WATER RESOURCES MANAGEMENT

Introduction

The Water Resources chapter provides guidance and a comprehensive policy framework for the use and integrated management of water resources and related infrastructure. These resources include surface water, ground water, water supply and the potable water distribution system, stormwater and stormwater management infrastructure, and the wastewater conveyance system. The chapter also provides a high-level summary of the policy guidance found in the City's adopted Local Surface Water Management Plan (LSWMP) and Water Supply Plan (WSP), and describes City policy related to the management of inflow and infiltration (I & I) in the City's wastewater conveyance system. (Note: The Mississippi River Corridor Critical Area Chapter contains policies and implementation ations for the State-designated Ctrical Area.)

Water is vital to everything—human life and the natural ecosystems that support us, our economy, and the things we use and consume every day. While water is abundant, it is finite; it is estimated that less than 1% of the Earth's water is freshwater available for human use. Saint Paul's drinking water system that is connected to abundant supplies of both treatable surface water and abundant, clean ground water. Protecting that supply, using water sensibly, and maintaining the infrastructure that treats and distributes clean water are all key to maintaining a safe, reliable and sustainable water supply.

The City of Saint Paul and partner agencies such as the Capital Region Watershed District (CRWD) and Ramsey-Washington Metro Watershed District (RWMWD) have made great progress in the last 10 years in improving stormwater management practices in Saint Paul. The goals and policies in this plan are aimed at maximizing and balancing the occasionally competing goals of achieving excellent surface water quality and maintaining right-sized gray stormwater infrastructure to prevent localized flooding during storm events.

The proper treatment of wastewater is vital to both public health, and continued surface water and groundwater quality. In an older, built-up city like Saint Paul, maintenance of and improvements to aging metropolitan, municipal and privately-owned wastewater conveyance and treatment infrastructure are critical to meeting the needs of current citizens and accommodating new demand as the city grows.

The following goals guide the Water Resources chapter:

1. Integrated water resource management.
2. A safe, reliable and sustainable water supply.
3. Excellent surface water quality.
4. Rehabilitated and upgraded gray stormwater infrastructure.
5. Sustainable wastewater conveyance and treatment infrastructure.

Goal 1: Integrated water resource management.

Policy WR-1. Utilize rain as a resource to achieve multiple benefits when managing stormwater, such as harvesting water for irrigation or flushing toilets.

Policy WR-2. Work with development partners to support district green stormwater approaches.

Policy WR-3. Promote visible green infrastructure landscape features, such as rain gardens, constructed wetlands and tree trenches, that contribute to placemaking and welcoming public spaces.

Policy WR-4. Advance municipal policy and financing solutions to support district green stormwater infrastructure.

Policy WR-5. Advocate for expanded water reuse capacity, including code and policy changes to make water reuse cheaper and easier.

Policy WR-6. Support a healthy urban forest and urban forestry initiatives to capture stormwater through canopy interception, evapotranspiration and increased infiltration.

Policy WR-7. Continue to explore and support the implementation of green infrastructure practices to increase resiliency to flooding, drought and climate change.

Policy WR-8. Support regional efforts to address groundwater usage and recharge.

Water is All around Us

Water is all around us—in lakes and rivers, trapped in snow and glaciers, underground, even in the air. Water moves constantly and freely between these states in a single continuous cycle.

Surface water

Surface water refers to oceans, lakes, rivers, streams and wetlands. Subsurface exchanges between groundwater and surface water are common; surface waters are also fed by atmospheric water vapor via precipitation and stormwater. In turn, large bodies of surface water evaporate into the atmosphere as water vapor.

Groundwater

Groundwater is water beneath the surface of the ground. It includes everything from the soil moisture you might find digging in a garden to deep bedrock aquifers. Generally, groundwater levels fluctuate where water is close to the surface, and can rise in times of more frequent or intense precipitation, like in springtime. Shallow groundwater is typically impacted by infiltration of stormwater, and can cause problems with infiltration into pipes and basements. In these areas, groundwater contamination can be a problem. Deep bedrock aquifers are hundreds of feet underground. An individual water molecule entering a bedrock aquifer at a recharge zone (where surface or other groundwater enters the aquifer, typically close to the surface) may remain in the aquifer for thousands of years. Four levels of bedrock aquifers—separated from each other by layers of less-permeable rock—underlay Saint Paul.

Stormwater

Stormwater is water that falls as rain. The amount of stormwater absorbed by permeable surfaces—those areas not covered by roads, buildings or other constructed surfaces – depends on a number of factors, including rate of rainfall, soil types, and amount and type of vegetation. Water that cannot be immediately absorbed by permeable surfaces or that falls on impervious surfaces becomes stormwater runoff. In urban environments, stormwater runoff has traditionally been directed away from structures and roads by curb and gutter, and conveyed to receiving surface waters by the storm sewer system. However, contemporary "green infrastructure," such as rainwater gardens or tree trench systems, is increasingly being used to capture and infiltrate stormwater into the ground. This is important to both reduce the volume of stormwater discharged to receiving surface waters, and to help capture pollutants and sediment picked up from impervious surfaces that would otherwise end up in lakes and streams.

Best Management Practices

When dealing with stormwater, a Best Managemetnt Practice (BMP) is used to describe structural or nonstructural approaches to intercepting, infiltrating and/or treating stormwater runoff, with a focus on green infrastructure. Common examples include rainwater gardens, tree trenches, bioswales and sand filtration. Different development and redevelopment sites and different types of projects present very different challenges to addressing stormwater runoff, and therefore require different approaches; the term BMPs is a catch-all to describe the diverse sets of tools and practices for managing stormwater. BMP tools and practices continue to evolve and grow through research, innovation and use.

Minimal Impact Design Standards

At the direction of the Minnesota Legislature, the Minimal Impact Design Standards (MIDS) system was created in 2013 by a diverse group of stakeholders with experience designing, building and regulating stormwater BMPs. The overall goal of MIDS is to promote - especially in dense urban areas - Low Impact Development, which focuses on keeping rain where it falls to the maximum extent practical. MIDS include performance goals for managing stormwater volumes, credit calculations for a range of structural stormwater techniques, design specifications for green infrastructure BMPs and an ordinance guidance package to help communities (and developers) implement MIDS.

Goal 2: A safe, reliable and sustainable water supply.

Policy WR-9. Apply an equity lens to policy and funding decisions relating to providing assistance to or coordinating with owners to improve private water connections to the public distribution system.

Policy WR-10. Continue education and conservation measures identified in the 2016 Water Supply Plan to increase efficiency and reduce water demand.

Policy WR-11. Work with partners to update and implement Saint Paul's Wellhead Protection and Source Water Protection plans.

Policy WR-12. Fund the strategic capital projects outlined in the 2016 Water Supply Plan and 2016-2018 Saint Paul Regional Water Services Strategic Plan.

Policy WR-13. Maintain response readiness for emergencies related to water supply contamination or interruption, and for damage to treatment and distribution infrastructure.

Goal 3: Excellent surface water quality.

Policy WR-14. Collaborate with partner agencies on water quality improvement efforts, including capital projects and programming.

Policy WR-15. Educate the public on urban water quality issues and stormwater best management practices.

Policy WR-16. Work with partners to address known surface water quality impairments outlined in the Saint Paul Local Surface Water Management Plan (LSWMP). (The LSWMP is a required plan developed in accordance with the requirements of the Metropolitan Surface Water Management Act and Minnesota Rules Section 8410. The plan includes an inventory of water resources and management concerns, outlines water resource management goals and policy, and sets water resource management implementation priorities.)

Policy WR-17. Utilize best management practices for "good housekeeping," including salt application, street sweeping and facility maintenance.

Policy WR-18. Encourage the use of Minimal Impact Design Standards (MIDS) for new development.

Policy WR-19. Apply an equity lens to policy and funding decisions relating to surface water quality and flooding/climate resiliency.

Goal 4: Rehabilitated and upgraded gray stormwater infrastructure.

Policy WR-20. Continue to maintain the serviceability of existing gray stormwater infrastructure, and incorporate or upgrade Best Management Practices to reduce pollution and respond to stormwater management regulations.

Policy WR-21. Rehabilitate existing gray stormwater infrastructure to protect the previous significant public investment.

Policy WR-22. Respond to changing precipitation patterns and ensure the adequacy of existing gray stormwater infrastructure and stormwater management regulations.

Shared, Stacked Green Infrastructure (SSGI)

The term "shared, stacked green infrastructure" (SSGI) describes an approach to handling stormwater that leverages funds spent on stormwater management to achieve multiple benefits. "Shared" means that stormwater from both public rights-of-way and private development sites is treated in the same system. "Stacked" means that the stormwater facility has two functions: treatment of stormwater and provision of passive green space. "Green infrastructure" refers to the use of plants and soil to filter stormwater and promote infiltration of water into the ground. These elements are in contrast to the more traditional approach to stormwater management, which treats parcels individually, and relies on curbs, gutters, and underground tanks and pipes to collect and rapidly convey stormwater away. A common example of green infrastructure is a rainwater garden. Generally, green infrastructure practices attempt to mimic natural "hydrology," or the ways in which water moves across and through the landscape in undisturbed natural systems. With SSGI, green infrastructure practices are scaled up to create district-wide systems that not only treat stormwater from the public right-of-way and multiple surrounding properties, but also provide open space and other amenities in urban areas.

An existing example is the tree trench providing stormwater treatment along most of University Avenue. The City of Saint Paul is currently working to incorporate SSGI into the redevelopment of multiple sites, including Snelling-Midway, Ford and the West Side Flats.

Goal 5: Sustainable wastewater conveyance and treatment infrastructure.

Policy WR-23. Continue to reinvest in critical sanitary collection and conveyance infrastructure by rehabilitating the existing system.

Policy WR-24. Continue I&I identification and correction efforts for municipal sanitary conveyance systems and connecting private infrastructure.

Policy WR-25. Encourage the Metropolitan Council to identify and correct I&I on Metropolitan Council Environmental Services (MCES)-owned facilities in Saint Paul and those in surrounding communities that impact MCES infrastructure serving Saint Paul.

Policy WR-26. Reduce reliance on individual sewage treatment systems where financially feasible.

Policy WR-27. Continue to reduce non-compliant Individual Sewage Treatment Systems (ISTS) and ensure maintenance of compliant systems.

Policy WR-28. Discourage new ISTSs where public sanitary conveyance infrastructure is available.

Policy WR-29. Prohibit new community treatment systems where public sanitary conveyance infrastructure is available.

Policy WR-30. Plan for adequate municipal conveyance infrastructure and support adequate metropolitan system capacity to serve more intensive redevelopment in appropriate locations.

Inflow and Infiltration

Conveyance and treatment of wastewater is energy-intensive, and extra water in the system means extra expense. Extra water in the sanitary sewer system can also reduce system capacity for treating wastewater, and in extreme cases will overload treatment plants and cause bypass events where untreated sewage is discharged into surface waters. Yuck!

Inflow and Infiltration (I&I) is a term used to describe the pathways by which extra water enters the sanitary sewer system.

Inflow occurs where groundwater or stormwater, which does not require treatment in a wastewater treatment plant, discharges to the sanitary sewer system. Although direct connections between groundwater/stormwater and the sanitary sewer system are not allowed in new construction, and many pre-existing connections have been eliminated, some still exist.

Infiltration occurs where stormwater runoff or groundwater enters the sanitary system through pipe joints, cracks in aging pipes, manholes, etc. These infiltration pathways can be identified through techniques such as "smoke testing." In smoke testing, smoke is pumped into sanitary sewers; where visible smoke emerges, it suggests an infiltration pathway. Once problems have been identified, maintenance crews can perform repairs, including sewer lining, to seal the infiltration pathways.