benefits (e.g., sustainability of water supply, longevity of infrastructure, etc.; assuming all necessary O&M activities are conducted)	High	+	• Groundwater modeling shows that anticipated 2040 pumping can be sustained by the aquifers in drought conditions • Infrastructure in this scenario is expected to have a standard lifespan of roughly 50 years
6. Provides multiple benefits (e.g., benefits to the aquifer, benefits to multiple communities)	Low	-	• Relatively little disruption to existing drinking water systems and infrastructure • Negligible additional benefits
7a. Addresses future water needs (e.g., population growth)	Medium	+	• Meets 2040 maximum daily demand
7b. Addresses future unknown/uncertain conditions (e.g., new contaminants, movement of contaminants, changing HBVs, climate change impacts)	High	O	• Treatment removes PFAS to detection limits, so wells that receive treatment would very likely remain below any future HBVs or HRLs • Many homes on private wells are connected to municipal water systems with treated groundwater • By treating wells with HI Equal to or greater than 0.5, this scenario leaves relatively few wells, but some, without treatment and vulnerable to future changes in HBVs/HRLs or PFAS plume movement
8. Has low risk of adverse impacts from remedial actions (e.g., those conducted under the Consent Order or other known remedies)	Medium	+	• The groundwater model was used to locate wells such that they are unlikely to be significantly impacted or harmed by remedial actions
9. Has low risk of unintended adverse health impacts (e.g., change in water corrosiveness, generation of disinfection byproducts)	Medium	+	• There is some risk of corrosivity issues with IX but it is usually minor and easy to manage with existing techniques. • Low likelihood of increase in disinfection byproducts and loss of chlorine residual due to modest expansion of distribution systems.

Criteria	Priority	Rating	Rationale
10. Minimizes adverse environmental impacts (e.g., movement of contaminants, additional contamination, physical harm to the environment, generation of waste)	Medium	-	• Significantly more impact on Medium-High and Medium value areas identified by the Wildlife Action Network • Small generation of waste that can be handled by incineration Continued impact on White Bear Lake
11. Minimizes adverse social impacts (e.g., construction impacts such as noise and poor air quality, disproportionate impact to disadvantaged communities)	Medium	+	• Construction would affect fewer residential and total parcels than other scenarios
Cost criteria			
13. Is cost-effective (Metrics may include: $ per household, $ per gallon treated; cost to include capital and O&M)	Medium	O	• Total cost per millions gallons per day (mgd) is above the median among scenarios for which the total 20 year cost does not exceed available funds
14. Has low long-term O&M costs	Medium	+	• Long-term annual O&M is below the median for scenarios when outliers are removed from the analysis • Rating does not currently take into account cost-sharing or any other contributions from communities to long-term O&M
Other criteria			
18. Is consistent with regional planning (e.g., Metropolitan Council planning, Washington County planning, regional aquifer planning)	Medium	+	• In general, consists of projects developed in collaboration with the communities and are consistent with community planning, which is approved by the Metropolitan Council
19. Is consistent with local planning (e.g., city comprehensive plans)	Medium	+	• In general, consists of projects developed in collaboration with the communities • In general, most projects have been determined to be consistent with the communities existing long-term water supply plans and current efforts
20. Is generally acceptable to the public (as reflected by public feedback on the preliminary results summary and input by the work groups)	High	+	• In general, public feedback reflected that this scenario consists of projects developed in collaboration with the communities

G.4 Original regional scenarios

The sections below provide the detailed evaluations of the regional scenarios. Sections G.4.1-G.4.2 present the scenarios with surface water treatment plants (SWTPs) on either the Mississippi and/or St. Croix Rivers. Section G.4.3 presents the scenario that would involve expanding St. Paul Regional Water Services (SPRWS). Sections G.4.4-G.2.6 present the sub-regional groundwater scenario, separated by GAC and IX. The regional groundwater scenario (Regional Scenario 2D) was not evaluated because the

groundwater model showed that the aquifers could not sustainably support the necessary pumping rates.

G.4.1 Original Regional Scenario 2A

Table G.22 summarizes the ratings against the applicable evaluation criteria, including the rationale for each rating.

Table G.22. Evaluation of the Regional Scenario 2A.

Criteria	Priority	Rating	Rationale
Implementation criteria			
3. Has a high probability of success (i.e., project outcomes are achieved)	High	+	• All technologies and approaches are standard and well-established as being reliable for drinking water systems
5. Provides long-term benefits (e.g., sustainability of water supply, longevity of infrastructure, etc.; assuming all necessary O&M activities are conducted)	High	+	• Mississippi River can sustain anticipated withdrawals; the maximum daily demand would represent less than 10% of daily river flow in the driest month on record since 1892 • Infrastructure in this scenario is expected to have a standard lifespan of roughly 50 years
6. Provides multiple benefits (e.g., benefits to the aquifer, benefits to multiple communities)	Low	+	• Surface water systems have the benefit of redundancy of supply (maintain groundwater for backup) • Ensure long-term safe water through centralized systems
7a. Addresses future water needs (e.g., population growth)	Medium	+	• Meets 2040 maximum daily demand
7b. Addresses future unknown/uncertain conditions (e.g., new contaminants, movement of contaminants, changing HBVs, climate change impacts)	High	+	• With surface water as the primary source of drinking water for most communities, future issues with PFAS in groundwater or changes in HBVs/HRLs are largely avoided • Communities without a municipal water system would get point of entry treatment (POET) systems; people in those homes that do not get a POET system now could be vulnerable to changing PFAS or HBVs/HRLs in the future; the Consent Order would cover homes with HI>=1 • Maintaining groundwater as back-up supply protects against future risks to surface water sources, including climate change. • Proposed SWTP sites are well outside current 100-year and 500-year floodplains, so flood risk under future conditions is very small.

Criteria	Priority	Rating	Rationale
8. Has low risk of adverse impacts from remedial actions (e.g., those conducted under the Consent Order or other known remedies)	Medium	+	• Surface water sources and associated infrastructure are unlikely to be significantly impacted or harmed by remedial actions
9. Has low risk of unintended adverse health impacts (e.g., change in water corrosiveness, generation of disinfection byproducts)	Medium	-	• Conversion to surface water will almost certainly lead to an increase in disinfection byproducts; while the WTPs will likely meet regulatory requirements, there is still a health impact associated with those levels of disinfection byproducts • Despite inclusion of corrosion control measures, conversion to surface water brings risk of increasing corrosion of water mains and service lines, which may contain lead; this may result in lead contamination for some customers • Surface water sources may be more likely to contain additional contaminants that may raise health concerns in the future (e.g., pharmaceuticals)
10. Minimizes adverse environmental impacts (e.g., movement of contaminants, additional contamination, physical harm to the environment, generation of waste)	Medium	+	• Less impact on Medium-High and Medium value areas identified by the Wildlife Action Network • Moderate amount of impact on Low-Medium value areas identified by the Wildlife Action Network • Reduced impact on White Bear Lake
11. Minimizes adverse social impacts (e.g., construction impacts such as noise and poor air quality, disproportionate impact to disadvantaged communities)	Medium	+	• Construction would affect fewer residential and total parcels than other scenarios
Cost criteria			
13. Is cost-effective (Metrics may include: $ per household, $ per gallon treated; cost to include capital and O&M)	Medium	-	• Total 20-year cost exceeds available funds
14. Has low long-term O&M costs	Medium	O	• Long-term annual O&M is above the median for scenarios when outliers are removed from the analysis • Rating does not currently take into account cost-sharing or any other contributions from communities to long-term O&M

Criteria	Priority	Rating	Rationale
Other criteria			
18. Is consistent with regional planning (e.g., Metropolitan Council planning, Washington County planning, regional aquifer planning)	Medium	O	• Diverges from the Metropolitan Council approved community water supply plans • Metropolitan Council is concerned with the sustainability of groundwater in the region
19. Is consistent with local planning (e.g., city comprehensive plans)	Medium	-	• Requires a switch from groundwater to surface water for a majority of the communities • Requires a reliance on a regional water supplier rather than local or non-municipal water supply
20. Is generally acceptable to the public (as reflected by public feedback on the preliminary results summary and input by the work groups)	High	-	• In general, public feedback reflected concern with a switch from groundwater to surface water

G.4.2 Original Regional Scenario 2B.1

Table G.23 summarizes the ratings against the applicable evaluation criteria, including the rationale for each rating.

Table G.23. Evaluation of the Regional Scenario 2B.1.

Criteria	Priority	Rating	Rationale
Implementation criteria			
3. Has a high probability of success (i.e., project outcomes are achieved)	High	+	• All technologies and approaches are standard and well-established as being reliable for drinking water systems
5. Provides long-term benefits (e.g., sustainability of water supply, longevity of infrastructure, etc.; assuming all necessary O&M activities are conducted)	High	+	• Mississippi River can sustain anticipated withdrawals; the maximum daily demand would represent less than 8% of daily river flow in the driest month on record since 1892 • St. Croix River can sustain anticipated withdrawals; the maximum daily demand would represent less than 2% of daily river flow in the driest month on record since 1902 • Infrastructure in this scenario is expected to have a standard lifespan of roughly 50 years
6. Provides multiple benefits (e.g., benefits to the aquifer, benefits to multiple communities)	Low	+	• Surface water systems have the benefit of redundancy of supply (maintain groundwater for backup) • Ensure long-term safe water through centralized systems
7a. Addresses future water needs (e.g., population growth)	Medium	+	• Meets 2040 maximum daily demand

Criteria	Priority	Rating	Rationale
7b. Addresses future unknown/uncertain conditions (e.g., new contaminants, movement of contaminants, changing HBVs, climate change impacts)	High	+	• With surface water as the primary source of drinking water for most communities, future issues with PFAS in groundwater or changes in HBVs/HRLs are largely avoided • Communities without a municipal water system would get POET systems; people in those homes that do not get a POET system now could be vulnerable to changing PFAS or HBVs/HRLs in the future; the Consent Order would cover homes with HI>=1 • Maintaining groundwater as back-up supply protects against future risks to surface water sources, including climate change. • Proposed SWTP sites are well outside current 100-year and 500-year floodplains, so flood risk under future conditions is very small.
8. Has low risk of adverse impacts from remedial actions (e.g., those conducted under the Consent Order or other known remedies)	Medium	+	• Surface water sources and associated infrastructure are unlikely to be significantly impacted or harmed by remedial actions
9. Has low risk of unintended adverse health impacts (e.g., change in water corrosiveness, generation of disinfection byproducts)	Medium	-	• Conversion to surface water will almost certainly lead to an increase in disinfection byproducts; while the WTPs will likely meet regulatory requirements, there is still a health impact associated with those levels of disinfection byproducts • Despite inclusion of corrosion control measures, conversion to surface water brings risk of increasing corrosion of water mains and service lines, which may contain lead; this may result in lead contamination for some customers • Surface water sources may be more likely to contain additional contaminants that may raise health concerns in the future (e.g., pharmaceuticals)
10. Minimizes adverse environmental impacts (e.g., movement of contaminants, additional contamination, physical harm to the environment, generation of waste)	Medium	+	• Less impact on Medium-High and Medium value areas identified by the Wildlife Action Network • Moderate amount of impact on Low-Medium value areas identified by the Wildlife Action Network • Reduced impact on White Bear Lake

Criteria	Priority	Rating	Rationale
11. Minimizes adverse social impacts (e.g., construction impacts such as noise and poor air quality, disproportionate impact to disadvantaged communities)	Medium	O	• Construction would affect a moderate number of residential and total parcels compared to other scenarios
Cost criteria			
13. Is cost-effective (Metrics may include: $ per household, $ per gallon treated; cost to include capital and O&M)	Medium	-	• Total 20-year cost exceeds available funds
14. Has low long-term O&M costs	Medium	O	• Long-term annual O&M is above the median for scenarios when outliers are removed from the analysis • Rating does not currently take into account cost-sharing or any other contributions from communities to long-term O&M
Other criteria			
18. Is consistent with regional planning (e.g., Metropolitan Council planning, Washington County planning, regional aquifer planning)	Medium	O	• Diverges from the Metropolitan Council approved community water supply plans • Metropolitan Council is concerned with the sustainability of groundwater in the region
19. Is consistent with local planning (e.g., city comprehensive plans)	Medium	-	• Requires a switch from groundwater to surface water for a majority of the communities • Requires a reliance on a regional water supplier rather than local or non-municipal water supply
20. Is generally acceptable to the public (as reflected by public feedback on the preliminary results summary and input by the work groups)	High	-	• In general, public feedback reflected concern with a switch from groundwater to surface water

G.4.3 Original Regional Scenario 2C – SPRWS

Table G.24 summarizes the ratings against the applicable evaluation criteria, including the rationale for each rating.

Table G.24. Evaluation of the Regional Scenario 2C.

Criteria	Priority	Rating	Rationale
Implementation criteria			
3. Has a high probability of success (i.e., project outcomes are achieved)	High	+	• All technologies and approaches are standard and well-established as being reliable for drinking water systems
5. Provides long-term benefits (e.g., sustainability of water supply, longevity of infrastructure, etc.; assuming all necessary O&M activities are conducted)	High	+	• SPRWS would expand facilities to support maximum daily demand of 52 mgd and has indicated that their Mississippi River diversion and back up groundwater sources can sustainably support anticipated demands • Infrastructure in this scenario is expected to have a standard lifespan of roughly 50 years
6. Provides multiple benefits (e.g., benefits to the aquifer, benefits to multiple communities)	Low	+	• Surface water systems have the benefit of redundancy of supply (maintain groundwater for backup) • Ensure long-term safe water through centralized systems
7a. Addresses future water needs (e.g., population growth)	Medium	+	• Meets 2040 maximum daily demand
7b. Addresses future unknown/uncertain conditions (e.g., new contaminants, movement of contaminants, changing HBVs, climate change impacts)	High	+	• With surface water as the primary source of drinking water for most communities, future issues with PFAS in groundwater or changes in HBVs/HRLs are largely avoided • Communities without a municipal water system would get POET systems; people in those homes that do not get a POET system now could be vulnerable to changing PFAS or HBVs/HRLs in the future; the Consent Order would cover homes with HI>=1 • Maintaining groundwater as back-up supply protects against future risks to surface water sources, including climate change. • Proposed SWTP sites are well outside current 100-year and 500-year floodplains, so flood risk under future conditions is very small.
8. Has low risk of adverse impacts from remedial actions (e.g., those conducted under the Consent Order or other known remedies)	Medium	+	• The groundwater model was used to locate wells such that they are unlikely to be significantly impacted or harmed by remedial actions

Criteria	Priority	Rating	Rationale
9. Has low risk of unintended adverse health impacts (e.g., change in water corrosiveness, generation of disinfection byproducts)	Medium	-	• Conversion to surface water will almost certainly lead to an increase in disinfection byproducts; while the SWTPs will likely meet regulatory requirements, there is still a health impact associated with those levels of disinfection byproducts • Despite inclusion of corrosion control measures, conversion to surface water brings risk of increasing corrosion of water mains and service lines, which may contain lead; this may result in lead contamination for some customers • Surface water sources may be more likely to contain additional contaminants that may raise health concerns in the future (e.g., pharmaceuticals)
10. Minimizes adverse environmental impacts (e.g., movement of contaminants, additional contamination, physical harm to the environment, generation of waste)	Medium	-	• Among all scenarios, this has the highest total impact on areas identified by the Wildlife Action Network, including larger impacts on areas designated Medium-High and Medium value • Reduced impact on White Bear Lake
11. Minimizes adverse social impacts (e.g., construction impacts such as noise and poor air quality, disproportionate impact to disadvantaged communities)	Medium	-	• Construction would affect a moderate number of residential and total parcels compared to other scenarios
Cost criteria			
13. Is cost-effective (Metrics may include: $ per household, $ per gallon treated; cost to include capital and O&M)	Medium	-	• Total 20-year cost exceeds available funds
14. Has low long-term O&M costs	Medium	-	• Long-term annual O&M is significantly greater than all other scenarios • Rating does not currently take into account cost-sharing or any other contributions from communities to long-term O&M
Other criteria			
18. Is consistent with regional planning (e.g., Metropolitan Council planning, Washington County planning, regional aquifer planning)	Medium	O	• Diverges from the Metropolitan Council approved community water supply plans • Metropolitan Council is concerned with the sustainability of groundwater in the region

Criteria	Priority	Rating	Rationale
19. Is consistent with local planning (e.g., city comprehensive plans)	Medium	-	• Requires a switch from groundwater to surface water for a majority of the communities • Requires a reliance on a regional water supplier rather than local or non-municipal water supply
20. Is generally acceptable to the public (as reflected by public feedback on the preliminary results summary and input by the work groups)	High	-	• In general, public feedback reflected concern with a switch from groundwater to surface water

G.4.4 Original Regional Scenario 2B.2 – Mississippi and St Croix SWTPs

Table G.25 summarizes the ratings against the applicable evaluation criteria, including the rationale for each rating.

Table G.25. Evaluation of the Regional Scenario 2B.2.

Criteria	Priority	Rating	Rationale
Implementation criteria			
3. Has a high probability of success (i.e., project outcomes are achieved)	High	+	• All technologies and approaches are standard and well-established as being reliable for drinking water systems
5. Provides long-term benefits (e.g., sustainability of water supply, longevity of infrastructure, etc.; assuming all necessary O&M activities are conducted)	High	+	• Mississippi River can sustain anticipated withdrawals; the maximum daily demand would represent less than 5% of daily river flow in the driest month on record since 1892 • St. Croix River can sustain anticipated withdrawals; the maximum daily demand would represent less than 5% of daily river flow in the driest month on record since 1902 • Infrastructure in this scenario is expected to have a standard lifespan of roughly 50 years
6. Provides multiple benefits (e.g., benefits to the aquifer, benefits to multiple communities)	Low	+	• Surface water systems have the benefit of redundancy of supply (maintain groundwater for backup) • Ensure long-term safe water through centralized systems
7a. Addresses future water needs (e.g., population growth)	Medium	+	• Meets 2040 maximum daily demand

Criteria	Priority	Rating	Rationale
7b. Addresses future unknown/uncertain conditions (e.g., new contaminants, movement of contaminants, changing HBVs, climate change impacts)	High	+	• With surface water as the primary source of drinking water for most communities, future issues with PFAS in groundwater or changes in HBVs/HRLs are largely avoided • Communities without a municipal water system would get POET systems; people in those homes that do not get a POET system now could be vulnerable to changing PFAS or HBVs/HRLs in the future; the Consent Order would cover homes with HI>=1 • Maintaining groundwater as back-up supply protects against future risks to surface water sources, including climate change. • Proposed SWTP sites are well outside current 100-year and 500-year floodplains, so flood risk under future conditions is very small.
8. Has low risk of adverse impacts from remedial actions (e.g., those conducted under the Consent Order or other known remedies)	Medium	+	• Surface water sources and associated infrastructure are unlikely to be significantly impacted or harmed by remedial actions
9. Has low risk of unintended adverse health impacts (e.g., change in water corrosiveness, generation of disinfection byproducts)	Medium	-	• Conversion to surface water will almost certainly lead to an increase in disinfection byproducts; while the WTPs will likely meet regulatory requirements, there is still a health impact associated with those levels of disinfection byproducts • Despite inclusion of corrosion control measures, conversion to surface water brings risk of increasing corrosion of water mains and service lines, which may contain lead; this may result in lead contamination for some customers • Surface water sources may be more likely to contain additional contaminants that may raise health concerns in the future (e.g., pharmaceuticals)
10. Minimizes adverse environmental impacts (e.g., movement of contaminants, additional contamination, physical harm to the environment, generation of waste)	Medium	+	• Less impact on Medium-High and Medium value areas identified by the Wildlife Action Network • Moderate amount of impact on Low-Medium value areas identified by the Wildlife Action Network • Reduced impact on White Bear Lake

Criteria	Priority	Rating	Rationale
11. Minimizes adverse social impacts (e.g., construction impacts such as noise and poor air quality, disproportionate impact to disadvantaged communities)	Medium	O	• Construction would affect a moderate number of residential and total parcels compared to other scenarios
Cost criteria			
13. Is cost-effective (Metrics may include: $ per household, $ per gallon treated; cost to include capital and O&M)	Medium	-	• Total 20-year cost exceeds available funds
14. Has low long-term O&M costs	Medium	O	• Long-term annual O&M is above the median for scenarios when outliers are removed from the analysis • Rating does not currently take into account cost-sharing or any other contributions from communities to long-term O&M
Other criteria			
18. Is consistent with regional planning (e.g., Metropolitan Council planning, Washington County planning, regional aquifer planning)	Medium	O	• Diverges from the Metropolitan Council approved community water supply plans • Metropolitan Council is concerned with the sustainability of groundwater in the region
19. Is consistent with local planning (e.g., city comprehensive plans)	Medium	-	• Requires a switch from groundwater to surface water for a majority of the communities • Requires a reliance on a regional water supplier rather than local or non-municipal water supply
20. Is generally acceptable to the public (as reflected by public feedback on the preliminary results summary and input by the work groups)	High	-	• In general, public feedback reflected concern with a switch from groundwater to surface water

G.4.5 Original Regional Scenario 2E – sub-regional groundwater (GAC)

Table G.26 summarizes the ratings against the applicable evaluation criteria, including the rationale for each rating.

Table G.26. Evaluation of the Regional Scenario 2E – GAC.

Criteria	Priority	Rating	Rationale
Implementation criteria			
3. Has a high probability of success (i.e., project outcomes are achieved)	High	+	• All technologies and approaches are standard and well-established as being reliable for drinking water systems
5. Provides long-term benefits (e.g., sustainability of water supply, longevity of infrastructure, etc.; assuming all necessary O&M activities are conducted)	High	+	• Groundwater modeling shows that anticipated 2040 pumping can be sustained by the aquifers in drought conditions • Infrastructure in this scenario is expected to have a standard lifespan of roughly 50 years
6. Provides multiple benefits (e.g., benefits to the aquifer, benefits to multiple communities)	Low	O	• Ensure long-term safe water through centralized systems
7a. Addresses future water needs (e.g., population growth)	Medium	+	• Meets 2040 maximum daily demand
7b. Addresses future unknown/uncertain conditions (e.g., new contaminants, movement of contaminants, changing HBVs, climate change impacts)	High	O	• With regional, treated groundwater as the primary source of drinking water for most communities, future issues with PFAS in groundwater or changes in HBVs/HRLs are largely avoided • Communities without a municipal water system would get POET systems; people in those homes that do not get a POET system now could be vulnerable to changing PFAS or HBVs/HRLs in the future; the Consent Order would cover homes with HI>=1 • Modeling shows the sub-regional well fields are resilient to drought conditions.
8. Has low risk of adverse impacts from remedial actions (e.g., those conducted under the Consent Order or other known remedies)	Medium	+	• The groundwater model was used to locate wells such that they are unlikely to be significantly impacted or harmed by remedial actions
9. Has low risk of unintended adverse health impacts (e.g., change in water corrosiveness, generation of disinfection byproducts)	Medium	O	• Some increase in disinfection byproducts due to length of time that water travels in the large distribution system • Some chance of loss of chlorine residual due to size of the distribution system, which can increase chances of bacterial contamination (e.g., legionella)

Criteria	Priority	Rating	Rationale
10. Minimizes adverse environmental impacts (e.g., movement of contaminants, additional contamination, physical harm to the environment, generation of waste)	Medium	-	• More impact on high value areas identified by the Wildlife Action Network • More impact on high value areas for Biodiversity Significant • Reduced impact on White Bear Lake
11. Minimizes adverse social impacts (e.g., construction impacts such as noise and poor air quality, disproportionate impact to disadvantaged communities)	Medium	-	• Construction would affect significantly more residential and total parcels compared to other scenarios
Cost criteria			
13. Is cost-effective (Metrics may include: $ per household, $ per gallon treated; cost to include capital and O&M)	Medium	O	• Cost per mgd is above the median for scenarios where the total 20 year cost does not exceed available funds • Total 20-year cost does not exceed available funds
14. Has low long-term O&M costs	Medium	O	• Long-term annual O&M is above the median for scenarios when outliers are removed from the analysis • Rating does not currently take into account cost-sharing or any other contributions from communities to long-term O&M
Other criteria			
18. Is consistent with regional planning (e.g., Metropolitan Council planning, Washington County planning, regional aquifer planning)	Medium	O	• Diverges from the Metropolitan Council approved community water supply plans • Metropolitan Council is concerned with the sustainability of groundwater in the region
19. Is consistent with local planning (e.g., city comprehensive plans)	Medium	O	• Requires a reliance on a regional water supplier rather than local or non-municipal water supply
20. Is generally acceptable to the public (as reflected by public feedback on the preliminary results summary and input by the work groups)	High	-	• In general, public feedback reflected concern with a switch from local or non-municipal water supply to a regional water supplier

G.4.6 Original Regional Scenario 2E – sub-regional groundwater (IX)

Table G.27 summarizes the ratings against the applicable evaluation criteria, including the rationale for each rating.

Table G.27. Evaluation of the Regional Scenario 2E – IX.

Criteria	Priority	Rating	Rationale
Implementation criteria			•
3. Has a high probability of success (i.e., project outcomes are achieved)	High	+	• IX is not yet approved by MDH but is in pilot-testing; IX is a well-established technology used throughout the country • All other technologies and approaches are standard and well-established as being reliable for drinking water systems
5. Provides long-term benefits (e.g., sustainability of water supply, longevity of infrastructure, etc.; assuming all necessary O&M activities are conducted)	High	+	• Groundwater modeling shows that anticipated 2040 pumping can be sustained by the aquifers in drought conditions • Infrastructure in this scenario is expected to have a standard lifespan of roughly 50 years
6. Provides multiple benefits (e.g., benefits to the aquifer, benefits to multiple communities)	Low	O	• Ensure long-term safe water through centralized systems
7a. Addresses future water needs (e.g., population growth)	Medium	+	• Meets 2040 maximum daily demand
7b. Addresses future unknown/uncertain conditions (e.g., new contaminants, movement of contaminants, changing health-based values, climate change impacts)	High	O	• With regional, treated groundwater as the primary source of drinking water for most communities, future issues with PFAS in groundwater or changes in HBVs/HRLs are largely avoided • Communities without a municipal water system would get POET systems; people in those homes that do not get a POET system now could be vulnerable to changing PFAS or HBVs/HRLs in the future; the Consent Order would cover homes with HI>=1 • Modeling shows the sub-regional well fields are resilient to drought conditions.
8. Has low risk of adverse impacts from remedial actions (e.g., those conducted under the Consent Order or other known remedies)	Medium	+	• The groundwater model was used to locate wells such that they are unlikely to be significantly impacted or harmed by remedial actions
9. Has low risk of unintended adverse health impacts (e.g., change in water corrosiveness, generation of disinfection byproducts)	Medium	O	• Some increase in disinfection byproducts due to length of time that water travels in the large distribution system • Some chance of loss of chlorine residual due to size of the distribution system, which can increase chances of bacterial contamination (e.g., legionella)

Criteria	Priority	Rating	Rationale
10. Minimizes adverse environmental impacts (e.g., movement of contaminants, additional contamination, physical harm to the environment, generation of waste)	Medium	-	• More impact on high value areas identified by the Wildlife Action Network • More impact on high value areas for Biodiversity Significant • Reduced impact on White Bear Lake
11. Minimizes adverse social impacts (e.g., construction impacts such as noise and poor air quality, disproportionate impact to disadvantaged communities)	Medium	-	• Construction would affect significantly more residential and total parcels compared to other scenarios
Cost criteria			
13. Is cost-effective (Metrics may include: $ per household, $ per gallon treated; cost to include capital and O&M)	Medium	O	• Cost per mgd is above the median for scenarios where the total 20 year cost does not exceed available funds • Total 20-year cost does not exceed available funds
14. Has low long-term O&M costs	Medium	+	• Long-term annual O&M is below the median for scenarios when outliers are removed from the analysis • Rating does not currently take into account cost-sharing or any other contributions from communities to long-term O&M
Other criteria			
18. Is consistent with regional planning (e.g., Metropolitan Council planning, Washington County planning, regional aquifer planning)	Medium	O	• Diverges from the Metropolitan Council approved community water supply plans • Metropolitan Council is concerned with the sustainability of groundwater in the region
19. Is consistent with local planning (e.g., city comprehensive plans)	Medium	O	• Requires a reliance on a regional water supplier rather than local or non-municipal water supply
20. Is generally acceptable to the public (as reflected by public feedback on the preliminary results summary and input by the work groups)	High	-	• In general, public feedback reflected concern with a switch from local or non-municipal water supply to a regional water supplier

G.5 Original treatment scenarios

The sections below provide the detailed evaluations of the regional scenarios, separated by the treatment level and treatment technology (i.e., GAC or IX). Only the scenarios for year 2040 were evaluated.

G.5.1 Original Treatment Scenario 3A – HI(PFAS) > 1 (GAC)

Table G.28 summarizes the ratings against the applicable evaluation criteria, including the rationale for each rating.

Table G.28. Evaluation of the Treatment Scenario 3A.2 – GAC.

Criteria	Priority	Rating	Rationale
Implementation criteria			
3. Has a high probability of success (i.e., project outcomes are achieved)	High	+	• All technologies and approaches are standard and well-established as being reliable for drinking water systems
5. Provides long-term benefits (e.g., sustainability of water supply, longevity of infrastructure, etc.; assuming all necessary O&M activities are conducted)	High	+	• Groundwater modeling shows that anticipated 2040 pumping can be sustained by the aquifers in drought conditions • Infrastructure in this scenario is expected to have a standard lifespan of roughly 50 years
6. Provides multiple benefits (e.g., benefits to the aquifer, benefits to multiple communities)	Low	-	• Relatively little disruption to existing drinking water systems and infrastructure • Negligible additional benefits
7a. Addresses future water needs (e.g., population growth)	Medium	O	• This scenario would provide 35 mgd of treated water, which is less than the project 2040 maximum daily demand
7b. Addresses future unknown/uncertain conditions (e.g., new contaminants, movement of contaminants, changing health-based values, climate change impacts)	High	-	• Treatment removes PFAS to detection limits, so wells that receive treatment would very likely remain below any future HBVs/HRLs • This scenario leaves many well, especially private wells, without treatment, so they would be vulnerable to future changes in HBVs/HRLs or PFAS plume movement
8. Has low risk of adverse impacts from remedial actions (e.g., those conducted under the Consent Order or other known remedies)	Medium	+	• Existing well locations are unlikely to be affected by remedial actions

Criteria	Priority	Rating	Rationale
9. Has low risk of unintended adverse health impacts (e.g., change in water corrosiveness, generation of disinfection byproducts)	Medium	+	• Since these scenarios do not involve changing a drinking water source, there is low risk of creating new unintended health impacts • There is some risk of bacterial growth in GAC systems but public water systems will be required to chlorinate and private systems will need to be carefully monitored and maintained; the odds of health impacts are very low
10. Minimizes adverse environmental impacts (e.g., movement of contaminants, additional contamination, physical harm to the environment, generation of waste)	Medium	O	• Minimal impact on areas identified by the Wildlife Action Network • Small generation of waste that can be handled by incineration or reactivation of the carbon • Continued impact on White Bear Lake
11. Minimizes adverse social impacts (e.g., construction impacts such as noise and poor air quality, disproportionate impact to disadvantaged communities)	Medium	+	• Minimal construction impact on communities and residents
Cost criteria			
13. Is cost-effective (Metrics may include: $ per household, $ per gallon treated; cost to include capital and O&M)	Medium	O	• Cost per mgd is above the median for scenarios where the total 20 year cost does not exceed available funds • Total 20-year cost does not exceed available funds
14. Has low long-term O&M costs	Medium	+	• Long-term annual O&M is below the median for scenarios when outliers are removed from the analysis • Rating does not currently take into account cost-sharing or any other contributions from communities to long-term O&M
Other criteria			
18. Is consistent with regional planning (e.g., Metropolitan Council planning, Washington County planning, regional aquifer planning)	Medium	O	• Provides treatment to most communities consistent with Metropolitan Council's regional plan for safe drinking water • Does not reflect the local planning efforts of some communities to expand their municipal water systems
19. Is consistent with local planning (e.g., city comprehensive plans)	Medium	O	• Provides treatment to most communities • Does not reflect the local planning efforts of some communities to expand their municipal water systems
20. Is generally acceptable to the public (as reflected by public feedback on the preliminary results summary and input by the work groups)	High	O	• Public feedback did not provide significant comment on treatment scenarios

G.5.2 Original Treatment Scenario 3A – HI(PFAS) > 1 (IX)

Table G.29 summarizes the ratings against the applicable evaluation criteria, including the rationale for each rating.

Table G.29. Evaluation of the Treatment Scenario 3A.2 – IX.

Criteria	Priority	Rating	Rationale
Implementation criteria			
3. Has a high probability of success (i.e., project outcomes are achieved)	High	+	• IX is not yet approved by MDH but is in pilot-testing; IX is a well-established technology used throughout the country • All other technologies and approaches are standard and well-established as being reliable for drinking water systems
5. Provides long-term benefits (e.g., sustainability of water supply, longevity of infrastructure, etc.; assuming all necessary O&M activities are conducted)	High	+	• Groundwater modeling shows that anticipated 2040 pumping can be sustained by the aquifers in drought conditions • Infrastructure in this scenario is expected to have a standard lifespan of roughly 50 years
6. Provides multiple benefits (e.g., benefits to the aquifer, benefits to multiple communities)	Low	-	• Relatively little disruption to existing drinking water systems and infrastructure • Negligible additional benefits
7a. Addresses future water needs (e.g., population growth)	Medium	O	• This scenario would provide 35 mgd of treated water, which is less than the project 2040 maximum daily demand
7b. Addresses future unknown/uncertain conditions (e.g., new contaminants, movement of contaminants, changing health-based values, climate change impacts)	High	-	• Treatment removes PFAS to detection limits, so wells that receive treatment would very likely remain below any future HBVs/HRLs • This scenario leaves many well, especially private wells, without treatment, so they would be vulnerable to future changes in HBVs/HRLs or PFAS plume movement
8. Has low risk of adverse impacts from remedial actions (e.g., those conducted under the Consent Order or other known remedies)	Medium	+	• Existing well locations are unlikely to be affected by remedial actions
9. Has low risk of unintended adverse health impacts (e.g., change in water corrosiveness, generation of disinfection byproducts)	Medium	+	• Since these scenarios do not involve changing a drinking water source, there is low risk of creating new unintended health impacts
10. Minimizes adverse environmental impacts (e.g., movement of contaminants, additional contamination, physical harm to the environment, generation of waste)	Medium	O	• Minimal impact on areas identified by the Wildlife Action Network • Small generation of waste that can be handled by incineration • Continued impact on White Bear Lake

Criteria	Priority	Rating	Rationale
11. Minimizes adverse social impacts (e.g., construction impacts such as noise and poor air quality, disproportionate impact to disadvantaged communities)	Medium	+	• Minimal construction impact on communities and residents
Cost criteria			
13. Is cost-effective (Metrics may include: $ per household, $ per gallon treated; cost to include capital and O&M)	Medium	+	• Cost per mgd is below the median for scenarios where the total 20 year cost does not exceed available funds • Total 20-year cost under 50% of the available funds
14. Has low long-term O&M costs	Medium	+	• Long-term annual O&M is below the median for scenarios when outliers are removed from the analysis • Rating does not currently take into account cost-sharing or any other contributions from communities to long-term O&M
Other criteria			
18. Is consistent with regional planning (e.g., Metropolitan Council planning, Washington County planning, regional aquifer planning)	Medium	O	• Provides treatment to most communities consistent with Metropolitan Council's regional plan for safe drinking water • Does not reflect the local planning efforts of some communities to expand their municipal water systems
19. Is consistent with local planning (e.g., city comprehensive plans)	Medium	O	• Provides treatment to most communities • Does not reflect the local planning efforts of some communities to expand their municipal water systems
20. Is generally acceptable to the public (as reflected by public feedback on the preliminary results summary and input by the work groups)	High	O	• Public feedback did not provide significant comment on treatment scenarios

G.5.3 Original Treatment Scenario 3B – HI(PFAS) ≥ 0.5 (GAC)

Table G.30 summarizes the ratings against the applicable evaluation criteria, including the rationale for each rating.

Table G.30. Evaluation of the Treatment Scenario 3B.2 – GAC.

Criteria	Priority	Rating	Rationale
Implementation criteria			
3. Has a high probability of success (i.e., project outcomes are achieved)	High	+	• All technologies and approaches are standard and well-established as being reliable for drinking water systems
5. Provides long-term benefits (e.g., sustainability of water supply, longevity of infrastructure, etc.; assuming all necessary O&M activities are conducted)	High	+	• Groundwater modeling shows that anticipated 2040 pumping can be sustained by the aquifers in drought conditions • Infrastructure in this scenario is expected to have a standard lifespan of roughly 50 years
6. Provides multiple benefits (e.g., benefits to the aquifer, benefits to multiple communities)	Low	-	• Relatively little disruption to existing drinking water systems and infrastructure • Negligible additional benefits
7a. Addresses future water needs (e.g., population growth)	Medium	+	• Meets 2040 maximum daily demand
7b. Addresses future unknown/uncertain conditions (e.g., new contaminants, movement of contaminants, changing health-based values, climate change impacts)	High	O	• Treatment removes PFAS to detection limits, so wells that receive treatment would very likely remain below any future HBVs/HRLs • This scenario leaves some wells without treatment, so they would be vulnerable to future changes in HBVs/HRLs or PFAS plume movement; there are fewer wells without treatment than under 3A
8. Has low risk of adverse impacts from remedial actions (e.g., those conducted under the Consent Order or other known remedies)		+	• Existing well locations are unlikely to be affected by remedial actions
9. Has low risk of unintended adverse health impacts (e.g., change in water corrosiveness, generation of disinfection byproducts)	Medium	+	• Since these scenarios do not involve changing a drinking water source, there is low risk of creating new unintended health impacts • There is some risk of bacterial growth in GAC systems but public water systems will be required to chlorinate and private systems will need to be carefully monitored and maintained; the odds of health impacts are very low

Criteria	Priority	Rating	Rationale
10. Minimizes adverse environmental impacts (e.g., movement of contaminants, additional contamination, physical harm to the environment, generation of waste)	Medium	O	• Minimal impact on areas identified by the Wildlife Action Network • Small generation of waste that can be handled by incineration or reactivation of the carbon • Continued impact on White Bear Lake
11. Minimizes adverse social impacts (e.g., construction impacts such as noise and poor air quality, disproportionate impact to disadvantaged communities)	Medium	+	• Minimal construction impact on communities and residents
Cost criteria			
13. Is cost-effective (Metrics may include: $ per household, $ per gallon treated; cost to include capital and O&M)	Medium	+	• • Cost per MGD is below the median for scenarios where the total 20 year cost does not exceed available funds Total 20-year cost does not exceed available funds
14. Has low long-term O&M costs	Medium	O	• Long-term annual O&M is above the median for scenarios when outliers are removed from the analysis • Rating does not currently take into account cost-sharing or any other contributions from communities to long-term O&M
Other criteria			
18. Is consistent with regional planning (e.g., Metropolitan Council planning, Washington County planning, regional aquifer planning)	Medium	O	• Provides treatment to most communities consistent with Metropolitan Council's regional plan for safe drinking water • Does not reflect the local planning efforts of some communities to expand their municipal water systems
19. Is consistent with local planning (e.g., city comprehensive plans)	Medium	O	• Provides treatment to most communities • Does not reflect the local planning efforts of some communities to expand their municipal water systems
20. Is generally acceptable to the public (as reflected by public feedback on the preliminary results summary and input by the work groups)	High	O	• Public feedback did not provide significant comment on treatment scenarios

G.5.4 Original Treatment Scenario 3B – HI(PFAS) ≥ 0.5 (IX)

Table G.31 summarizes the ratings against the applicable evaluation criteria, including the rationale for each rating.

Table G.31. Evaluation of the Treatment Scenario 3B.2 – IX.

Criteria	Priority	Rating	Rationale
Implementation criteria			
3. Has a high probability of success (i.e., project outcomes are achieved)	High	+	• IX is not yet approved by MDH but is in pilot-testing; IX is a well-established technology used throughout the country • All other technologies and approaches are standard and well-established as being reliable for drinking water systems
5. Provides long-term benefits (e.g., sustainability of water supply, longevity of infrastructure, etc.; assuming all necessary O&M activities are conducted)	High	+	• Groundwater modeling shows that anticipated 2040 pumping can be sustained by the aquifers in drought conditions • Infrastructure in this scenario is expected to have a standard lifespan of roughly 50 years
6. Provides multiple benefits (e.g., benefits to the aquifer, benefits to multiple communities)	Low	-	• Relatively little disruption to existing drinking water systems and infrastructure • Negligible additional benefits
7a. Addresses future water needs (e.g., population growth)	Medium	+	• Meets 2040 maximum daily demand
7b. Addresses future unknown/uncertain conditions (e.g., new contaminants, movement of contaminants, changing health-based values, climate change impacts)	High	O	• Treatment removes PFAS to detection limits, so wells that receive treatment would very likely remain below any future HBVs/HRLs • This scenario leaves some wells without treatment, so they would be vulnerable to future changes in HBVs/HRLs or PFAS plume movement; there are fewer wells without treatment than under 3A
8. Has low risk of adverse impacts from remedial actions (e.g., those conducted under the Consent Order or other known remedies)		+	• Existing well locations are unlikely to be affected by remedial actions
9. Has low risk of unintended adverse health impacts (e.g., change in water corrosiveness, generation of disinfection byproducts)	Medium	+	• Since these scenarios do not involve changing a drinking water source, there is low risk of creating new unintended health impacts
10. Minimizes adverse environmental impacts (e.g., movement of contaminants, additional contamination, physical harm to the environment, generation of waste)	Medium	O	• Minimal impact on areas identified by the Wildlife Action Network • Small generation of waste that can be handled by incineration • Continued impact on White Bear Lake

Criteria	Priority	Rating	Rationale
11. Minimizes adverse social impacts (e.g., construction impacts such as noise and poor air quality, disproportionate impact to disadvantaged communities)	Medium	+	• Minimal construction impact on communities and residents
Cost criteria			
13. Is cost-effective (Metrics may include: $ per household, $ per gallon treated; cost to include capital and O&M)	Medium	+	• Cost per MGD is below the median for scenarios where the total 20 year cost does not exceed available funds • Total 20-year cost does not exceed available funds
14. Has low long-term O&M costs	Medium	+	• Long-term annual O&M is below the median for scenarios when outliers are removed from the analysis • Rating does not currently take into account cost-sharing or any other contributions from communities to long-term O&M
Other criteria			
18. Is consistent with regional planning (e.g., Metropolitan Council planning, Washington County planning, regional aquifer planning)	Medium	O	• Provides treatment to most communities consistent with Metropolitan Council's regional plan for safe drinking water • Does not reflect the local planning efforts of some communities to expand their municipal water systems
19. Is consistent with local planning (e.g., city comprehensive plans)	Medium	O	• Provides treatment to most communities • Does not reflect the local planning efforts of some communities to expand their municipal water systems
20. Is generally acceptable to the public (as reflected by public feedback on the preliminary results summary and input by the work groups)	High	O	• Public feedback did not provide significant comment on treatment scenarios

G.5.5 Original Treatment Scenario 3C – HI(PFOS, PFOA, PFHxS) > 0 (GAC)

Table G.32 summarizes the ratings against the applicable evaluation criteria, including the rationale for each rating.

Table G.32. Evaluation of the Treatment Scenario 3C.2 – GAC.

Criteria	Priority	Rating	Rationale
Implementation criteria			
3. Has a high probability of success (i.e., project outcomes are achieved)	High	+	• All technologies and approaches are standard and well-established as being reliable for drinking water systems
5. Provides long-term benefits (e.g., sustainability of water supply, longevity of infrastructure, etc.; assuming all necessary O&M activities are conducted)	High	+	• Groundwater modeling shows that anticipated 2040 pumping can be sustained by the aquifers in drought conditions • Infrastructure in this scenario is expected to have a standard lifespan of roughly 50 years
6. Provides multiple benefits (e.g., benefits to the aquifer, benefits to multiple communities)	Low	-	• Relatively little disruption to existing drinking water systems and infrastructure • Negligible additional benefits
7a. Addresses future water needs (e.g., population growth)	Medium	+	• Meets 2040 maximum daily demand
7b. Addresses future unknown/uncertain conditions (e.g., new contaminants, movement of contaminants, changing health-based values, climate change impacts)	High	+	• Treatment removes PFAS to detection limits, so wells that receive treatment would very likely remain below any future HBVs/HRLs • This scenario leaves relatively few wells without treatment, so very few homes would be vulnerable to future changes in HBVs/HRLs or PFAS plume movement
8. Has low risk of adverse impacts from remedial actions (e.g., those conducted under the Consent Order or other known remedies)	Medium	+	• Existing well locations are unlikely to be affected by remedial actions
9. Has low risk of unintended adverse health impacts (e.g., change in water corrosiveness, generation of disinfection byproducts)	Medium	+	• Since these scenarios do not involve changing a drinking water source, there is low risk of creating new unintended health impacts • There is some risk of bacterial growth in GAC systems but public water systems will be required to chlorinate and private systems will need to be carefully monitored and maintained; the odds of health impacts are very low
10. Minimizes adverse environmental impacts (e.g., movement of contaminants, additional contamination, physical harm to the environment, generation of waste)	Medium	O	• Minimal impact on areas identified by the Wildlife Action Network • Small generation of waste that can be handled by incineration or reactivation of the carbon • Continued impact on White Bear Lake

Criteria	Priority	Rating	Rationale
11. Minimizes adverse social impacts (e.g., construction impacts such as noise and poor air quality, disproportionate impact to disadvantaged communities)	Medium	+	• Minimal construction impact on communities and residents
Cost criteria			
13. Is cost-effective (Metrics may include: $ per household, $ per gallon treated; cost to include capital and O&M)	Medium	+	• Cost per MGD is equal to the median for scenarios where the total 20 year cost does not exceed available funds • Total 20-year cost does not exceed available funds
14. Has low long-term O&M costs	Medium	O	• Long-term annual O&M is above the median for scenarios when outliers are removed from the analysis • Rating does not currently take into account cost-sharing or any other contributions from communities to long-term O&M
Other criteria			
18. Is consistent with regional planning (e.g., Metropolitan Council planning, Washington County planning, regional aquifer planning)	Medium	O	• Provides treatment to most communities consistent with Metropolitan Council's regional plan for safe drinking water • Does not reflect the local planning efforts of some communities to expand their municipal water systems
19. Is consistent with local planning (e.g., city comprehensive plans)	Medium	O	• Provides treatment to all communities • Does not reflect the local planning efforts of some communities to expand their municipal water systems
20. Is generally acceptable to the public (as reflected by public feedback on the preliminary results summary and input by the work groups)	High	O	• Public feedback did not provide significant comment on treatment scenarios

G.5.6 Original Treatment Scenario 3C – HI(PFOS, PFOA, PFHxS) > 0 (IX)

Table G.33 summarizes the ratings against the applicable evaluation criteria, including the rationale for each rating.

Table G.33. Evaluation of the Treatment Scenario 3C.2 – IX.

Criteria	Priority	Rating	Rationale
Implementation criteria			
3. Has a high probability of success (i.e., project outcomes are achieved)	High	+	• IX is not yet approved by MDH but is in pilot-testing; IX is a well-established technology used throughout the country • All other technologies and approaches are standard and well-established as being reliable for drinking water systems
5. Provides long-term benefits (e.g., sustainability of water supply, longevity of infrastructure, etc.; assuming all necessary O&M activities are conducted)	High	+	• Groundwater modeling shows that anticipated 2040 pumping can be sustained by the aquifers in drought conditions • Infrastructure in this scenario is expected to have a standard lifespan of roughly 50 years
6. Provides multiple benefits (e.g., benefits to the aquifer, benefits to multiple communities)	Low	-	• Relatively little disruption to existing drinking water systems and infrastructure • Negligible additional benefits
7a. Addresses future water needs (e.g., population growth)	Medium	+	• Meets 2040 max daily demand
7b. Addresses future unknown/uncertain conditions (e.g., new contaminants, movement of contaminants, changing health-based values, climate change impacts)	High	+	• Treatment removes PFAS to detection limits, so wells that receive treatment would very likely remain below any future HBVs/HRLs • This scenario leaves relatively few wells without treatment, so very few homes would be vulnerable to future changes in HBVs/HRLs or PFAS plume movement
8. Has low risk of adverse impacts from remedial actions (e.g., those conducted under the Consent Order or other known remedies)	Medium	+	• Existing well locations are unlikely to be affected by remedial actions
9. Has low risk of unintended adverse health impacts (e.g., change in water corrosiveness, generation of disinfection byproducts)	Medium	+	• Since these scenarios do not involve changing a drinking water source, there is low risk of creating new unintended health impacts
10. Minimizes adverse environmental impacts (e.g., movement of contaminants, additional contamination, physical harm to the environment, generation of waste)	Medium	O	• Minimal impact on areas identified by the Wildlife Action Network • Small generation of waste that can be handled by incineration • Continued impact on White Bear Lake

Criteria	Priority	Rating	Rationale
11. Minimizes adverse social impacts (e.g., construction impacts such as noise and poor air quality, disproportionate impact to disadvantaged communities)	Medium	+	• Minimal construction impact on communities and residents
Cost criteria			
13. Is cost-effective (Metrics may include: $ per household, $ per gallon treated; cost to include capital and O&M)	Medium	+	• Cost per MGD is below the median for scenarios where the total 20 year cost does not exceed available funds • Total 20-year cost does not exceed available funds
14. Has low long-term O&M costs	Medium	+	• Long-term annual O&M is below the median for scenarios when outliers are removed from the analysis • Rating does not currently take into account cost-sharing or any other contributions from communities to long-term O&M
Other criteria			
18. Is consistent with regional planning (e.g., Metropolitan Council planning, Washington County planning, regional aquifer planning)	Medium	O	• Provides treatment to most communities consistent with Metropolitan Council's regional plan for safe drinking water • Does not reflect the local planning efforts of some communities to expand their municipal water systems
19. Is consistent with local planning (e.g., city comprehensive plans)	Medium	O	• Provides treatment to all communities • Does not reflect the local planning efforts of some communities to expand their municipal water systems
20. Is generally acceptable to the public (as reflected by public feedback on the preliminary results summary and input by the work groups)	High	O	• Public feedback did not provide significant comment on treatment scenarios

G.5.7 Original Treatment Scenario 3D – HI(PFAS) > 0 (GAC)

Table G.34 summarizes the ratings against the applicable evaluation criteria, including the rationale for each rating.

Table G.34. Evaluation of the Treatment Scenario 3D.2 – GAC.

Criteria	Priority	Rating	Rationale
Implementation criteria			
3. Has a high probability of success (i.e., project outcomes are achieved)	High	+	• All technologies and approaches are standard and well-established as being reliable for drinking water systems
5. Provides long-term benefits (e.g., sustainability of water supply, longevity of infrastructure, etc.; assuming all necessary O&M activities are conducted)	High	+	• Groundwater modeling shows that anticipated 2040 pumping can be sustained by the aquifers in drought conditions • Infrastructure in this scenario is expected to have a standard lifespan of roughly 50 years
6. Provides multiple benefits (e.g., benefits to the aquifer, benefits to multiple communities)	Low	-	• Relatively little disruption to existing drinking water systems and infrastructure • Negligible additional benefits
7a. Addresses future water needs (e.g., population growth)	Medium	+	• Meets 2040 maximum daily demand
7b. Addresses future unknown/uncertain conditions (e.g., new contaminants, movement of contaminants, changing health-based values, climate change impacts)	High	+	• Treatment removes PFAS to detection limits, so wells that receive treatment would very likely remain below any future HBVs/HRLs • This scenario leaves very few wells without treatment, so very few homes would be vulnerable to future changes in HBVs/HRLs or PFAS plume movement
8. Has low risk of adverse impacts from remedial actions (e.g., those conducted under the Consent Order or other known remedies)	Medium	+	• Existing well locations are unlikely to be affected by remedial actions
9. Has low risk of unintended adverse health impacts (e.g., change in water corrosiveness, generation of disinfection byproducts)	Medium	+	• Since these scenarios do not involve changing a drinking water source, there is low risk of creating new unintended health impacts • There is some risk of bacterial growth in GAC systems but public water systems will be required to chlorinate and private systems will need to be carefully monitored and maintained; the odds of health impacts are very low
10. Minimizes adverse environmental impacts (e.g., movement of contaminants, additional contamination, physical harm to the environment, generation of waste)	Medium	O	• Minimal impact on areas identified by the Wildlife Action Network • Small generation of waste that can be handled by incineration or reactivation of the carbon • Continued impact on White Bear Lake

Criteria	Priority	Rating	Rationale
11. Minimizes adverse social impacts (e.g., construction impacts such as noise and poor air quality, disproportionate impact to disadvantaged communities)	Medium	+	• Minimal construction impact on communities and residents
Cost criteria			
13. Is cost-effective (Metrics may include: $ per household, $ per gallon treated; cost to include capital and O&M)	Medium	-	• Total 20-year cost exceeds available funds
14. Has low long-term O&M costs	Medium	-	• Long-term annual O&M is significantly greater than nearly all other scenarios • Rating does not currently take into account cost-sharing or any other contributions from communities to long-term O&M
Other criteria			
18. Is consistent with regional planning (e.g., Metropolitan Council planning, Washington County planning, regional aquifer planning)	Medium	O	• Provides treatment to most communities consistent with Metropolitan Council's regional plan for safe drinking water • Does not reflect the local planning efforts of some communities to expand their municipal water systems
19. Is consistent with local planning (e.g., city comprehensive plans)	Medium	O	• Provides treatment to all communities • Does not reflect the local planning efforts of some communities to expand their municipal water systems
20. Is generally acceptable to the public (as reflected by public feedback on the preliminary results summary and input by the work groups)	High	O	• Public feedback did not provide significant comment on treatment scenarios

G.5.8 Original Treatment Scenario 3D – HI(PFAS) > 0 (IX)

Table G.35 summarizes the ratings against the applicable evaluation criteria, including the rationale for each rating.

Table G.35. Evaluation of the Treatment Scenario 3D.2 – IX.

Criteria	Priority	Rating	Rationale
Implementation criteria			
3. Has a high probability of success (i.e., project outcomes are achieved)	High	+	• IX is not yet approved by MDH but is in pilot-testing; IX is a well-established technology used throughout the country • All other technologies and approaches are standard and well-established as being reliable for drinking water systems
5. Provides long-term benefits (e.g., sustainability of water supply, longevity of infrastructure, etc.; assuming all necessary O&M activities are conducted)	High	+	• Groundwater modeling shows that anticipated 2040 pumping can be sustained by the aquifers in drought conditions • Infrastructure in this scenario is expected to have a standard lifespan of roughly 50 years
6. Provides multiple benefits (e.g., benefits to the aquifer, benefits to multiple communities)	Low	-	• Relatively little disruption to existing drinking water systems and infrastructure • Negligible additional benefits
7a. Addresses future water needs (e.g., population growth)	Medium	+	• Meets 2040 maximum daily demand
7b. Addresses future unknown/uncertain conditions (e.g., new contaminants, movement of contaminants, changing health-based values, climate change impacts)	High	+	• Treatment removes PFAS to detection limits, so wells that receive treatment would very likely remain below any future HBVs/HRLs • This scenario leaves very few wells without treatment, so very few homes would be vulnerable to future changes in HBVs/HRLs or PFAS plume movement
8. Has low risk of adverse impacts from remedial actions (e.g., those conducted under the Consent Order or other known remedies)	Medium	+	• Existing well locations are unlikely to be affected by remedial actions
9. Has low risk of unintended adverse health impacts (e.g., change in water corrosiveness, generation of disinfection byproducts)	Medium	+	• Since these scenarios do not involve changing a drinking water source, there is low risk of creating new unintended health impacts
10. Minimizes adverse environmental impacts (e.g., movement of contaminants, additional contamination, physical harm to the environment, generation of waste)	Medium	O	• Minimal impact on areas identified by the Wildlife Action Network • Small generation of waste that can be handled by incineration • Continued impact on White Bear Lake

Criteria	Priority	Rating	Rationale
11. Minimizes adverse social impacts (e.g., construction impacts such as noise and poor air quality, disproportionate impact to disadvantaged communities)	Medium	+	• Minimal construction impact on communities and residents
Cost criteria			
13. Is cost-effective (Metrics may include: $ per household, $ per gallon treated; cost to include capital and O&M)	Medium	+	• Cost per mgd is below the median for scenarios where the total 20 year cost does not exceed available funds • Total 20-year cost does not exceed available funds
14. Has low long-term O&M costs	Medium	+	• Long-term annual O&M is below the median for scenarios when outliers are removed from the analysis • Rating does not currently take into account cost-sharing or any other contributions from communities to long-term O&M
Other criteria			
18. Is consistent with regional planning (e.g., Metropolitan Council planning, Washington County planning, regional aquifer planning)	Medium	O	• Provides treatment to most communities consistent with Metropolitan Council's regional plan for safe drinking water • Does not reflect the local planning efforts of some communities to expand their municipal water systems
19. Is consistent with local planning (e.g., city comprehensive plans)	Medium	O	• Provides treatment to all communities • Does not reflect the local planning efforts of some communities to expand their municipal water systems
20. Is generally acceptable to the public (as reflected by public feedback on the preliminary results summary and input by the work groups)	High	O	• Public feedback did not provide significant comment on treatment scenarios

G.6 Integrated scenarios

The sections below provide the detailed evaluations of the integrated scenario, separated by treatment technology. GAC is presented in Section G.6.1. IX is presented in Section G.6.2.

G.6.1 Original Integrated Scenario 4A – GAC

Table G.36 summarizes the ratings against the applicable evaluation criteria, including the rationale for each rating.

Table G.36. Evaluation of the Integrated Scenario 4A – GAC.

Criteria	Priority	Rating	Rationale
Implementation criteria			
3. Has a high probability of success (i.e., project outcomes are achieved)	High	+	• All technologies and approaches are standard and well-established as being reliable for drinking water systems
5. Provides long-term benefits (e.g., sustainability of water supply, longevity of infrastructure, etc.; assuming all necessary O&M activities are conducted)	High	+	• Groundwater modeling shows that anticipated 2040 pumping can be sustained by the aquifers in drought conditions • Infrastructure in this scenario is expected to have a standard lifespan of roughly 50 years
6. Provides multiple benefits (e.g., benefits to the aquifer, benefits to multiple communities)	Low	-	• Relatively little disruption to existing drinking water systems and infrastructure • Negligible additional benefits
7a. Addresses future water needs (e.g., population growth)	Medium	+	• Meets 2040 maximum daily demand
7b. Addresses future unknown/uncertain conditions (e.g., new contaminants, movement of contaminants, changing health-based values, climate change impacts)	High	O	• Treatment removes PFAS to detection limits, so wells that receive treatment would very likely remain below any future HBVs/HRLs • Many homes on private wells are connected to PWSs with treated groundwater • Targeting HI≥0.5, this scenario leaves relatively few wells without treatment and vulnerable to future changes in HBVs/HRLs or PFAS plume movement
8. Has low risk of adverse impacts from remedial actions (e.g., those conducted under the Consent Order or other known remedies)	Medium	+	• The groundwater model was used to locate wells such that they are unlikely to be significantly impacted or harmed by remedial actions
9. Has low risk of unintended adverse health impacts (e.g., change in water corrosiveness, generation of disinfection byproducts)	Medium	+	• Low likelihood of bacterial contamination of GAC treatment systems; chlorination would be required. • Low likelihood of increase in disinfection byproducts and loss of chlorine residual due to modest expansion of distribution systems

Criteria	Priority	Rating	Rationale
10. Minimizes adverse environmental impacts (e.g., movement of contaminants, additional contamination, physical harm to the environment, generation of waste)	Medium	-	• Significantly more impact on Medium-High and Medium value areas identified by the Wildlife Action Network • Small generation of waste that can be handled by incineration or reactivation of the carbon • Continued impact on White Bear Lake
11. Minimizes adverse social impacts (e.g., construction impacts such as noise and poor air quality, disproportionate impact to disadvantaged communities)	Medium	+	• Construction would affect fewer residential and total parcels than other scenarios
Cost criteria			
13. Is cost-effective (Metrics may include: $ per household, $ per gallon treated; cost to include capital and O&M)	Medium	-	• Total 20-year cost exceeds available funds
14. Has low long-term O&M costs	Medium	O	• Long-term annual O&M is above the median for scenarios when outliers are removed from the analysis Rating does not currently take into account cost-sharing or any other contributions from communities to long-term O&M
Other criteria			
18. Is consistent with regional planning (e.g., Metropolitan Council planning, Washington County planning, regional aquifer planning)	Medium	+	• In general, consists of projects developed in collaboration with the communities and are consistent with the community planning, which is approved by Metropolitan Council • The Metropolitan Council's Master Water Supply Plan indicates that a goal of the regional plan is to help realize economies of scale
19. Is consistent with local planning (e.g., city comprehensive plans)	Medium	O	• Consists of variations on the community proposed conceptual projects and the conceptual projects are generally consistent with local planning • However, variations will require collaboration between communities that is not currently consistent with comprehensive plans, water supply plans, or the proposed conceptual projects
20. Is generally acceptable to the public (as reflected by public feedback on the preliminary results summary and input by the work groups)	High	O	• In general, public feedback reflected that this scenario is consistent with the proposed conceptual projects but the variations would require collaboration between communities that is not reflected in the proposed conceptual projects

G.6.2 Original Integrated Scenario 4A – IX

Table G.37 summarizes the ratings against the applicable evaluation criteria, including the rationale for each rating.

Table G.37. Evaluation of the Integrated Scenario 4A – IX.

Criteria	Priority	Rating	Rationale
Implementation criteria			
3. Has a high probability of success (i.e., project outcomes are achieved)	High	+	• IX is not yet approved by MDH but is in pilot-testing; IX is a well-established technology used throughout the country • All other technologies and approaches are standard and well-established as being reliable for drinking water systems
5. Provides long-term benefits (e.g., sustainability of water supply, longevity of infrastructure, etc.; assuming all necessary O&M activities are conducted)	High	+	• Groundwater modeling shows that anticipated 2040 pumping can be sustained by the aquifers in drought conditions • Infrastructure in this scenario is expected to have a standard lifespan of roughly 50 years
6. Provides multiple benefits (e.g., benefits to the aquifer, benefits to multiple communities)	Low	-	• Relatively little disruption to existing drinking water systems and infrastructure • Negligible additional benefits
7a. Addresses future water needs (e.g., population growth)	Medium	+	• Meets 2040 maximum daily demand
7b. Addresses future unknown/uncertain conditions (e.g., new contaminants, movement of contaminants, changing health-based values, climate change impacts)	High	O	• Treatment removes PFAS to detection limits, so wells that receive treatment would very likely remain below any future HBVs/HRLs • Many homes on private wells are connected to PWSs with treated groundwater • Targeting HI≥0.5, this scenario leaves relatively few wells without treatment and vulnerable to future changes in HBVs/HRLs or PFAS plume movement
8. Has low risk of adverse impacts from remedial actions (e.g., those conducted under the Consent Order or other known remedies)	Medium	+	• The groundwater model was used to locate wells such that they are unlikely to be significantly impacted or harmed by remedial actions
9. Has low risk of unintended adverse health impacts (e.g., change in water corrosiveness, generation of disinfection byproducts)	Medium	+	• Low likelihood of increase in disinfection byproducts and loss of chlorine residual due to modest expansion of distribution systems
10. Minimizes adverse environmental impacts (e.g., movement of contaminants, additional contamination, physical harm to the environment, generation of waste)	Medium	-	• Significantly more impact on Medium-High and Medium value areas identified by the Wildlife Action Network • Small generation of waste that can be handled by incineration • Continued impact on White Bear Lake

Criteria	Priority	Rating	Rationale
11. Minimizes adverse social impacts (e.g., construction impacts such as noise and poor air quality, disproportionate impact to disadvantaged communities)	Medium	+	• Construction would affect fewer residential and total parcels than other scenarios
Cost criteria			
13. Is cost-effective (Metrics may include: $ per household, $ per gallon treated; cost to include capital and O&M)	Medium	O	• Cost per mgd is above the median for scenarios where the total 20 year cost does not exceed available funds • Total 20-year cost does not exceed available funds
14. Has low long-term O&M costs	Medium	+	• Long-term annual O&M is below the median for scenarios when outliers are removed from the analysis • Rating does not currently take into account cost-sharing or any other contributions from communities to long-term O&M
Other criteria			
18. Is consistent with regional planning (e.g., Metropolitan Council planning, Washington County planning, regional aquifer planning)	Medium	+	• In general, consists of projects developed in collaboration with the communities and are consistent with the community planning, which is approved by Metropolitan Council • The Metropolitan Council's Master Water Supply Plan indicates that a goal of the regional plan is to help realize economies of scale
19. Is consistent with local planning (e.g., city comprehensive plans)	Medium	O	• Consists of variations on the community proposed conceptual projects and the conceptual projects are generally consistent with local planning • However, variations will require collaboration between communities that is not currently consistent with comprehensive plans, water supply plans, or the proposed conceptual projects
20. Is generally acceptable to the public (as reflected by public feedback on the preliminary results summary and input by the work groups)	High	O	• In general, public feedback reflected that this scenario is consistent with the proposed conceptual projects but the variations would require collaboration between communities that is not reflected in the proposed conceptual projects