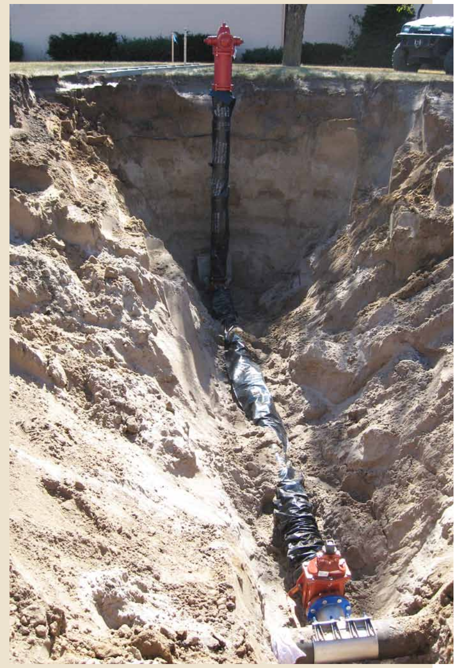
Section 3

Development Framework

3.3 Framework Components (continued)



Section 3.3.4: Utility Framework

The utility infrastructure in South Loop consists of sanitary sewer, potable water, and storm sewer systems, as well as energy and telecommunication systems. South Loop is served by public and private utility systems. The majority of the public utility infrastructure is sufficient to accommodate current demands.

Utility upgrades are typically done in conjunction with new development or redevelopment, with new road construction, or as part of the City's ongoing utility maintenance schedule. Utilities needed to serve new development will be located to coincide with the proposed fine-grain street network. The ***Implementation Plan, Table 5.3**, page 5.6*, identifies potential funding for these improvements.

Public Utilities

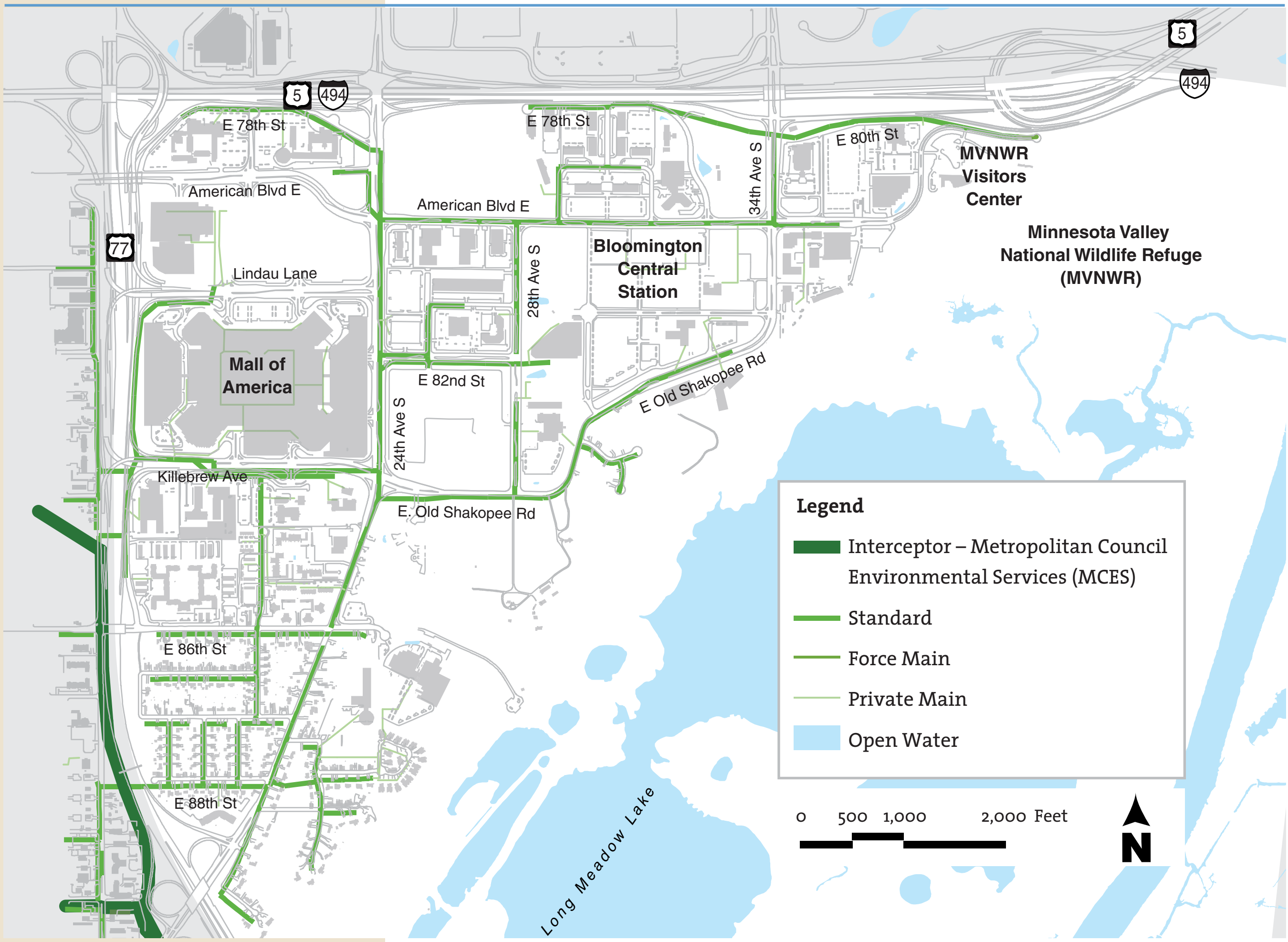
Sanitary Sewer

The sanitary sewer system in South Loop, ***Figure 3.37**, page 3.76*, has been upgraded to address deficiencies identified in the *1998 Sanitary Sewer Policy Plan* and the *2002 Alternative Urban Area Review* (AUAR). To serve increased flows from projected future development in South Loop, additional improvements will be needed to ensure adequate capacity.

Hydraulic modeling and capacity analysis conducted for year 2030 and 2050 forecast development indicate that 35 to 67 pipe segments will exceed capacity, respectively. Pipe segments with critical flows for 2030 and 2050 are located in the same general area. *See **Figure 3.38**, page 3.77*. Therefore, needed system upgrades are to be done in conjunction with road improvement and maintenance projects to serve forecast 2050 development volumes and minimize reconstruction and restoration costs.

Determination of needed system upgrades will be based on the City's Utility Asset Management policies, which examine condition, performance, reliability, and criticality issues. Pipes are considered critical where modeled flow depths exceed 75 percent of the pipe diameter. Utilities staff will conduct close analysis to determine what, or if, system upgrades are necessary.

Figure 3.37 Existing Sanitary Sewer System



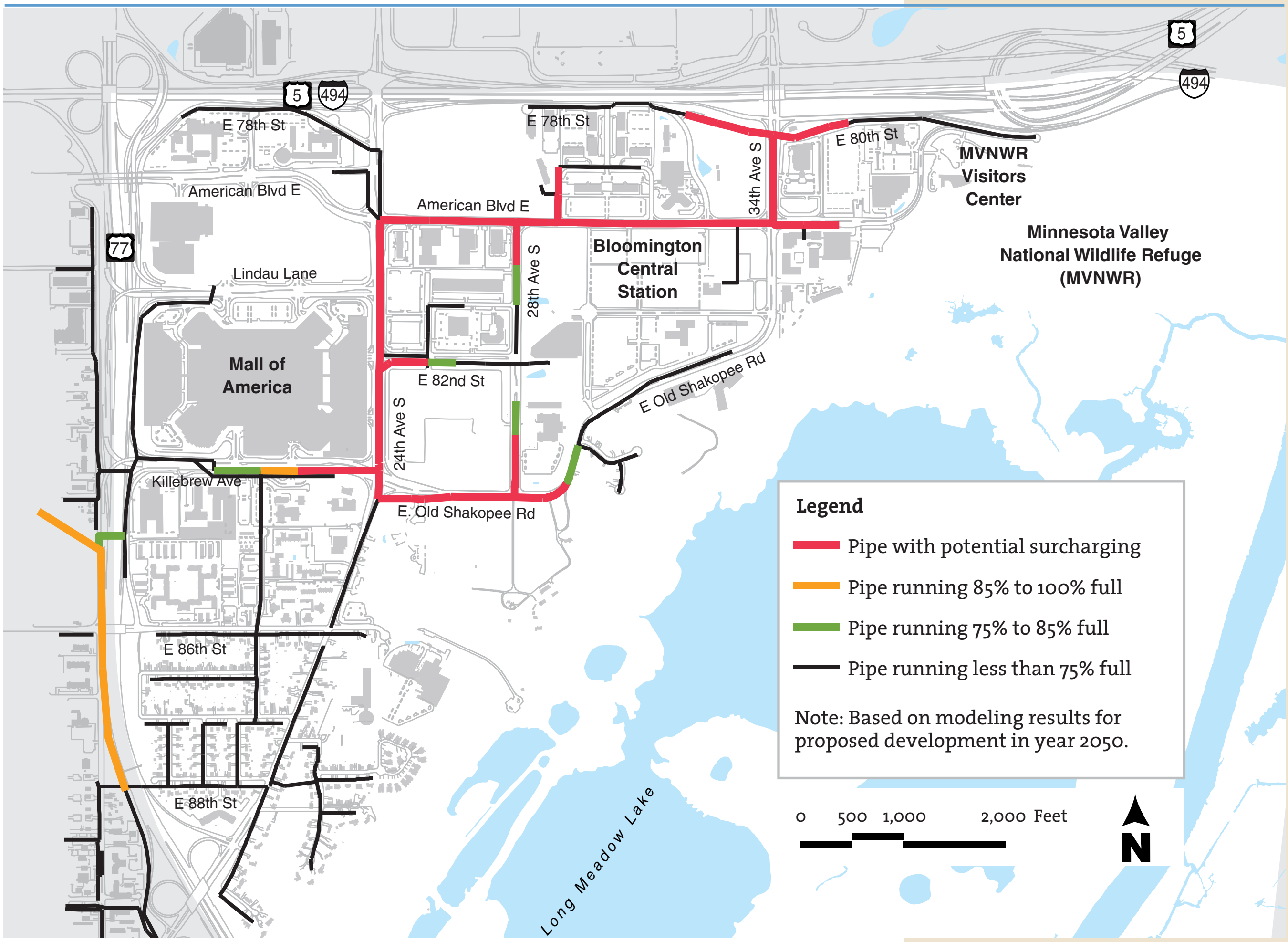
Source: Bloomington Utilities Division, 2012.

Because most of the pipes identified by the model as critical are trunk sewer lines that convey sewer flows from all over the South Loop District, determining the need for additional system capacity and covering the costs to provide it should be based on a District approach. The City is in the process of developing a fair-share cost allocation process to fund necessary system upgrades. It is anticipated that cost allocation will be based on the City's current development/flow generation forecasts. In some cases, cost collection will be delayed until the system upgrades are implemented or district development approaches forecast levels.

Potable Water

Bloomington's public water supply is drawn from six deep wells extending to the Jordan and Mount Simon bedrock aquifers. To prevent pollution of these aquifers, the City established wellhead protection areas in accordance with state law. The City's well field is located at the water treatment plant at West 90th Street and Normandale Boulevard. None of the South Loop District

Figure 3.38 Potential Sanitary Sewer Constraints

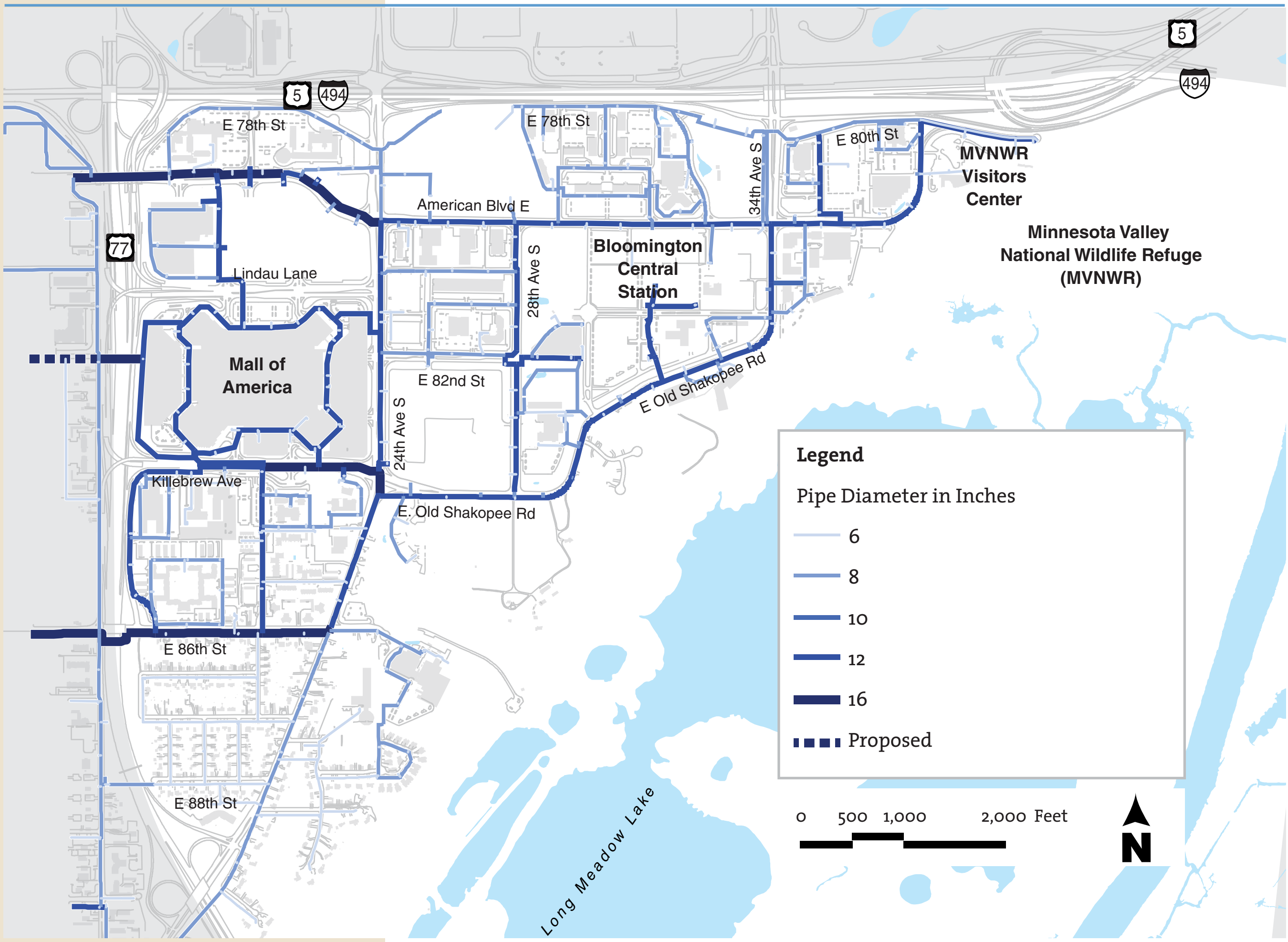


Source: Bloomington Utilities Division, 2012.

is located within the wellhead protection area.

The City's water distribution system, ***Figure 3.39**, page 3.78,* has adequate capacity to accommodate existing and projected future development in South Loop. If needed, Bloomington can also draw up to 30 million gallons per day (MGD) from the city of Minneapolis. It is recommended that the existing 12-inch water main on 82nd Street between 12th Avenue and TH 77 (just west of the District) be upsized to 16 inches. This upgrade will enhance flow to the Mall of America Phase II site and South Loop as a whole. Analysis of the water transmissions system capacity was conducted for the Bloomington *2010 Water System Master Plan*.

Figure 3.39 Watermain



Source: Bloomington Utilities Division, 2012.

The goal of stormwater management is to remove 80 percent of total suspended solids (TSS) and phosphorus from runoff prior to water going off-site.

Stormwater Management

Managing stormwater runoff in developed areas is required to mitigate potential impacts on groundwater, downstream surface water bodies and wetlands. It is also essential to protect natural resources along the bluff and in the Minnesota Valley National Wildlife Refuge (MVNWR). The primary receiving bodies of water are Long Meadow Lake and the Minnesota River and its associate wetlands.

To protect these waters from degradation, stormwater management focuses on three key objectives:

1. Reduce the **quantity of water** that runs off development sites.
2. Control the peak **flow rates** of runoff.
3. Improve **water quality** prior to off-site discharge.

Reducing Quantity and Flow Rate

The *Bloomington Comprehensive Surface Water Management Plan* (CSWMP) requires that surface water discharge rates be controlled from new development and redevelopment that disturbs one acre or more of land. While pipes and ponds can collect and retain the runoff, current objectives are to minimize the amount of stormwater that runs off a development site and slow down its rate of discharge. Low-impact development (LID) techniques increase on-site stormwater infiltration and retention to reduce the volume and slow down the rate of discharge from development sites, and ultimately, reduce the amount of stormwater discharge into the Minnesota River.

Improving Water Quality

Stormwater run-off from developed areas often comes from "dirty" surfaces such as rooftops, streets and parking lots. Filtering out pollutants prior to discharge into the Minnesota River is the goal. Water quality treatment at all development sites must meet the City's *Comprehensive Surface Water Management Plan* requirement to maintain or improve the water quality. Development sites must also be in conformance with Lower Minnesota River Watershed District or Richfield-Bloomington Watershed Management Organization requirements. A green infrastructure approach can be effective in attaining water quality standards.

Sustainable Stormwater Management

Managing stormwater in a sustainable manner is a key objective in making South Loop a model of sustainable development. The overall goal is to manage stormwater runoff from developed areas in a manner that comes as close to pre-development conditions as feasible. As development occurs, the amount of pervious surface area, where precipitation can naturally infiltrate, decreases. Under pre-development conditions, approximately 10 percent of precipitation runs off the land. Currently in South Loop, about 403 acres (56 percent) of the developed urban area above the bluff are impervious, resulting in approximately 85 percent of precipitation becoming runoff.

South Loop stormwater drains to the Long Meadow Lake wetland network and the Minnesota River. The goal is to minimize the amount of runoff and remove pollutants from the water prior to it reaching Long Meadow Lake and the Minnesota River. To do that, a sustainable approach to stormwater management based on green infrastructure must be implemented to preserve, restore, and enhance natural resources with site, infrastructure, and architectural design.

Conventional "pipe and pond" infrastructure approaches move stormwater from one area to another, often without providing the highest level of stormwater treatment. A sustainable stormwater management approach utilizes green infrastructure and LID techniques that focus on a "slow-spread-soak" approach based on the characteristics of the watershed (e.g., soils, topography, vegetation cover).

Bioswales within a parking lot help collect and filter runoff.

Planted "green roofs" increase the amount of pervious surface on a development site.

A rain garden/infiltration trench demonstrates sustainable stormwater management.

Low Impact Development (LID) and Best Management Practices (BMPs)

LID and BMPs form the core of the sustainable stormwater management approach in South Loop. These sometimes overlapping approaches will be used along with more conventional infrastructure components (e.g., pipes and ponds) to achieve the quantity, rate, and water quality objectives stated above.

LID is an ecologically based approach that favors landscape techniques to manage stormwater over mechanical or structural approaches, such as pipes, catch basins, curbs and gutters. The LID "slow-spread-soak" approach involves a variety of techniques ranging from mechanical (pipes) to biological (constructed wetlands). This approach and associated techniques are described below.

Slowing involves controlling the flow of runoff, detention to reduce peak flow rates, and retention to allow sedimentation of suspended solids.

- Oversized pipes.
- Flow control devices.
- Dry swales.
- Underground detention.
- Detention ponds (where allowed in South Loop).
- Wet vaults.
- Rainwater harvesting.
- Retention ponds.

Spreading involves filtering runoff to remove sediments and infiltration to recharge the groundwater.

- Filter strips.
- Underground sand filters.
- Surface sand filters.
- Vegetated walls.
- Vegetated roofs (aka "green roofs").
- Pervious pavement.
- Infiltration trenches.
- Tree box filters.
- Rain gardens.
- Riparian buffers.

Soaking involves treatment to improve water quality by removing or metabolizing contaminants in the runoff.

- Bioswales.
- Infiltration basins.
- Constructed wetlands.

These techniques will be incorporated into the proposed network of public parks, green medians, rain gardens, and open spaces in South Loop. LID stormwater management techniques will also need to be included as site design features of private development. Many of these can become attractive landscape features while providing stormwater management functions.

BMPs are techniques found to be most effective and practical in achieving desired outcomes, such as reducing erosion. Examples of stormwater BMPs that may be implemented in South Loop include:

- **On-site retention** that is used in some watershed districts, but not those in South Loop, currently require on-site retention of the first inch of runoff over impervious surfaces. Implementation of this requirement should be evaluated based on its potential effect on development costs, the site characteristics, and whether detention BMPs would be allowed.

- **Street sweeping** is one of several maintenance related Best Management Practices (BMPs) that can greatly reduce the pollutants entering the stormwater management system. It has the added benefit of keeping the streets clean and attractive. It is recommended that the City study the feasibility and cost-effectiveness of implementing an aggressive monthly or bi-monthly street sweeping program in South Loop. The cost of this additional maintenance could be covered in a revised storm utility fee structure or as a part of a business improvement district.

- **Stream bank and bluff protection** is critical to maintain and restore the bluff edge and steep-sided ravines that form the south and east border of South Loop. These ecologically sensitive areas are vulnerable to erosion from uncontrolled overland flows or point source stormwater discharge. Existing Bluff Protection and Floodplain regulations should be evaluated to ensure preservation of these areas. The Lower Minnesota River Watershed District has completed a gully inventory. Appropriate restoration projects should be supported to minimize erosion and sedimentation impacts.

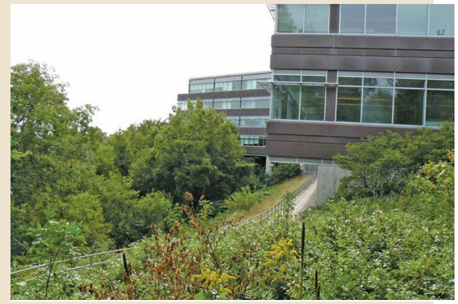
- **Disconnecting impervious surfaces from stormwater inlets** will allow more runoff to infiltrate or soak into pervious areas, reduce runoff volume, recharge groundwater resources, reduce peak runoff rates, and reduce stormwater pollutant loading. Existing untreated surfaces that discharge to the bluff and/or Long Meadow Lake should be eliminated or treated prior to discharge. The Ceridian/Long Meadow Circle outfall is partially treated, however, and the existing corrugated metal pipe is scheduled to be replaced.

City Stormwater Infrastructure

The existing stormwater infrastructure system consists of pipes, storage (retention and detention) ponds, and structural BMPs used to treat the runoff water prior to discharge. The network of pipes collects runoff from developed sites, roads, and other impervious surfaces and conveys it to a series of ponds. The ponds hold the water, allowing removal of phosphorus and total suspended solids (TSS) to occur, as well as control the rate of discharge to downstream water bodies. *See **Figure 3.40**, page 3.82.*

Minneapolis-St. Paul International Airport Zoning regulations and the City's Airport Runway Overlay Districts restrict open water ponds above the Minnesota River bluff 800-foot elevation. The purpose of these regulations is to eliminate wildlife attractants and reduce the potential for bird strikes in the area of airport operations.

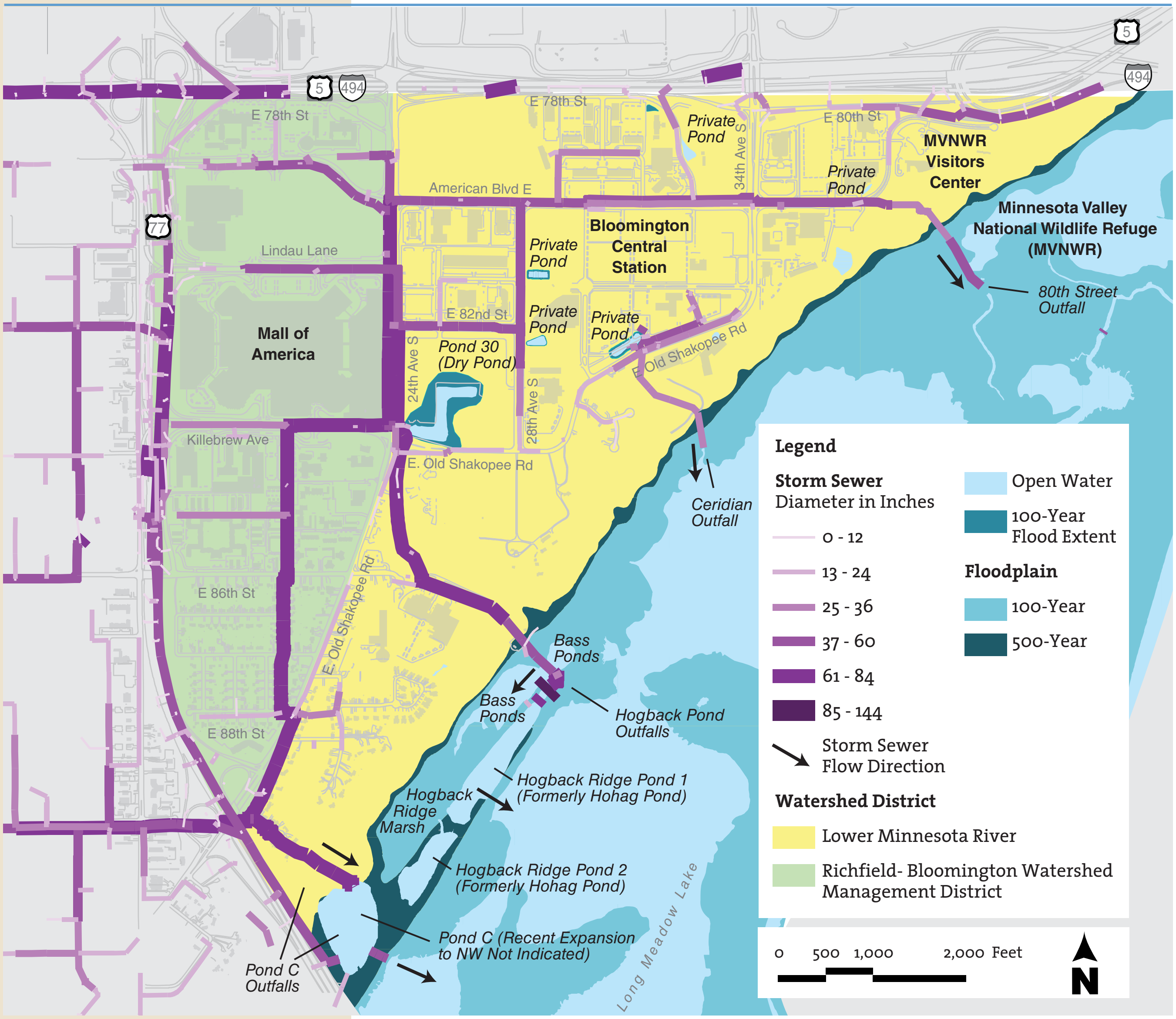
New development will need to connect to the existing stormwater system based on what on-site stormwater management approach is taken. Future system upgrades will mostly involve ponds and other BMPs, as described below.



Development abutting the bluff must not encroach on the steep-wooded slopes.

Pond C is the main regional treatment pond serving South Loop.

Figure 3.40 Stormwater Features



Source: Bloomington Utilities Division, 2012.

Regional Ponding

Given the restriction on ponds and open water, regional ponds located below the bluff, play an important role in retention and treatment of stormwater in South Loop. The main regional treatment pond currently serving South Loop is Pond C, located just east of the TH 77 Bridge. Construction of additional regional ponds to serve South Loop will need to be assessed in relationship to the needs of new development. However, regional ponds cannot serve all of South Loop cost effectively. Some areas, particularly the northeast portion of South Loop, will need to manage all, or most of their stormwater through on-site treatment.

Pond 30

This private pond was constructed as a temporary rate control pond for the parking lot on the parcels located just east of 24th Avenue, between 82nd Street and East Old Shakopee Road. It provides a great deal of infiltration and is normally dry. Replacement of this private pond will require careful attention to current flow conditions during site redevelopment because open water is not allowed in this area.

Water Quality Wetlands

Upgrading existing wetlands to provide stormwater management functions and natural resource improvements would accomplish multiple objectives.

Forest Glen Stream

Also known as Ike's Creek, this stream flows through a major ravine in Forest Glen Park before entering the MVNWR. While the stream does not serve as a stormwater outfall, it is a unique natural area and its high-quality water sustains watercress and trout. An inventory of the area should be undertaken and a management plan prepared that considers possible impacts from development of adjoining properties on the natural resources of the ravine. In addition, a sustainable trail is proposed through the ravine that will connect a new trailhead and park at the top of the ravine to the MVNWR.

Private Utilities

Private utility companies provide certain utilities, particularly energy and communications. The primary private utilities serving South Loop include: Xcel Energy (electric power) and CenterPoint Energy (natural gas). There are numerous phone, cable and Internet service providers operating in South Loop. The largest and most common are: Comcast and CenturyLink (formerly Qwest).

Energy Systems

With rising concerns about climate change and energy costs, interest in alternative, clean, renewable energy generation has grown in recent years. The amount of new development projected for South Loop make it a potential candidate for implementation of the alternative energy systems described below, particularly those designed for large-scale application.

District Energy

District energy systems produce heating or cooling for the built environment in a centralized location that is then distributed to multiple users or buildings. District energy systems provide higher efficiencies and better pollution control than dispersed heating and cooling systems. Cogeneration, a form of district energy, employs the utilization of waste energy from the electricity generation process to fuel district energy systems, and can further increase the efficiency of district energy.

A feasibility study was conducted in 2010-11 to determine the cost-effectiveness of developing a district energy system to serve South Loop. The study makes recommendations regarding fuel sources, location of facilities (plant, distribution pipes, etc.,) and system configuration (e.g., energy islands). It also outlines steps

This stream – known for its high quality water – runs through Forest Glen Park and extends into the MVNWR.

An electric vehicle uses an on-street charging station.

Photo voltaic panels provide active solar energy generation.

for a private company to implement the system. If deemed feasible, the City or Port Authority may be a partner in financing such a system or issue a Request for Proposal to select a district energy provider. Three options were studied:

1. Utilizing the Xcel Black Dog Power Plant to supply steam;

2. Constructing a cogeneration facility on Metropolitan Airports Commission (MAC) property, serving South Loop with the excess energy; and

3. Constructing a natural gas fueled energy facility at or near Bloomington Central Station.

Any of these options will require coordination and partnering with multiple parties such as CenterPoint Energy, Xcel Energy, MAC, and local businesses, among others. If a district energy system is to be built, the decision to invest in district energy should be made before significant development occurs. This allows maximum flexibility in locating the district energy infrastructure. In South Loop, distribution pipes would be located to follow the proposed street grid. Implementation would occur with new street construction. District energy facilities may be located within or adjacent to parking ramps.

Smart Grid

A Smart Grid is a type of electrical grid that attempts to predict and respond to the behavior and actions of all electric power users connected to it to more efficiently deliver reliable, economic, and sustainable electrical power. Smart grid technologies emerged from earlier use of electronic controls, metering, and monitoring that track how electricity is used at different times. In a Smart Grid, buildings are equipped with "smart meters" that allow energy use to be monitored in real time. Energy suppliers may charge variable electric rates to reflect peak and off-peak generation costs. Electricity consumers can then choose to consume electricity when rates are lower. Satellite energy suppliers (e.g., residential solar array or wind generator) may sell energy back to the grid. Smart Grids could also allow electric vehicles, charged at night when power is cheaper, to supply the grid during the daytime peaks.

Solar Energy

This involves converting solar radiation into electricity or heat. Solar technology is generally characterized as passive or active. Active solar techniques use photovoltaic panels, solar-thermal panels, pumps, and fans to convert solar radiation into useable energy. These approaches increase the energy supply. Passive solar techniques include a range of applications such as the use of materials that deflect or retain heat, use of natural ventilation and air circulation, and positioning buildings or landscaping relative to the position of the sun. While passive techniques do not increase energy supply, they reduce the need and demand for other energy resources.

Photovoltaic panels are the most common active solar technique used in development. Technological improvements have created panels that are smaller, more efficient, and more versatile, allowing a wide range of uses from roof-mounted panels, to integration with building siding materials, to use in appurtenances such as streetlights and parking meters. Common passive techniques include: southern orientation of buildings, use of high albedo (light reflecting) materials and light colors, use of overhangs to selectively shade buildings, specific placement of landscaping to maximize summer shade, and winter sun access.

Wind Energy

In an urban setting, small wind turbines are used on individual buildings or sites to produce electricity from wind. As a source of renewable, alternative energy, wind energy can be used to reduce reliance on electricity from the grid or other, more conventional energy sources. Technological advances have made small wind turbines quieter, more reliable, and better able to blend into developed areas. However, wind turbines must be fairly tall to have unobstructed access to wind, which can limit their application in urban settings, particularly residential areas.

Photo credit: Great River Energy

Wind turbines are sources of renewable, alternative energy.