11. PUBLIC UTILITIES

Key Terminology:

Urbanized (drainage): Defined as an area where natural soils, waterways, and environmental functions are replaced with impervious surfaces (roads, parking lots, sidewalks, buildings, etc). This causes a decrease in the amount of water obsorbed into the ground (soil) and an increase in the amount of water that has to be removed by stormsewer sytems. It also causes an increase in the amount of pollutants found in surface water.

Watershed Manamagement Organization (WMO): A WMO, also referred to as a Watershed Management Commission (WMC) is defined as a watershed district wholly within the seven-county, Twin Cities Metropolitan Area or a joint powers entity established wholly or partly in the metropolitan area by special law or agreement to perform some or all of the functions of a watershed district. Minnesota Statute Chapter 103B governs the formation and operation of watershed management organizations. The WMO has the authority to require permits and regulate development in accordance with adopted local water management plan or implementation program.

OVERVIEW

The following chapter addresses existing public utilities in the Penn Avenue corridor. With regard to water and sanitary sewer systems, there are no known problems or issues in the corridor, and current capacities within these systems are adequate to accommodate future development or redevelopment.

The following is an inventory and analysis of the corridor's stormwater management system. A high-level review of the corridor was conducted to identify general drainage characteristics, issue areas, and areas for opportunities as it pertains to stormwater runoff and the implementation of best management practices (BMPs), or green infrastructure.

STORMWATER MANAGEMENT

Penn Avenue is a highly urbanized corridor served by a series of storm sewer systems, referred to as sewersheds. Drainage from the corridor is routed to Crystal Lake, Shingle Creek, Basset Creek, and the Mississippi River.

WATERSHED MANAGEMENT ORGANIZATIONS AND COMMISSIONS

The Penn Avenue corridor intersects three Watershed Management Organizations (WMO):

1. Basset Creek Watershed Management Commission
2. Shingle Creek Watershed Management Commission
3. Mississippi Watershed Management Organization

The attached Water Resources figures exhibit the sewersheds and watershed management boundaries. The Penn Avenue corridor is the approximate boundary line between the WMOs.

WATER QUALITY

The existing storm sewer infrastructure along the corridor provides little to no water quality treatment. Runoff from impervious surfaces enters directly into the storm sewer systems, which in turn discharges directly to one of several natural water bodies. These various water bodies are impaired and as such require special design and/or construction considerations.

Basset Creek is impaired for several reasons, among them being biotic impairment, which requires additional consideration during construction. Wirth Lake is also within the Basset Creek Watershed. Drainage from the corridor does not contribute directly to Wirth Lake, but it does reach Wirth Lake via Basset Creek flood overflow. Wirth Lake has an approved Total Maximum Daily Load (TMDL) for phosphorus. As part of the TMDL implementation plan, hydrodynamic separators, filtration, and infiltration should be part of any redevelopment project within the Basset Creek Watershed. Hydrodynamic separators are stormwater management devices that use cyclonic separation to control water pollution. They are designed as flow-through structures with a settling or separation unit to remove sediment and other pollutants.

Shingle Creek is impaired for several reasons, including dissolved oxygen and chloride. The dissolved oxygen impairment has a 2012 approved TMDL implementation plan. The TMDL implementation plan for chloride is still under development. Additional consideration per the 2012 dissolved oxygen TMDL implementation plan must be given to water quality during design and construction.

Crystal Lake and Ryan Lake, which are also located in the Shingle Creek watershed and receive water from the Penn Avenue study area, are impaired for nutrients and require additional consideration during construction. Both lakes have an approved TMDL plan for Nutrient/Eutrophication Biological Indicators and each should be consulted during design and construction to ensure water quality goals are met. Nutrient/Eutrophication Biological Indicators are a type of impairment that causes eutrophication of water bodies. Eutrophication is the process by which a body of water acquires a high concentration of nutrients, especially phosphates and nitrates. These typically promote excessive growth of algae. As the algae die and decompose, high levels of organic matter and the decomposing organisms deplete the water of available oxygen, causing the death of other organisms, such as fish. Eutrophication is a natural, slow-aging process for a water body, but human activity greatly speeds up the process.

It should also be noted that part of the Penn Avenue corridor within the Shingle Creek Watershed Management Commission (WMC) drains to the east, paralleling Victory Memorial Parkway, and discharges to Webber Lake prior to reaching Shingle Creek. Webber Lake is currently being repurposed as a swimming and recreational water body. Improving the water quality to Webber Lake may be recognized as an additional benefit.

The Mississippi River impairments through the reach that receives water from the Penn Avenue corridor study area do not require special design measures above and beyond standard criteria.

Key Terminology:

Runoff: Rainfall, snowmelt or irrigation water flowing over the ground surface.

Impaired: A waterbody that does not meet state water quality standards and that has been included on the MPCA Section 303(d) list of Impaired Waters of the state. The cause of the water quality standard violation is called an impairment.

Total Maximum Daily Load: A TMDL is a regulatory term in the U.S. Clean Water Act, describing a value of the maximum amount of a pollutant that a body of water can receive while still meeting water quality standards.

SEWERSHEDS

There are ten sewersheds servicing the corridor. Three of the sewersheds are contained in the Mississippi WMO, three are contained in the Basset Creek WMC, and four are contained in the Shingle Creek WMC. Very little storm sewer is routed north–south along the corridor (approximately five blocks of the corridor – 2nd to 3rd, West Broadway to 25th, 38th to 39th, and 46th to 47th). Most storm sewer crosses the corridor east/west. The corridor drainage is conveyed north–south in gutters to inlets that connect to the east–west systems, and is transported away from Penn via storm sewer.

FLOODING

The 2005 *Status Update – Flood Mitigation Program* report for the City of Minneapolis identifies one remaining flood problem area along Penn Avenue (Flood Area 5). Flooding is experienced along Penn Avenue from 35th to 36th Avenue. The water resources inventory (Figures 11-1 and 11-2) shows the flooding area as a hatched grey region. The primary cause of flooding is an undersized storm sewer from 35th and Vincent over to the outlet at Crystal Lake in Robbinsdale. An engineering report completed by the City of Minneapolis recommends extensive improvements to the trunk storm sewer system, along with construction of a detention pond within the Victory Memorial Parkway Boulevard. While the overall solution is not within the Penn Avenue corridor, any volume and rate control that can be provide within the sewershed in conjunction with the Penn Avenue improvements will contribute to the flood mitigation. This area is designated on the attached Water Resources figures with a yellow oval.

OPPORTUNITIES (FOR WATER QUALITY, RATE CONTROL, AND VOLUME CONTROL)

Many of the opportunities to implement best management practices (BMPs) within the roadway corridor will be dependent on the corridor layout (the typical sections) and the other corridor facilities and amenities included, such as streetscapes, biking infrastructure, etc. The implementation of BMPs will also be dependent on the type, availability, and level of maintenance required. To help facilitate the development of corridor concepts, a “tool bag” of potential BMPs to incorporate along the corridor has been assembled in Table 11-1.

In addition to BMPs within the roadway corridor proper, a review of the adjacent properties identified a variety of development/redevelopment areas that may also provide opportunity to implement BMPs. Some of the BMP locations identified are on public lands, while others are on private land and could serve both public and private needs. A few of the potential BMPs that could be considered for development/ redevelopment are provided in Table 11-2.

Of special note is the potential for water reuse in some of the park areas. Reuse is an emerging green infrastructure BMP that provides water quality benefits, volume control, rate control, and reduces potable water use.

Key Terminology:

Volume Control: The retention and abstraction of a certain volume of stormwater runoff onsite through techniques such as infiltration, and capture and reuse.

Rate Control: Rate Control refers to methods used to help manage timing or reduce the rate of stormwater discharge.

Best Management Practice (BMP): Techniques, including green infrastruture, proven to be effective in controlling runoff, erosion, and sedimentation

Green Infrastructure: The stategic use of of landscape features and/or natural processes to manage and/or treat stormwater in a manner that provides environmental

TABLE 11-1: POTENTIAL BMPS WITHIN THE PENN AVENUE CORRIDOR

Stormwater Feature	Description	Volume Control	Rate Control	Water Quality
Shallow Rain Garden	Treats runoff from trail, sidewalks, and front yards	X		X
Deep Rain Garden	Treats runoff from trail, sidewalks, and front yards upstream of known flood areas	X	X	X
Tree Trench	Treats runoff from trail, sidewalks, and front yards	X		X
Large Pipe Storage	Flow rate reduction upstream of known flood areas		X	
Hydrodynamic Separator	Reduces sediments and floatables from trunk systems crossing the greenway when upstream watershed cannot be adequately treated (approx. 30 acres or less)			X
SAFL Baffle	Reduces sediment and floatables prior to entering the trunk system.			X

TABLE 11-2: POTENTIAL BMPS ON PROPERTIES ADJACENT TO THE PENN AVENUE CORRIDOR

Stormwater Feature	Description	Volume Control	Rate Control	Water Quality
Deep Rain Garden	Treats runoff from trail, sidewalks, front yards, and rooftops	X	X	X
Bioretention		X		X
Large Pipe Storage	Flow rate reduction upstream of known flood areas		X	
Dry Pond	Flow rate reduction upstream of known flood areas. Potential for infiltration and volume control.	X	X	
Wet Pond	In-line flow rate reduction upstream of known flood areas. Wet ponds effectively remove sediment from storm water.		X	X
Water Reuse	Treats runoff from trail, sidewalks, streets, rooftops, and front yards	X		X

Key Terminology:

Rain Garden (Bioretention Cells): A rain garden or bioretention cell is a depressed area with porous backfill (material used to refill an excavation) under a vegetated surface. These areas are designed to encourage filtration and infiltration, and often have underdrains in clayey soils. Bioretention cells provide groundwater recharge, pollutant removal, and runoff detention. Bioretention cells are an effective solution in parking lots or urban areas where green space is limited.

Porous: A rock or other material having small spaces or holes through which liquid or air may pass.

Tree Trench: A tree trench is a stormwater management technique that relies on trees planted in amended soils and rock to capture runoff from surrounding impervious surfaces and store it underground in order to reduce runoff volume through plant uptake and infiltration.

SAFL Baffle: A SAFL Baffle is a post-construction stormwater pretreatment system that fits into a sump structure (new or existing) and keeps sediment out of downstream water bodies and BMPs. It works by capturing sediment through settling and reducing resuspention.

FIGURE 11-1: WATER RESOURCES INVENTORY – NORTHERN PORTION OF THE PENN AVENUE CORRIDOR

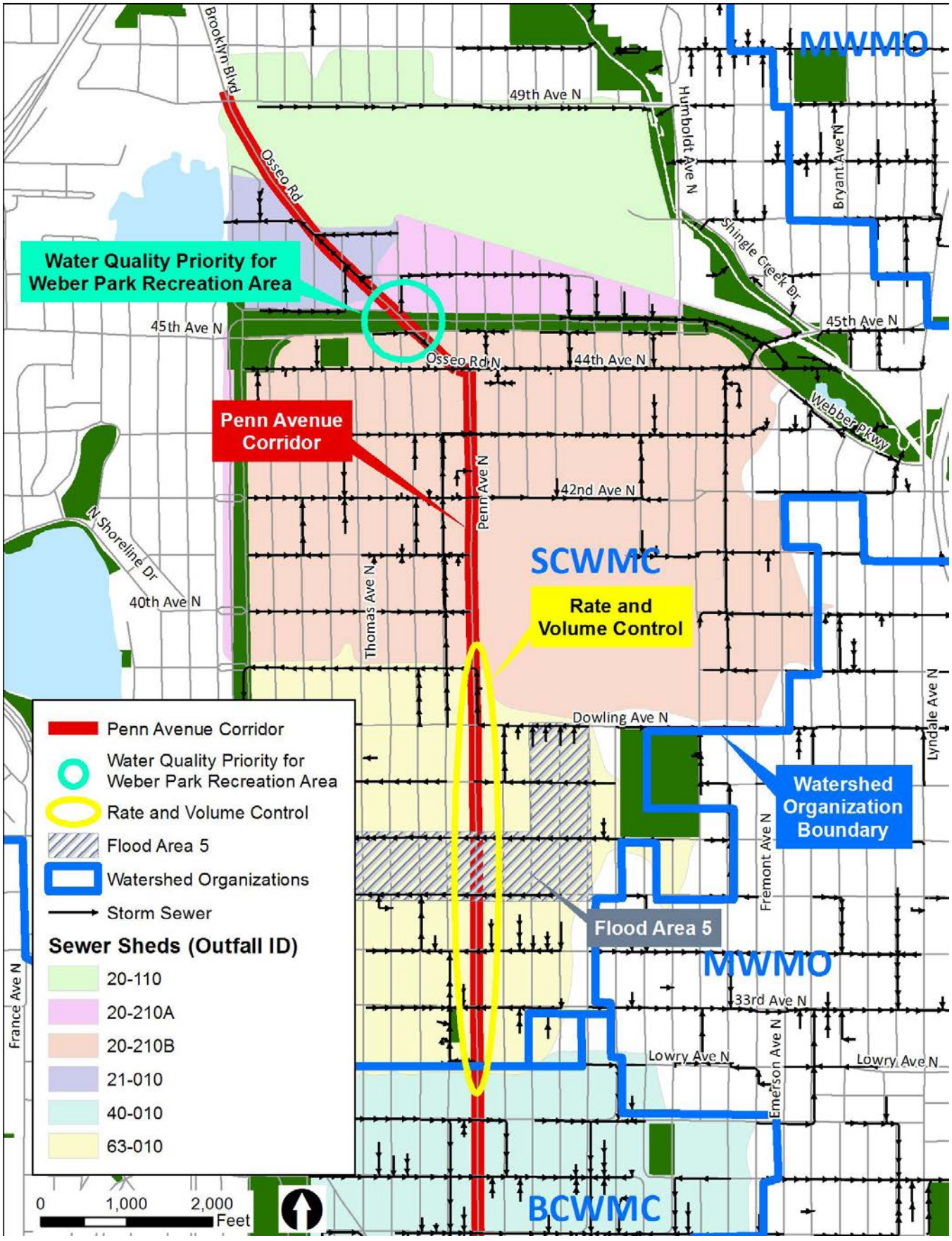

FIGURE 11-2: WATER RESOURCES INVENTORY – SOUTHERN PORTION OF THE PENN AVENUE CORRIDOR