WATER REUSE

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Acronyms and abbreviations

DLI – Department of Labor and Industry
DNR – Minnesota Department of Natural Resources
Environmental Services – Metropolitan Council Environmental Services
MDA – Minnesota Department of Agriculture
MDH – Minnesota Department of Health
Met Council – Metropolitan Council
ml - Milliliters
MPCA – Minnesota Pollution Control Agency
MPN – Most Probable Number
NPDES - National Pollutant Discharge Elimination System
NTU - Nephelometric Turbidity Units
PFAS – Per- and Polyfluoroalkyl Substances

Policy research approach

The Metropolitan Council (Met Council) is charged by state statute to develop plans for the growth and economic development of the seven-county Twin Cities metropolitan region (metro region). Publications like the metropolitan development guide (***Thrive MSP 2040***) and associated system plans, including the ***Water Resources Policy Plan***, are the primary vehicle for us to share our vision and goals for the region. They are updated every ten years but have a twenty-five year planning horizon to allow for long-term development of the region. Each iteration of regional planning builds upon the previous effort, while adjusting our actions, policies, and vision to address current issues, mitigate future risks, and optimize regional opportunities.

The 2050 Water Resources Policy Plan, like the 2040 plan before it, will be an integrated plan that supports our core mission to operate and manage the regional wastewater system, provide water supply planning, and provide surface water planning and management throughout the region. It will serve as our guide to address issues affecting our waters, and to protect these resources for future generations.

This research paper is part of a series investigating current and future water concerns for the metro region. Together, these papers will inform our 2050 Water Resources Policy Plan. The paper topics are:

- Protecting source water areas
- Rural water concerns
- Water and climate
- Water availability, access, and use
- Water reuse
- Water quality
- Wastewater concerns

The project's intent is to share our current understanding of issues, identify current policy connections or gaps, and to propose future policies and strategies to ensure sustainable water resources. Not all the recommendations included in the papers will move forward for inclusion into the Water Resources Policy Plan, and conversely, the Water Resources Policy Plan may include policies not discussed in these papers. The intent is to begin to develop a shared understanding and conversation about topics that are connected to all aspects of our core services.

Research paper topics were investigated using three core principles:

- **One Water, integrated water management:** Our region is water-rich, and that water holds immense value. Integrated water management, also known as "One Water", addresses water as it moves from water supply, through wastewater systems and into surface waters. The ultimate goal of integrated water management is sustainable, high-quality water in the region.
- **Utilize existing systems:** We have a robust water planning and wastewater operations system with many actors – community water and wastewater utilities, watershed management organizations, and regional, county, state, and federal agencies. Coordination and collaboration between these groups is necessary to protect our water for future generations.
- **Metric-based policies:** It is hard to quantify policy success without accountability. We will provide policy options with associated metrics and measurable outcomes where possible, to demonstrate the effectiveness of our water policies and actions.

Introduction and background

We at the Met Council strive to foster and maintain a growing economy that creates and provides jobs for the citizens of the region. We do this by providing a good transportation system that fairly and equitably links residents with job opportunities and affordable housing, and sustainable natural resources that provide recreational opportunities and that support life. Sustainable and plentiful high-quality water resources provide a firm foundation for the region's future economic growth, livability, and high quality of life.

Regional sustainability means protecting our vitality for generations to come by preserving our capacity to maintain and support our region's well-being and productivity over the long-term. Sustainable water resources include abundant, high-quality groundwater and surface water, resources that support the state's growing water supply needs and unique ecosystems. This can only be achieved if we have wise use of water through expanding water conservation and the promotion of efficient and cost-effective water reuse to increase groundwater recharge and to augment non-potable water usage.

Water reuse is one tool that can be used to offset limitations due to water quality and quantity issues and help promote water sustainability throughout the region. Water reuse for resources such as wastewater, rainwater, stormwater, graywater and subsurface water, can be utilized and supported in ways that protect public health and are cost-effective. Wastewater reuse for the purposes of this paper is the practice of reusing treated wastewater from a wastewater treatment plant for beneficial use before releasing it back into the water cycle.

Water reuse projects have been implemented slowly throughout the state with limited guidance and direction. In 2015, the Minnesota Legislature directed the Minnesota Department of Health to prepare a comprehensive study of and recommendations for regulatory and nonregulatory approaches to water reuse for state policy (Session Law, 2015).

The Clean Water Land and Legacy Amendment provided funding for this project and the Water Reuse Interagency Workgroup, led by the Minnesota Department of Health, was formed to complete this work. Met Council was a part of the workgroup to offer guidance and regional insight. In 2018, the interagency workgroup released a report titled *Advancing Safe and Sustainable Water Reuse in Minnesota*. Eight recommendations were included for continued work in this area:

- Create an expanded workgroup with practitioners, advisors, and stakeholders to continue development of standards and programs.
- Prioritize research needs and integrate ongoing research to address questions about reuse.
- Define roles and responsibilities to oversee and monitor water reuse.
- Establish an information and collaboration hub on the web to share information and resources.
- Develop a risk-based management system to determine if regulation or guidance is needed.
- Develop water quality criteria for a variety of reuse systems based on the log reduction target approach for pathogens to manage human health risks.

- Resolve unique issues related to graywater reuse to determine the feasibility of expanding graywater reuse.
- Provide education and training to support water reuse.

The interagency workgroup was preparing to take the next steps on the recommendations when the COVID-19 pandemic hit. At that time, many Minnesota Department of Health and other state agency resources were reallocated to work on pandemic issues. This resulted in a slowdown of progress on the water reuse recommendations. Recently, a group of state agency staff, including Met Council staff, began working on defining a clear process to get this work moving forward again.

Issue statement

Sustainable water resources are a necessary component of a growing, prosperous region, and water reuse is one strategy to ensure sustainability. Contamination, potable water demand, regulatory usage limits, and changes in climate may compromise the availability and quality of regional water resources. Currently, we lack a clear process to implement nonpotable stormwater reuse in Minnesota that is adequately protective of our public health and includes flexible regulatory guidance. This process needs to be developed by regional stakeholders, the Met Council, and state agencies, to accelerate and expand water reuse in the region. Strong regional water policies and associated actions are necessary to promote water reuse and set the stage for a future with sustainable water resources.

Our role

As the regional wastewater system operator, Environmental Services meets National Pollutant Discharge Elimination System (NPDES) permit requirements. Our wastewater, surface water and water supply planning functions work to promote sustainable water resources while addressing pollution and other factors impacting those resources for the metro region. Our vested interest in the region’s livability and prosperity will allow us to accomplish these goals through the work we do and the work we do in partnership with others.

Our water planning role includes looking at issues such as limited or poor-quality drinking water resources, how we can support heathy ecosystems, and how we plan for a high quality of life in the region. We work with our partners to define ways to move these issues forward.

We have three primary water planning focuses supported by state and federal statutes.

- **Wastewater:** We prepare a comprehensive development guide consisting of policy statements, goals, standards, programs, and maps prescribing guides for the orderly and economical development of the region. The regional wastewater collection and treatment system one of the four regional systems included in this effort (Minn. Stat. § 473.145).

- **Water Resources Management:** State and federal law requires us to adopt a water resources plan and federal requirements for a regional management plan to address pollution from point sources, such as treatment plant discharges, and nonpoint sources, such as stormwater runoff (Minn. Stat. § 473.157; 33 U.S.C. §1288).

- **Water Supply Planning:** We are required to create plans to address regional water supply needs, including the regional Master Water Supply Plan, developing and maintaining technical information related to water supply issues and concerns, providing assistance to communities in the development of their local water supply plans, and identifying approaches for emerging water supply issues (Minn. Stat. § 473.1565).

As a part of our responsibilities, we are required to approve Local Comprehensive Sewer Plans to make sure they are in conformance with the Water Resource Policy Plan including the Wastewater System Plan. We also review and comment on Local Surface Water Management and Local Water Supply Plans to ensure that they are in conformance and consistent with regional plans.

Sustainable and plentiful high-quality water resources provide a firm foundation for the region's future economic growth and prosperity, livability, and high quality of life as long as we are good stewards and use our resources wisely. A growing economy that creates and provides jobs for the citizens of the region, a good transportation system that fairly and equitably links citizens with job opportunities and affordable housing, sustainable natural and water resources that provide for recreational opportunities and that support a high quality of life are all part of the region that we strive to foster and maintain.

Recent events and changes in climate have put stress on our water supply systems, ecosystems, and valued water resources. We, at the Met Council, have been interested in exploring ways to replenish our water resources through the nonpotable reuse of treated wastewater and stormwater. This reuse will offset the demands being placed on surface waters and groundwater since the 2040 Water Resources Plan was adopted. The metro region may not have an immediate need to look to reuse for drinking water sources as in the arid southwest, but we are seeing clear impacts on our surface water and groundwater levels.

The 2040 Water Resources Policy Plan included high-level policies and implementation strategies related to water reuse. It laid the foundation for future work needed in this area to begin to promote and implement stormwater and wastewater reuse. After the plan was adopted in 2015, our Environmental Services staff formed an advisory team to research wastewater reuse at our facilities. A process is now in place to implement wastewater reuse once the appropriate conditions are met. Nonpotable stormwater reuse does not have as clear a path and process due to the lack of direction and regulation from state agencies. Our staff have been working with state agencies and partners to help define a clear path and processes to implement stormwater and wastewater reuse to meet our goal of sustainable water resources for the region.

The update for the 2050 Water Resources Policy Plan is an opportunity to improve and expand on the 2040 Water Resources Policy Plan. It is a time to think boldly about the policies and implementation strategies needed to advance water reuse. Working closely with our partner agencies and local governments is critical in developing clear guidance and direction for water reuse in the region. Now is the time to collectively further our efforts to get ahead of the issues of declining aquifer levels and surface water impacts in our region.

In the past, we have provided grant programs to help offset the cost of implementing stormwater reuse projects in the region. This paper provides an opportunity for input on those grants and additional efforts to help offset these costs and support reuse in the future.

Crucial concerns

Current state and reuse drivers

Minnesota is known for being a water-rich state with plentiful recreational and water supply resources. Due to this perceived abundance, water conservation, efficient use, and resource replenishment are often not prioritized by decision-makers. About 3/4 of the region's water demand is met by sourcing water from deep aquifers. After treatment to meet drinking water standards, the potable water is used, treated, and then finally discharged from wastewater treatment plant into local rivers or into shallow groundwater by subsurface sewage treatment systems. Unfortunately, our rate of water usage does not match the rate at which our aquifers "recharge", creating a water deficit. Water reuse is one potential avenue to extend the life of water within the region, and to ensure a resilient system and sustainable outcomes for local communities.

Stormwater management is an immediate driver for reuse. Despite the recent droughts, historically, excessive water on the landscape has been a more common issue for the metro region. Water reuse is one way for developed areas to keep or slow water on the land and protect the quality of surface waters. Our current drought status and new areas of contamination have reminded us that reuse can also have a role in various conditions, as it can alleviate some water availability concerns due to quality or quantity limitations.

Currently, more than 50% of Minnesota's population lives in the Twin Cities metro region. The Mississippi River and the region's aquifers provide residents with reliable water supplies. As demands on water supply grow due to population increase, urbanization, climate change, and increased irrigation and industry, reuse will become a more important part of managing the state's water resources.

The two primary forms of reuse being implemented in the state are stormwater and wastewater reuse. Stormwater reuse is the practice of harvesting stormwater runoff to meet water demands. Wastewater reuse is the practice of highly treating and reusing wastewater treatment plant effluent for beneficial use. The highly treated wastewater is called reclaimed water. In Minnesota, both stormwater and wastewater reuse can provide alternative supplies for nonpotable water uses to enhance water security, sustainability, and resilience. Both forms of reuse are primarily driven by the need to:

- Increase water conservation efforts to preserve potable water for essential uses.
- Improve and maintain watershed hydrology and reduce pollutant loading.
- Reduce stress on water infrastructure and the need for additional supply systems.

Increase water conservation to conserve potable water for essential uses
We use four primary aquifers for drinking water: Quaternary, Prairie du Chien – Jordan, Tunnel City – Wonewoc (formerly known as the Franconia-Ironton-Galesville), and Mount Simon – Hinckley. These aquifers supply water to 75% of the metro area residents (Met Council, 2013). The Mississippi River supplies drinking water to both the Minneapolis Water Works and Saint Paul Regional Water Services to account for the remaining 25% of drinking water supply for regional residents.

There are limitations and resiliency issues associated with the Mississippi River and the four primary aquifers pumped for drinking water. The Mississippi River is susceptible to drought and contamination. The river experienced drought conditions in 1988, 2021, and 2022, resulting in limited water supply for Minneapolis Water Works and Saint Paul Regional Water Service. Additionally, pollutant spills in the Mississippi River may affect the Minneapolis and Saint Paul drinking water systems. As for our aquifers, groundwater use in Minnesota increased by 26 percent from 1990 to 2020. (Department of Natural Resources (DNR), 2020). To address this issue, the DNR will not issue new water-use permits for the Mount Simon – Hinckley aquifer unless the appropriation is for potable water use, there are no feasible or practical alternatives to this source, and a water conservation plan is incorporated with each permit.

Some areas of the metro have begun to feel stress on both the quality and quantity of their groundwater. Depletion of groundwater reserves in certain areas of the state have focused the attention on more efficient uses of water. **Figure 1** shows long-term declining groundwater levels in the north and west parts of the metro, suggesting limited groundwater supply in these areas.

The DNR established a groundwater management area in the north and east metro to address water level issues in White Bear Lake (**Figure 2**). The following measures limit how much groundwater can be used in the area:

- No new groundwater appropriation permits or increases within five miles of White Bear Lake unless specified conditions are met.
- A residential irrigation ban is in effect when White Bear Lake water levels drop to 923.5 feet.
- Public water suppliers must implement a residential goal of 75 gallons per person per day and a total of 90 gallons per person per day. Public water suppliers must also develop a contingency plan to shift their water source from groundwater to surface water.
- A collective annual withdrawal limit is set for White Bear Lake which requires permits to be adjusted to meet this new limit.

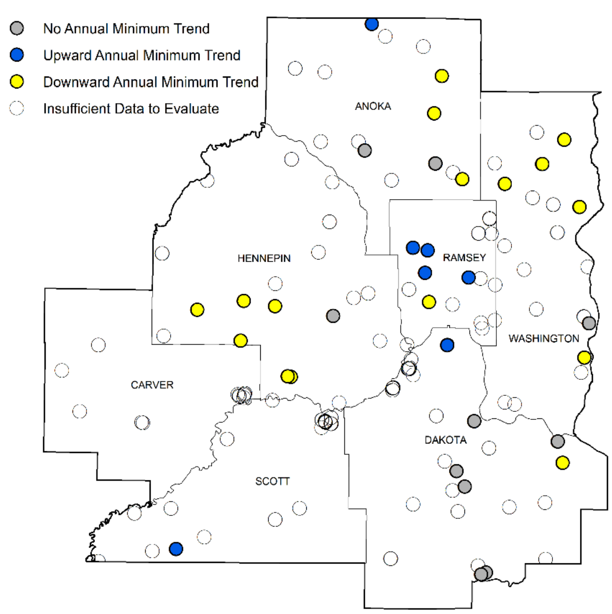

Figure 1: DNR observation well trends in annual minimum water levels (1993-2012) (Met Council, 2015)

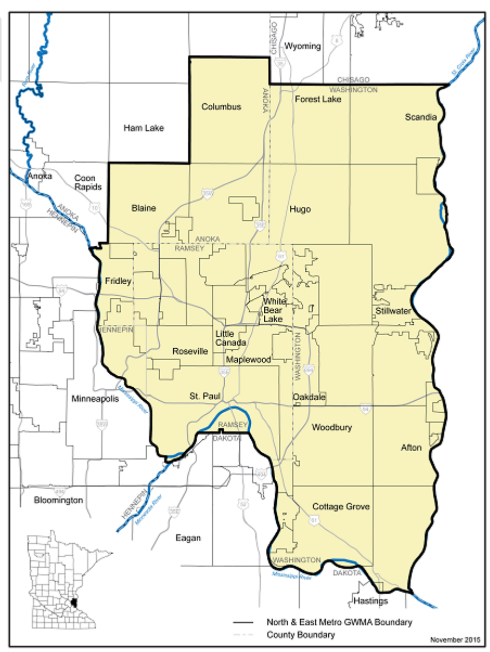

Figure 2: DNR groundwater management area (DNR, n.d.)

Additionally, groundwater quality and quantity concerns are impacting the northwest metro region where the primary source of drinking water is the Tunnel City- Wonewoc aquifer. Groundwater use concerns include naturally occurring manganese, a potential health concern, and aquifer drawdown due to projected increased future demands. These communities have significant growth forecast for 2040 and it is possible that groundwater may not be able to meet future drinking water demands. For example, the cities of Corcoran, Dayton, Ramsey and Rogers are projected to grow by 250%. The average water demand for these communities is expected to increase from 3.3 million gallons per day to 7.8 million gallons per day in 2040 (Metropolitan Council, 2021). Projections for fully developed conditions predict an average demand of 29 million gallons per day and a maximum demand of 73 million gallons per day. It is possible that water reuse projects could reduce the average and maximum daily water demands in this region, thereby reducing the total water demand and related water supply infrastructure needed to meet this demand.

Contaminants of concern (e.g. Per- and Polyfluoroalkyl Substances (PFAS), chlorides, nitrates, volatile organic compounds, naturally occurring metals and non-metals – manganese, arsenic, etc.) are raising groundwater contamination issues for several metro region communities. Large plumes of PFAS contamination have affected many groundwater users in the east metro region. Nitrate contamination is a considerable issue in Dakota County. Treating PFAS and nitrate in groundwater-sourced drinking water adds financial burden for municipalities and private well owners.

In areas with limited groundwater supply or with groundwater quality issues, reuse can relieve some pressure on the water supply. Stormwater reuse could be used for nonpotable uses such as irrigation, industrial cooling, or toilet flushing. This could conserve potable water for essential uses, provide alternatives to potable water during peak demand, reduce/limit withdrawals from ground or surface water supply, and help maintain reliable water supply in the event of disruption (Minnesota Pollution Control Agency (MPCA), 2017).

Water conservation is a potential driver for wastewater reuse. Like stormwater reuse, using reclaimed water would preserve high-quality groundwater resources for domestic use. Wastewater reuse that directly or indirectly offsets potable water use helps conserve water supplies. An example of an indirect offset would be subsurface infiltration to an aquifer used for irrigation. However, the water quality of the reclaimed water may influence how and where it could be used. Currently in the Twin Cities metro region, wastewater reuse for commercial, industrial, and agricultural demand is normally evaluated on a case-by-case basis.

Improve or maintain watershed hydrology and reduce pollutant loading

Urbanization dramatically alters watershed hydrology by increasing impervious surface coverage. This leads to less water infiltration and more stormwater runoff from the landscape. The result is increased peak stream flows following storm events, decreased groundwater recharge, and lower stream baseflows in the watershed. Retaining stormwater on-site through harvesting and reuse can reduce the peak flows of the receiving body of water (stream, river, lake, wetland). It does this by slowing, storing, and rerouting the water through the reuse pathway, instead of flowing directly into the storm sewer system (MPCA, 2017). The overall impact on riverine systems is a reduction of bank erosion and more stable habitat. In lake or wetland habitats, it can reduce the fluctuation rate of water levels which can destabilize aquatic and nearshore plant communities.

Stormwater management and reuse are being used by regional developers to meet the NPDES Construction Stormwater Permit requirement to retain one inch of runoff from new impervious surfaces on site (or meet other, more stringent watershed requirements), either through infiltration or other volume control methods. Some parts of the region have geologic conditions in which infiltration may not be feasible (i.e., high groundwater or tight soils). In these locations, reuse is one of few possible volume control options. Western Carver County is an example of a location in which soil types preclude infiltration as a stormwater management option and reuse is used instead. The Waconia case study addressed later in this paper is another example of this solution, but there are many cities and townships in the metro region experiencing similar issues.

In addition to reducing stormwater volume, most stormwater retention systems treat the water prior to use. The treatment removes urban pollution that would have been carried by runoff to the area's receiving waterbody. Depending on the reused stormwater's use (i.e., irrigation), the treated water may eventually travel to the receiving water, but with less speed or pollutant load.

Generally, wastewater reuse also has positive impacts on riverine systems. The reclaimed water reduces the volume and pollutant load of effluent water discharged from the wastewater treatment plant by routing it through an alternate pathway. A prolonged drought would be the exception to the beneficial impact. Under extreme low flow conditions, wastewater treatment plant effluent becomes a vital source of river water volume.

Reduce stress on water infrastructure and the need for additional supply systems
Stormwater reuse reduces the size of stormwater best management practices needed to achieve regulatory requirements (Waconia case study, page 10). It also increases the efficiency and extends the life of stormwater infrastructure, reduces stress on municipal water systems and budgets, and reduces the community expenditure on infrastructure expansion (MPCA, 2017).

Wastewater reuse that doesn't result in the return of the reused water to the wastewater treatment plant (irrigation, subsurface infiltration, etc.) can help recover existing regional interceptor and wastewater treatment capacity. For example, our Environmental Services interceptors near Hugo, Vadnais Heights, White Bear Lake, and White Bear Township have limited capacity to handle the long-term flow from the communities. Building a decentralized water reclamation facility in the area is one potential solution, as the cost for construction would be less than replacing the existing interceptors and the new facility would treat the water per MPCA standards.

Increasing stormwater and wastewater reuse for nonpotable water use needs could reduce the strain on the potable water supply, helping reduce the need for additional water supply systems.

Stormwater reuse uses and barriers

Stormwater can be reused for a variety of residential/commercial, municipal, and industrial purposes, as shown in **Table 1**.

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Table 1: End use examples for stormwater reuse

Residential and commercial	Municipal	Industrial
Landscape irrigation (parks, lawns, nurseries, highway buffer areas, golf courses)	Street cleaning	Cooling
Utility washing (vehicles, equipment)	Dust control	Processes
Water features	Equipment washing	Wash-down
In-building use (toilets)	Fire protection	
	Sanitary sewer flushing	

Of the several barriers to implementing stormwater reuse in Minnesota, the primary barrier is related to regulatory issues (Minnesota Department of Health, 2018; Freshwater Society, 2016). The 2018 Minnesota Department of Health report highlighted that few rules exist specific to water reuse, especially in areas of water quality, system design, and operations and maintenance. For example, there is lack of clear regulatory guidance on whether stormwater must be treated prior to being reused. Additionally, agency expertise does not always align with agency authority. For example, the Department of Labor and Industry has authority to regulate indoor reuse, but the MPCA and Minnesota Department of Health have the expertise in water and wastewater treatment.

Rainwater collection systems are now included in the Minnesota Plumbing Code, but most in-building applications of wastewater, graywater, and combined rainwater and stormwater require variances through the Plumbing Board. Variances involve more in-depth scrutiny than a standard permit. Local plumbing authorities (delegated to administer building and plumbing codes) are not always consistent in how they consider variances or interpret the rules to allow for reuse.

Excluding centralized wastewater reclamation and food product manufacturing, there is currently no standardized system of oversight or monitoring for stormwater reuse systems. Confusion exists about the steps organizations need to take before reusing stormwater. **Table 2** taken from the Minnesota Department of Health report, helps to highlight the current regulatory complexity presented by stormwater reuse.

Further barriers to implementing stormwater reuse were identified by the Freshwater Society including:

- Lack of state or national policies for oversight and management of decentralized non-potable water systems.
- High cost. Potable water is inexpensive by comparison.
- Lack of water quality and performance standards for decentralized water systems.
- Water appropriation permitting and reporting processes are discouraging.
- Not enough public health risk data.

Table 2: Reuse regulation or guidance by water source (MDH, 2018)

Source	Capture/Storage	Treatment	Distribution	End Use
Rainwater	**DLI**: regulates collection from roofs and catchment systems **MPCA**: guidance through Stormwater Manual	**DLI**: regulates water quality treatment requirements	**DLI**: regulates use within building and drainage systems to discharge point **DNR**: regulates if volumes used more than 10,000 gallons per day or one million gallons per year, with some exceptions	*Irrigation: not specifically regulated* **DLI**: regulates use for toilet flushing **MDA**: regulates food processing, food crop irrigation, etc. **MDH**: guidance on infiltration in vulnerable groundwater areas **USEPA**: regulates injection
Stormwater	**DLI**: regulates conveyance within piping **MPCA**: guidance through Stormwater Manual	**MPCA**: guidance through Stormwater Manual	**DLI**: regulates use within buildings by variance **DNR**: regulates use except for water withdrawn from "constructed management facilities for stormwater"	**DLI**: regulates toilet flushing by variance **MDA**: regulates food processing, food crop irrigation, etc. **MDH**: guidance on infiltration in vulnerable groundwater areas **MPCA**: guidance on irrigation through Stormwater Manual **USEPA**: regulates injection
Graywater	**DLI**: regulates diversion within buildings by variance **MPCA**: regulates, requirements similar to septic tank and disposal systems, with lower design flows and smaller tanks	**DLI**: regulates use within buildings by variance **MPCA**: regulates through wastewater standards, no requirements specific to graywater	**DLI**: regulates use within buildings by variance **MDH**: regulates separation distances from wells **MPCA**: regulates through wastewater standards	**DLI**: use in buildings - regulates by variance **MDA**: regulates food processing food crop irrigation, etc. **MPCA**: irrigation – wastewater standards apply
Wastewater	**DLI**: regulates use of public sewer/water **MPCA**: regulates disposal of wastewater, requirements for septic tanks, pumps, and dispersal in trenches, seepage beds, mounds, or at-grade systems	**MPCA**: regulates through NPDES and SDS permits referencing California Titles 17 and 22 requirements; offers guidance on reuse; and regulates treatment and disposal of waste residuals	**MDH**: regulates separation distances from wells	**DLI**: regulates us in buildings by variance **MDA**: regulates food processing food crop irrigation, etc. **MPCA**: regulates irrigation as a discharge to land, guidance on reuse for nonpotable use
Industrial Process Water	*Depends on process*	*Determined by end use or discharge permit* **MPCA**: regulates treatment and disposal of waste residuals	**DLI**: regulates up to water supply backflow preventer (prior to industrial use) or if industrial reuse is supplying plumbing fixture or plumbing system	**MDA and MDH**: regulate food processing **MPCA**: regulates discharges
Subsurface Water	**DLI**: regulates capture/storage by variance	**MDH**: regulates if treated for drinking water	**DLI**: regulates use within buildings by variance	**MDH**: regulates supplementation of potable water supplies **MPCA**: regulates pollution containment

DLI = Department of Labor and Industry; MPCA = Minnesota Pollution Control Agency; MDH = Minnesota Department of Health; MDA = Minnesota Department of Agriculture; USEPA = U.S. Environmental Protection Agency

In addition to regulatory barriers and costs, the level and feasibility of treatment is an important consideration for broad adoption. Road dust microplastic particles (Pramanik *et al.*, 2020), human-derived bacterial and viral contamination (Sidhu *et al.*, 2013), and heavy metals from road surfaces (Liu *et al.*, 2015) have all been shown to contaminate stormwater and may affect the cost and ability to treat and reuse it safely. Further work should quantify costs and include a feasibility analysis for current and emerging contaminate concerns.

While there are many obstacles to implementing stormwater reuse in Minnesota, there remain multiple benefits. One of the major benefits of stormwater reuse is that it supplements groundwater and surface water supplies. Reuse installations and water conservation efforts to reduce demand can help reduce the need to expand water utilities, saving energy and improving water quality.

Stormwater reuse case studies

The following case studies highlight the diverse drivers, obstacles, and implementation strategies for current stormwater systems in the metro region.

Rainwater harvesting at CHS Field

CHS Field is a regional ballpark in the heart of the Lowertown neighborhood of Saint Paul, located near the Mississippi River. The ballpark has a capacity of 7,000 spectators, hosts approximately 400,000 visitors annually and is used for both sporting and non-sporting events.

Ballparks require large amounts of water for irrigation, drinking and other operational activities. To reduce consumption of potable water as well as the amount of polluted runoff flowing to the Mississippi River, the City of Saint Paul, Saint Paul Saints, Capitol Region Watershed District, and our team at the Met Council collaborated to collect and store rainwater and use it for irrigation and other uses at CHS Field (**Figure 3**).

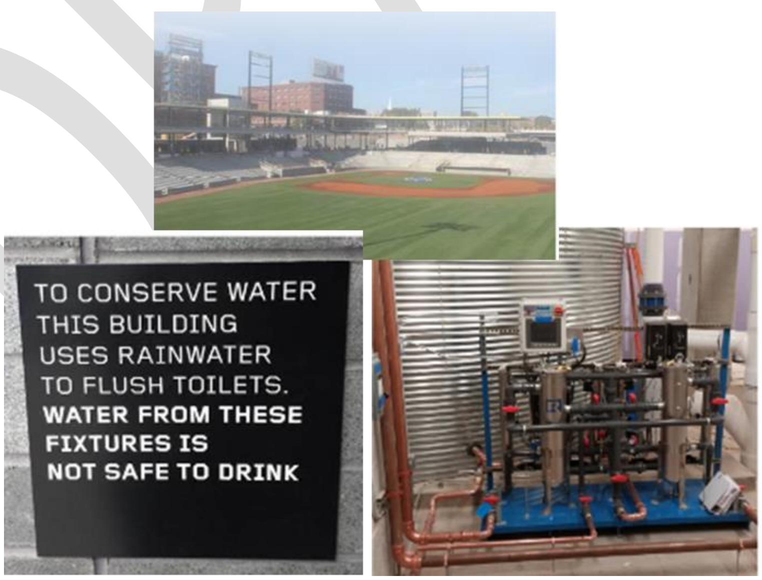

Figure 3: CHS Stadium reuse system

Water source: Rooftops provide a great opportunity to collect rainwater because the water flowing off roofs is relatively clean compared to the rain from streets or parking lots. CHS Field does not have a large amount of roof cover, so to improve outcomes, we offered the roof area of our Metro Transit light rail Operations and Maintenance Facility next door. A pipe installed between the properties allows rainwater to flow from a roughly three-fourths acre portion of the facility roof to a 27,000-gallon steel cistern tank below the ballpark grounds.

Treatment: A vortex filter removes large particles such as leaves and sediment from the water before it goes to the cistern. From there, a pump pulls water from the cistern and sends it through two filters that remove smaller particles. Finally, ultraviolet light is used to disinfect the water before it is sent to the irrigation system or toilets.

Uses:

- The harvested rainwater is used to irrigate the main playing field, which includes two acres of sod. The area is watered by 115 irrigation heads and 7,000 feet of irrigation pipe.
- The public toilets located behind center field include nine water closets and four urinals which are serviced by water from the cistern. The remaining 127 public toilets are located too far away to be served by the cistern, but all toilets in the park include water-saving fixtures.

Stormwater reuse at the City of Waconia

The City of Waconia in partnership with the Carver County Watershed Management Organization has created and implemented an innovative approach to stormwater reuse throughout the city. Waconia operates the system as a utility, and has created city ordinances specific to these regional reuse systems and partnered with the Carver County Watershed Management Organization to create a credit bank system to meet the watershed organization's volume reduction requirements for developed and developing city sub-watersheds. The main drivers for Waconia to create its reuse program were:

1. Rapid population growth and increase in development.
2. A 2016 Carver County Watershed Management Organization ordinance update with new stormwater volume reduction requirements.
3. To decrease the use of groundwater for irrigation.
4. A desire to improve water quality of surface waters.
5. To reduce flooding issues caused by insufficient stormwater management.

Water source: In 2015, a Highway 5 reconstruction project was the impetus for Waconia's Regional Reuse Systems as it offered a unique opportunity. Multiple best management practices were identified to treat stormwater for the project, including a large pond for volume control and water quality treatment. This large pond holds roughly 240,000 cubic feet of water, which the city decided to use for irrigation at the highway site and for other sites within its sub-watershed. The use of this stormwater pond for irrigation created the city's first regional reuse system.

Treatment: All the water being reused for irrigation is treated by either ultraviolet or sodium hypochlorite to California standards. Waconia is partnering with the Minnesota Department of Health to perform testing on the water being reused for irrigation. The city also measures the amount of chloride in the water. For additional public health protection, Waconia tries to irrigate at times when less people are likely come into contact with the water.

Uses: Currently, there are 13 active sites in the Regional Reuse System created by the Highway 5 reconstruction pond. These sites use more than 2.5 million gallons of stormwater reuse for irrigation. Overall, the Regional Reuse System has been a success. The irrigation rate is 50% less than the high rate for potable water uses at $2.50/1,000 gallons.

Stormwater reuse systems for the City of Hugo

The City of Hugo is proactive in water conservation efforts and has made a commitment to strive to "reduce, reuse and replenish" its water resources for the purposes of being good stewards of the resource (Hugo, 2022). Hugo is rapidly growing and has developed stormwater reuse systems that will help the city conserve water and decrease demand from new development.

It is estimated that the projected increase in population would cause an additional 350 million gallons per year increase for irrigation. Stormwater reuse helped to reduce the projected need for new wells from 11 to seven, and for new water towers from four to two. This reduction would be achieved by reducing peak demand in the summertime months due to irrigation. There are numerous existing stormwater ponds in Hugo, along with existing stormwater conveyance infrastructure, which eased the expense of constructing reuse systems. Additionally, Hugo is in the DNR's North & East Metro Groundwater Management Area, and this could cause future water appropriations to be impacted by issues related to White Bear Lake.

The City of Hugo did experience several barriers to implementing stormwater reuse systems. The barriers include:

1. Finding enough surface water.
2. Low pond levels which can cause resident dissatisfaction.
3. Complex regulatory environment.
4. White Bear Lake lawsuit.
5. Residents not acclimated to reuse systems.
6. Stream mitigation of agricultural drainage ditches, watershed impoundment and DNR shoreland rules.

Treatment: Unlike the city of Waconia, Hugo does not provide any ultraviolet or sodium hypochlorite treatment to stormwater before it is reused. Hugo is looking to partner with other organizations to test and monitor the stormwater being reused for pathogens and to develop best practices for reuse.

Uses: Currently, irrigation makes up nearly 50% of Hugo's municipal water use (approximately 200 million gallons per year out of 425 million gallons per year, and without water conservation or reuse efforts, it is expected to grow as the city grows.

Stormwater Reuse Recommendations

- Metropolitan Council staff will share information and resources to help develop guidance for implementing stormwater reuse.
- Metropolitan Council staff, in collaboration with partners, will help to inform the direction on whether further guidance is needed, or regulation is needed for the various stormwater and rainwater reuse practices being installed in the metro region. This action

will include working with partners and agencies to better understand the risks associated with all types of reuse before decisions are made about guidance or regulation.

- Metropolitan Council staff will work with agency partners to better define agency roles and responsibilities for reuse in Minnesota.
- The Metropolitan Council will seek funding for grant programs to support the reuse of stormwater in the metro region, as appropriate.
- The Metropolitan Council will work with partners to remove obstacles, as appropriate, so reuse can become more commonly used to reach sustainable water resources in the region.
- The Metropolitan Council will implement stormwater reuse at our facilities (including for purposes of demonstration) in accordance with Minnesota Department of Health guidance as they are developed, NPDES permit requirements, and as is economically feasible.

Wastewater reuse uses and barriers

As mentioned previously, for the purpose of this paper, wastewater reuse is the practice of reusing treated wastewater from a wastewater treatment plant for beneficial use before releasing it back into the water cycle. Use of treated wastewater, on the same site or by the same owner of the wastewater treatment plant is called “recycling” and does not require additional permitting. Wastewater recycling is a relatively common practice in Minnesota. Minnesota wastewater recyclers include our Environmental Services division, the City of Mankato, and St. Francis.

MPCA recognizes wastewater reuse categories by level of treatment, and currently limits external wastewater reuse to nonpotable types as listed in **Table 3**. The MPCA’s reuse requirements for treated effluent are protective of public health by minimizing human exposure to pathogens and microorganisms that could cause illness.

Treated wastewater from conventional municipal wastewater treatment plants would meet Disinfected Secondary 200 reuse permit requirements without supplemental treatment. Additional treatment would be required for conventional wastewater treatment plants to meet Disinfected Tertiary and Disinfected Secondary 23 reuse permit limits. We, in Environmental Services, use the term “reclaimed water” to indicate that the wastewater has been treated beyond the permit requirements for discharge.

The regulatory path for wastewater reuse in Minnesota is essentially the same as that of all wastewater treatment and disposal, as illustrated in **Figure 4**. The discharge of treated wastewater to surface waters, ground surface, or subsurface is regulated by the MPCA. MPCA issues two types of water quality permits - the NPDES and the State Disposal System. The NPDES permit is a federal program, established under the Clean Water Act, regulating any treatment and disposal system that discharges to surface waters. The State Disposal System permit is a Minnesota program established under Minnesota Statutes, Chapter 115, regulating discharges to ground surface (e.g., spray irrigation) or subsurface disposal. Permits are issued on a case-by-case basis. Requirements vary based on the design flows of the facility, the type of treatment system, and where and how the treated wastewater will be discharged.

Implementation of wastewater reuse is currently limited in Minnesota, primarily because other sources of water are available and are relatively less expensive (**Table 4**). Industries and other users typically choose municipal or groundwater sources because they are cheaper. Our Environmental Services wastewater treatment is currently competitive with other water utilities, 35% less that the national average of all wastewater utilities in the United States that serve greater than 1 million people (National Association of Clean Water Agencies, 2021). However, additional treatment, storage and conveyance requirements for many reuse applications make other source water alternatives more cost-effective than treated wastewater in Minnesota. Additionally, potential future wastewater treatment requirements for various contaminants could increase the cost of wastewater treatment and negatively impact the cost-effectiveness of reuse.

The cost of constructing a wastewater reuse facility and distribution infrastructure to the end user(s) can be high. In 2017, Enerkem, a Canadian company, was considering constructing a waste-to-fuel facility in Inver Grove Heights that needed 1.6 million gallons of water per day for its industrial processes and for cooling. Enerkem contacted us and stated its interest in receiving reclaimed water from our treatment plants. We developed a facility plan for constructing a southeast metro water reclamation facility and distribution piping to provide reuse water to Enerkem. The distribution piping would consist of 4.5 miles of 16-inch-high density polyethylene pipe. The overall cost for this project was estimated to be $35 million (2022 dollars). The cost for constructing the 4.5 mile of 16-inch high density polyethylene pipe was estimated to be $17.5 million (2022 dollars), which equals to $3.8 million/mile. Additionally, lack of water quality and performance standards for decentralized water systems creates a barrier for reusing wastewater.

Our Environmental Services wastewater treatment plant effluent typically has high chloride concentrations, which come primarily from residential water softeners and road salts that do not get removed in water supply or wastewater treatment processes. A chloride concentration of 100 mg/L or higher in treated wastewater makes it unsuitable for irrigation; a chloride concentration of 500 mg/L or higher in treated wastewater makes it unsuitable for industrial cooling. A barrier to the 2017 southeast metro water reclamation facility project moving was the cost of a satellite treatment plant that Enerkem would need to build at its site to reduce chloride concentration.

PFAS is another contaminant of concern which, pending the development of EPA actions and Minnesota's PFAS regulatory framework, will delay or deter further implementation of wastewater reuse in the state. Implementation of wastewater reuse will be impacted by where in its cycle the PFAS is regulated. If PFAS reduction is required of the end user, it will significantly increase the cost of service and likely result in the rejection of wastewater reuse for another more cost-effective source water.

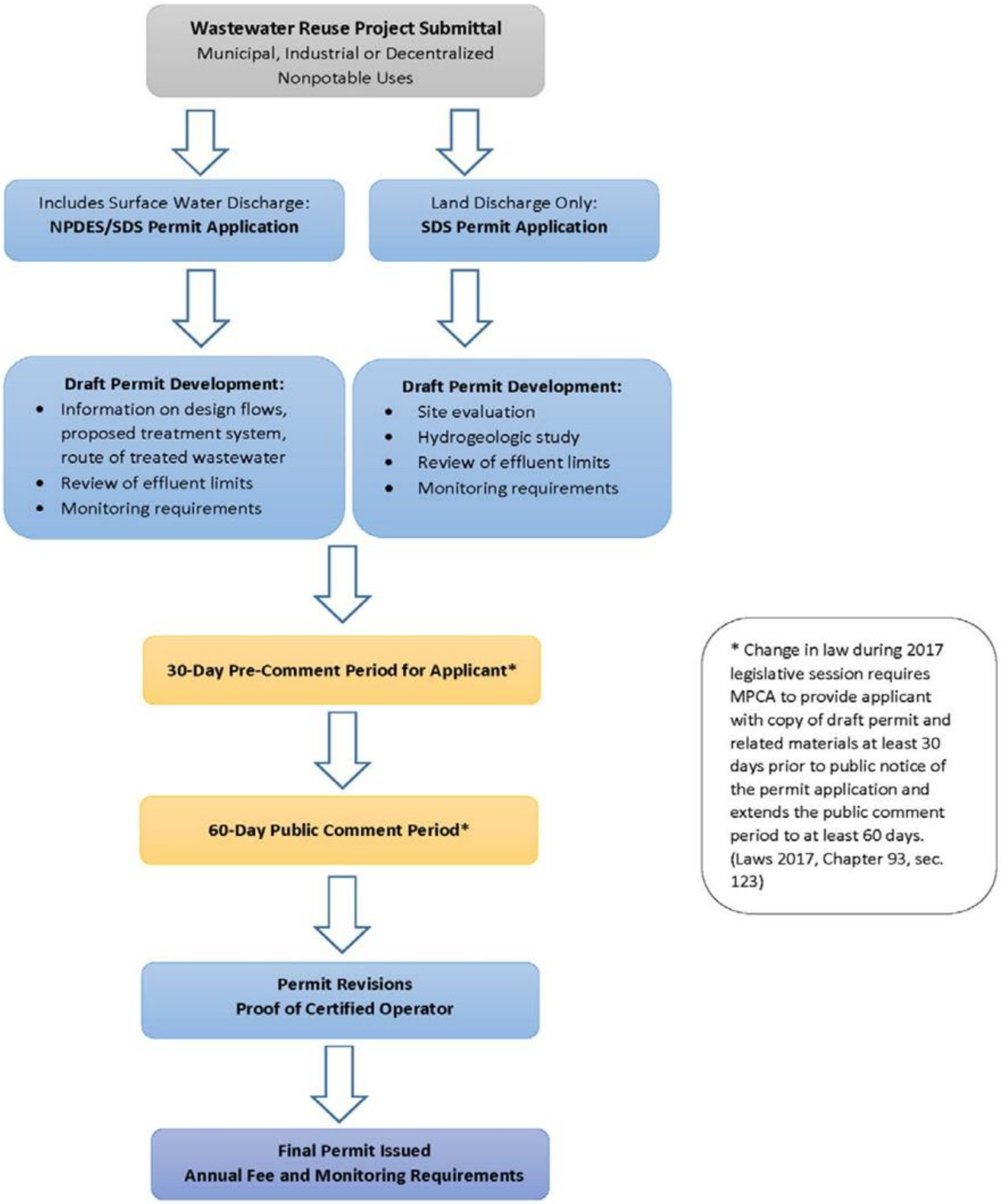

Figure 4: Current regulatory wastewater reuse path (MDH, 2018)

Table 3: MPCA treatment requirements for non-potable wastewater reuse

Types of reuse	Reuse permit limits	Minimum level of treatment
• Food crops where the recycled water contacts the edible portion of the crop, including root crops • Irrigation of residential landscape, parks, playgrounds, school yards, golf courses • Toilet flushing • Decorative fountains • Artificial snow making, structural fire fighting • Backfill consolidation around portable water pipe • Industrial process water that may come in contact with workers • Industrial or commercial cooling or air conditioning involving cooling towers, evaporative condensers, or spray that creates mist	2.2 Most Probable Number (MPN)/100 milliliters (ml). Total coliform 2 Nephelometric Turbidity Units (NTU) daily average; 10 NTU daily maximum turbidity	**Disinfected Tertiary** Secondary, filtration, disinfection
• Cemeteries • Roadway landscaping • Ornamental nursery stock and sod farms with restricted access • Pasture for animals producing milk for human consumption • Nonstructural fire fighting • Backfill consolidation around non-potable water pipe • Soil compaction, mixing concrete, dust control on roads and streets • Cleaning roads, sidewalks, and outdoor work areas • Industrial process water that will not come into contact with workers • Industrial boiler feed • Industrial or commercial cooling or air conditioning not involving cooling towers, evaporative condenser, or spray that creates mist	23 MPN/100 ml. Total coliform.	**Disinfected Secondary 23** Secondary, disinfection
• Fodder, fiber, and seed crops • Food crops not for direct human consumption • Orchards and vineyards with no contact between edible portion • Non-food bearing trees, such as Christmas trees, nursery stock and sod farms not irrigated less than 14 days before harvest • In Minnesota, this is commonly called “spray irrigation”	200 MPN/100 ml. Fecal coliform.	**Disinfected Secondary 200** Secondary, disinfection (Stabilization pond systems with 210 days of storage do not need a separate disinfection process)

(Source: Minnesota Pollution Control Agency. 2010)

Table 4: Comparison of source water rates in the Minneapolis/Saint Paul region

Municipal drinking water- Surface water source [a]	Municipal drinking water- Groundwater source [a]	Environmental Services treated wastewater (non-potable)
$6.87/1000 gal	$2.50/1000 gal	$5.37/1000 gal

[a] Tabulated values are average 2020 retail rates.
Please see *https://metrocouncil.org/Wastewater-Water/Planning/Water-Supply-Planning/Grants/Water-Rates.aspx* for individual community water rates.

Wastewater reuse case studies

The most common types of treated wastewater reuse in Minnesota include irrigation of cropland, grassland or forests, golf course irrigation, industrial cooling, and toilet flushing. Environmental Services recycles about 24 million gallons per day of treated wastewater for internal nonpotable water needs where there is low potential for human contact. Industrial cooling at the Mankato Energy Center is currently the largest type of wastewater reuse by volume in Minnesota, 1.5 million gallons per day.

Mankato Water Resource Recovery Facility

Mankato Water Resources Recovery Facility is a MPCA permitted water reclamation facility. The facility originally began producing reuse water in 2007 to supply Mankato Energy Center (a local gas power plant) with cooling water. Treatment processes specifically benefiting the reuse water occur after the process water is treated for suspended sediments and nutrients. The water is treated through an iron ion flocculation/coagulation system that binds the phosphorus to larger particles that are filtered out with other suspended sediments by a disc filtering apparatus. Reuse water is then disinfected with sodium hypochlorite. The water is elevated through a lift pump station to supply water to the end users. End users of reuse water from Mankato Water Resources Recovery Facility include internal processes at the facility (240 million gallons in 2021), Mankato Energy Center, a natural gas power plant (563 million gallons in 2021), Riverfront Park, (0.4 million gallons in 2021), and various contractors including street sweeping, ice rink flooding, hydro seeding, pipeline hydrotesting, flower irrigation, cement preparation, and others (1.6 million gallons in 2021).

Effluent recycling at our wastewater treatment plants

We own and operate nine wastewater treatment plants that produce high quality plant effluent that meet NPDES permit requirements. At several wastewater treatment plants, plant effluent is recycled for internal uses. The uses include plant seal water, flow meter flushing, cooling water, irrigation of the plant site, tank cleaning, etc. **Table 5** summarizes effluent reuse flow rates at each treatment plant. The total effluent reuse flow rate is about 24 million gallons per day. Recycling our plant effluent for internal uses conserves groundwater and city water sources.

Table 5: Treated effluent reuse at Environmental Services wastewater treatment plants

WWTP	Effluent reuse flow rate	Effluent recycling category
Metro	18.7 millions of gallons per day	• Flow meter flushing in secondary treatment: 2.1 millions of gallons per day • Gravity thickener dilution; heat recovery & air pollution control equipment associated with incineration in solids treatment: 15.2 millions of gallons per day • Grit agitation, scum skimming & conveyance in pretreatment and primary treatment: 1.4 millions of gallons per day
Blue Lake	1.8 millions of gallons per day + seasonal	• Cooling water for solids processing: 1.2 millions of gallons per day • Irrigation of the plant site: seasonal • Plant seal water: 0.6 millions of gallons per day • Tank cleaning: ad hoc
Seneca	1.3 millions of gallons per day	• Cooling in the incinerator exhaust pollution control process: 1.4 millions of gallons per day • Plant seal water: 0.9 millions of gallons per day
Empire	0.79 millions of gallons per day	• Belt filter press wash water • Grit system wash water • Influent pump cooling water • Seal water: return activated sludge Pumping, headworks, gravity belt thickener, digester, sludge pumping buildings • Septage receiving: Interior tanks wash, hydrants, hauler truck area washdown, bar screen wash water. • Service/hydrants: headworks, gravity belt thickener, sludge pumping, effluent pumping, solids, digester buildings • Solids conveyor system wash water • Transfer water: belt filter press & gravity belt thickener polymer
St. Croix Valley	0.38 millions of gallons per day	• Alum carrier • Dilution water to gravity thickener • Seal water • Tank flushing • Tank spray
Eagles Point	0.15 millions of gallons per day	• Admin heat exchanger cooling water • Bar screen spray water • Grit system wash water • Hauler truck area washdown/hose rinsing • Non-potable flushing water • Seal water all plant pumps • Spray water for primary and secondary tanks • Tank cleaning • Transfer water: gravity belt thickener polymer

WWTP	Effluent reuse flow rate	Effluent recycling category
Hastings	0.07 millions of gallons per day	• Carrier water for alum • Non potable flushing water • Primary and Final clarifying tanks spray water • Yard hydrants

East Bethel Water Reclamation Facility

East Bethel was constructed as a demonstration facility for subsurface infiltration and wastewater reuse. Although there are currently no end users, irrigation is considered as a future opportunity.

Built in 2014, the East Bethel Water Reclamation Facility is the first Environmental Services-owned water reclamation facility, and it treats wastewater to serve projected growth and new businesses in the East Bethel area. Due to the topography and geology of the East Bethel area, effluent discharge to a surface water was not a viable option. Therefore, the decision was made to build a reclamation facility in the area. Reclaimed water from the facility is used for replenishing surficial groundwater.

The East Bethel Water Reclamation Facility is a membrane bioreactor facility with capacity of 410,000 gallons per day. It currently treats 57,000 gallons of wastewater per day to MPCA's highest level for wastewater reuse. The reclaimed water is pumped to one of two rapid infiltration ponds, where it is filtered through a surficial sand aquifer and ultimately flows to Crooked Brook (**Figure 5**). Reclaimed water from the East Bethel facility can also be made available for low quality water needs in industries and commercial establishments, site landscape watering and building amenities (fountains and ponds) if a dual potable and reclaimed water distribution system is constructed as the city infrastructure develops.

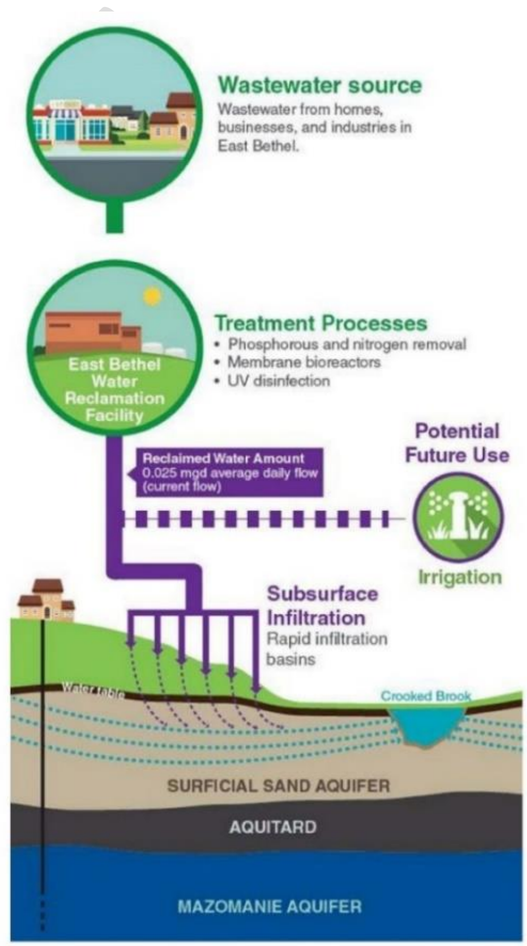

Figure 5: East Bethel water reclamation system

Wastewater Reuse Recommendations

- The Metropolitan Council will continue to work with partners to identify external opportunities to reuse treated wastewater and assist in the evaluation of this opportunity as one regional alternative to conserve potable water sources.
- The Metropolitan Council will identify criteria for viable wastewater reuse projects including, but not limited to, effluent contaminant concentrations to reduce the likelihood of expensive treatment.
- The Metropolitan Council will clearly identify on our website who to contact to work with us on a wastewater reuse project.
- The Metropolitan Council will provide additional treatment to meet MPCA reuse requirements for internal use to advance our practice.

Equity considerations

Public policy and industry practice have produced an unequal landscape across American neighborhoods. This has caused a disproportionate burden on people of color including causing them to experience negative impacts on wealth building, health, and environmental justice issues. Discriminatory housing practices from both federal and private programs have contributed to the segregation of neighborhoods, making it possible to geographically target and withhold public investment. In 2016, the median net worth among White families was 10 times that of Black families, and more than eight times that of Hispanic families (Loh et al., 2020). Impacts from these programs and practices can be seen and felt within the metro region.

Equity in relation to the environment and our water resources is important to protect all residents from environmental hazards and to provide access to environmental benefits regardless of income, race, and other characteristics (UCLA, n.d.). Environmental equity is a basic human right and includes fair treatment and meaningful involvement. Under-represented and vulnerable communities must be engaged in a manner so that outreach will not be a performative exercise, but rather an opportunity to inform and involve groups most impacted by the decision-making processes and outcomes.

Environmental justice is a core tenet of environmental equity and is often deeply intertwined with water quality contamination issues. Environmental justice acknowledges that past harms have been committed against vulnerable communities through policies and rules across systems. Currently, we are working at the intersection of equity and our regional services, with a focus on environmental justice through our 2022 Climate Action Plan. The Climate Action Plan team created the Environmental Justice Taskforce to create a framework to assist in the development and evaluation of the Climate Action Plan with an environmental justice lens. The Taskforce's definition for environmental justice, specifically for the Met Council, is:

> *Environmental justice is the equitable engagement of policy creation for, and service delivery to, all people in the metropolitan region with the prioritization of communities of color and low-income communities. The term justice is used to*

> *acknowledge that there has been an ongoing history of harm and environmental racism towards Black, Indigenous and people of color in the state of Minnesota.*

Stormwater reuse can impact several equity concerns including affordable housing, gentrification, and water rates. If implemented correctly, stormwater reuse can be of benefit to affordable housing developments and help to reduce utility treated water consumption of residents. A good example of water reuse implemented with an equity lens is a mixed-income housing development, the Rose Apartments, in Minneapolis.

The Rose Apartments contain three rain gardens that filter up to 26,000 gallons of rainwater. An underground retention system then stores and filters the water, and contains it in cisterns (ULI, 2021). The collected water is used to irrigate a 5,000 square foot community garden that provides food and programming for the residents (ULI, 2021). The apartments utilize water-efficient fixtures to help further reduce the development's water footprint (ULI, 2021). The residents benefit from lowered water bills and access to productive green space, while Minneapolis gains affordable housing stock which improves runoff from a formerly contaminated site and adds a degree of climate resilience.

A report from the National Wildlife Federation found that while affordable housing developments and stormwater reuse can help to further equitable practices, steps need to be taken to ensure the projects are positive and limit harmful impacts. Cities and developers need to take advantage of federal and state funding opportunities to help developers address the additional upfront costs of onsite water reuse systems (US Water Alliance, 2022). Additionally, affordable housing projects are often developed with tight timelines and budgets. Reducing regulatory barriers can encourage the integration of reuse into developments (US Water Alliance, 2022). Regulatory barriers can be reduced through best practice sharing, waiving fees, and by providing technical assistance. Finally, green infrastructure can lead to gentrification. Community based anti-displacement strategies can help to limit the displacement that may occur. These strategies include Right to Return policies, property tax freezes, workforce initiatives that prioritize black, indigenous and people of color (BIPOC) and low-income communities, and inclusionary zoning (US Water Alliance, 2022).

Connections to current policy

The 2040 Water Resources Policy Plan contains 11 separate policies. Four of these policies address water reuse, as denoted below.

Water Conservation and Reuse Policy
The Met Council will work with our partners to identify emerging issues and challenges for the region as we work together on solutions that include the use of water conservation, wastewater and stormwater reuse, and low-impact development practices in order to promote a more sustainable region.

The following implementation strategies related to reuse are included under this policy:

- Identify and pursue options to reuse treated wastewater to supplement groundwater and surface water as sources of water to support regional growth, when economically feasible.
- Investigate reusing treated wastewater, and when cost-effective, implement reuse.

- The institutional arrangements and cost of service approach for wastewater reuse are important to the development of wastewater reuse in the region. In implementing wastewater reuse opportunities, the Met Council will use the following approaches:
    - The Met Council shall use a cost-of-service, case-by-case approach to wastewater reuse in cooperation and partnership with local communities. The Met Council will evaluate the potential regional benefit of a potential wastewater reuse project and, if the Met Council's criteria are met, will determine an appropriate cost share, provided that the cumulative regional cost share shall not exceed 0.75% of the total annual municipal wastewater charges.
    - Criteria to be used to evaluate whether there is a regional benefit to a potential wastewater reuse opportunity shall include: (1) the regional wastewater system was built to service long-term growth in a sub-regional service area in which (a) water managers now recognize concerns about sustainable water supply and the importance of meeting the needs of future generations while not harming ecosystems, degrading water, or reducing water levels beyond the reach of public water supplies and private wells and (b) a growing demand for groundwater could mean it will be difficult to obtain a groundwater use permit from the Department of Natural Resources; and/or (2) the proposed reuse project reduces Environmental Services' surface water discharge, delaying capital improvements to meet more stringent regulatory requirements.
    - The Met Council shall hold a public hearing to obtain customer and public input prior to making a final determination on regional benefit and regional cost share. Implementation of each wastewater reuse project shall be consistent with the comprehensive plan of the community in which the reclaimed water user is located.
    - The Met Council shall enter into a joint powers agreement with the community in which the reclaimed water user is located to define the reclaimed water service institutional arrangements and to avoid competition with municipal water suppliers.
    - The Met Council shall enter into a long-term reclaimed water service agreement with each user, using a cost-of-service approach, including a potential regional cost share where appropriate.
    - The Met Council shall pursue sources of non-Met Council funding to complement Met Council funding of wastewater reuse projects, including Clean Water Legacy Funds, state bond funds, and reuse grants.
    - The Met Council shall report about the wastewater reuse pilot program at Met Council's annual budget outreach meetings.

Investment Policy
The Met Council will strive to maximize regional benefits from regional investments.

The following reuse related implementation strategies are included under this policy:

- Invest in wastewater reuse when justified by the benefits for supplementing groundwater and surface water as sources of non-potable water to support regional growth, and by the benefits for maintaining water quality.
- Support cost-effective investments in water supply infrastructure to promote sustainable use and protect the region's water supplies by:

- Supporting cost-benefit analyses of alternative water supply options

Wastewater Sustainability Policy
The Met Council will provide efficient, high-quality, and environmentally sustainable regional wastewater infrastructure and services.

The Met Council shall conduct its regional wastewater system operations in a sustainable manner as is economically feasible. Sustainable operations relate not only to water resources but also to increasing energy efficiency and using renewable energy sources, reducing air pollutant emissions, and reducing, reusing, and recycling solid wastes.

The following reuse related implementation strategies are included under this policy:

- Reuse treated wastewater to meet non-potable water needs within Met Council wastewater treatment facilities where economically feasible.

Wastewater System Finance Policy
The Met Council will continue to implement regional wastewater service fees and charges based on regional cost of services and rules adopted by the Met Council.

The following reuse related implementation strategies are included under this policy:

- The Met Council shall report about the wastewater reuse pilot program funding at Met Council's annual budget outreach meetings.

Draft Policy Proposals and Implementation Strategies

Minnesota needs a clear vision and process that sets the stage to make reuse a feasible tool to achieve water sustainability. Regulatory clarity, simplicity, and flexibility is needed to move us forward to reach our goal of sustainable water resources in the region.

Stormwater reuse

Stormwater reuse in Minnesota currently does not have a clear process and guidance/regulatory structure. The following recommendations are a mix of immediate and long-term actions that will direct new stormwater reuse policies and actions in our 2050 Water Resources Policy Plan.

<u>Proposed policy recommendation:</u>

The Metropolitan Council will work with our state agency partners and impacted stakeholders to advance stormwater reuse to promote a more sustainable region.

Proposed actions:

- Metropolitan Council staff will share information and resources to help develop guidance for implementing stormwater reuse.
- Metropolitan Council staff, in collaboration with partners, will help to inform the direction on whether further guidance and/or regulation is needed for the various stormwater and

rainwater reuse practices being installed in the metro region. This action will include working with partners and agencies to better understand the risks associated with all types of reuse before decisions are made about guidance or regulation.

- Metropolitan Council staff will work with agency partners to better define agency roles and responsibilities for reuse in Minnesota.

Proposed policy recommendation:

The Metropolitan Council will support stormwater reuse in Minnesota, where feasible, as a means of achieving water sustainability in the region.

Proposed actions:

- The Metropolitan Council will work in partnership with state and local governments to include internal and public outreach/acceptance campaigns to promote stormwater reuse as a viable water source.
- The Metropolitan Council will seek funding for grant programs to support the reuse of stormwater in the metro region, as appropriate.
- The Metropolitan Council will work with partners to remove obstacles, as appropriate, so reuse can become more commonly used to reach sustainable water resources in the region.
- The Metropolitan Council will implement stormwater reuse at our facilities (including for purposes of demonstration) in accordance with Minnesota Department of Health guidance as it is developed, NPDES permit requirements, and as is economically feasible.

Wastewater reuse

Our current policy related to reuse focuses heavily on the process to reuse wastewater from our Environmental Services wastewater treatment plants. In addition, the regulatory approach for reuse of wastewater is clearly identified and overseen by the MPCA. At this time, we are not proposing any changes to our approved process for wastewater reuse. We are proposing new wastewater reuse policy.

Proposed policy recommendation:

The Metropolitan Council will support the reuse of treated wastewater where feasible and appropriate.

Proposed actions:

- The Metropolitan Council will work in partnership with state and local governments to include internal and public outreach/acceptance campaigns to promote wastewater reuse as a viable water source.
- The Metropolitan Council will continue to work with partners to identify external opportunities to reuse treated wastewater and assist in the evaluation of this opportunity as one regional alternative to conserve potable water sources.

- The Metropolitan Council will identify criteria for viable wastewater reuse projects including, but not limited to, effluent contaminant concentrations to reduce the likelihood of expensive treatment.
- The Metropolitan Council will clearly identify on our website a contact to work with us on a wastewater reuse project.
- The Metropolitan Council will provide additional treatment to meet MPCA reuse requirements for internal use to advance our practice.

Next steps

This topical research paper is the first step in the process of creating regional water policies to safeguard our waters and to protect the livability and prosperity of the region (**Figure 6**). The ideas in this paper are intended to spark discussion and generate additional water-focused policy recommendations to provide the foundation of the 2050 Water Resources Policy Plan. This paper was created and reviewed by our Met Council staff. Our planned next step is to gather and include the perspectives of our partners on important policy recommendations.

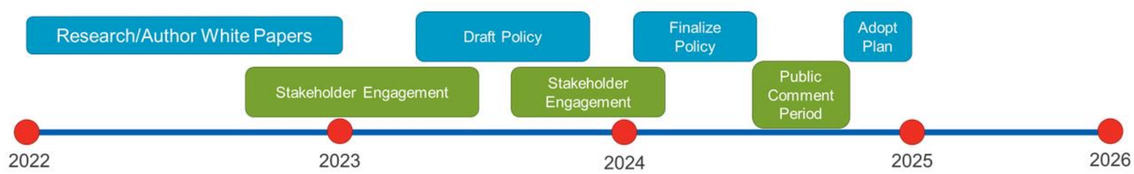

Figure 6: Water Resources Policy Plan timeline

After this additional information is gathered, we will update the draft policy recommendations through an interactive process of drafting policies, listening to stakeholder feedback, and integrating the information collected to assist our Council members in developing, evaluating, refining, and adopting these new policies. Alternating between engagement and policy creation will allow stakeholders to participate and shape plan content from the very beginning. This proposed process is an intentional attempt to bring more voices and perspectives to the table, and to help us produce polices and implementation strategies that are reflective of the region's water priorities.

If you have any questions or feedback about the content of this paper, please contact Judy Sventek at ***judy.sventek@metc.state.mn.us***.

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