



Title: Acceptance of Downtown Long Lake Stormwater Study

Resolution number: 26-069

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Recommended action: Accept the findings of the Downtown Long Lake Stormwater Study

Past Board action: Res # 25-045 Authorize Contract for Downtown Long Lake Study

Purpose:

At the August 27, 2026, meeting of the MCWD Board of Managers, staff will present an overview of the Long Lake Creek Roadmap, the recommended strategy for improving Long Lake, and the findings of the DRAFT Downtown Long Lake Stormwater Study. The Board will be asked to accept the findings of the Downtown Long Lake Stormwater Study.

Long Lake Background:

Long Lake is included on Minnesota's impaired waters list because it does not meet state water quality standards for nutrients. Under Section 303(d) of the federal Clean Water Act, Minnesota was required to develop a Total Maximum Daily Load, or TMDL, establishing the phosphorus reductions needed to restore the Lake. The Long Lake TMDL assigns wasteload allocations to regulated municipal stormwater systems (MS4s), including the contributing cities. These allocations represent municipal regulatory obligations to reduce phosphorus loading to impaired waters.

Long Lake Creek Roadmap:

Following requests for support from cities subject to the TMDL to develop a clear, actionable plan to implement projects that reduce phosphorus loading, in 2023, the Minnehaha Creek Watershed District delivered the [Long Lake Creek Roadmap](#). With funding from the state of Minnesota and completed in close coordination with member communities—Long Lake, Medina, and Orono—and the nonprofit Long Lake Waters Association, the Roadmap involved:

1. Conducting a data-driven assessment to identify the relative drivers of water quality issues in the Subwatershed
2. Identifying cost-effective capital improvement projects that could achieve meaningful improvements
3. Mapping a prioritized implementation strategy to make measurable progress on the Cities' water quality goals

The Roadmap outlined a tiered, comprehensive implementation strategy that prioritizes addressing significant sources of external pollutant loading, to achieve lasting water quality improvements and restore the Subwatershed's five impaired lakes, including Long Lake.

1. Regional Treatment
 - a. Prioritize regional treatment projects to treat large drainage areas before pollution reaches Long Lake
2. Landscape Projects
 - a. Implement landscape projects as development, infrastructure, landowner interests, and capacity allow
3. Upstream Lakes
 - a. Restore impaired upstream shallow lakes to reduce pollution being delivered downstream to Long Lake
4. Internal Load Management
 - a. Address phosphorus loading inside Long Lake, once progress is made to reduce external nutrient sources

Roadmap Status and Progress:

County Road 6 Pond Retrofit

MCWD completed the County Road 6 Pond Retrofit in 2026, which was identified in the Roadmap as a priority regional treatment project opportunity. The \$725,000 project treats runoff from more than 3,000 acres before it reaches Long Lake and is projected to remove an additional 40 pounds of phosphorus annually.

Upstream Lakes and Landscape Projects

MCWD is advancing restoration opportunities involving upstream shallow lakes, and is initiating scoping of ravine stabilization projects associated with Wolsfeld Lake. These areas can store and release phosphorus that is transported downstream to Long Lake. Advancing this work will require continued coordination with the City of Medina, affected landowners, and other project partners. MCWD is also monitoring wetlands in the Tamarack Drive area downstream of Spring Hill Golf Club. This work will help refine the understanding of phosphorus sources and movement through the upstream system and determine whether future wetland, drainage, or landscape improvements are warranted.

Downtown Long Lake

The Roadmap identified downtown Long Lake as a priority because of its concentrated impervious surface, direct drainage to the Lake, and opportunity to provide regional stormwater treatment. With approximately \$150,000 in funding from the Minnesota Board of Water and Soil Resources, MCWD and the City of Long Lake have competed an evaluation of downtown stormwater opportunities.

Together, this work reflects the Roadmap's recommended sequence: complete high-value regional treatment projects, develop downtown stormwater improvements, investigate upstream sources and restoration opportunities, and use the resulting progress and monitoring data to guide future consideration of in-lake management.

Downtown Long Lake Stormwater Study (Attached)

The Downtown Long Lake Stormwater Study is a direct implementation step flowing from the 2023 Long Lake Creek Roadmap. The Downtown Management Unit encompasses approximately 518 acres and contributes an estimated 194 pounds of phosphorus annually to Long Lake. Under MCWD's refined nutrient budget and implementation strategy, the target reduction from this area is 88 pounds annually through landscape projects.

The study screened 22 potential project concepts and advanced 11 for water quality modeling, concept design, and cost estimating. Projects were evaluated based on expected water quality benefit, cost, constructability, site control, permitting, and operations and maintenance. The evaluation also considered potential community, ecological, and public realm benefits.

That process resulted in five recommended projects, including two that could be advanced now and three that could be integrated into future capital improvement planning as other municipal infrastructure investment or redevelopment occurs. These are summarized in the attached Feasibility Study (Attachment 1). Together the two immediate implementation projects (Highway Pond Retrofit and Nelson Lakeside Park Restoration) are estimated to reduce phosphorus loading by approximately 33 – 65 lbs annually, representing 38 – 74% of the City's reduction target.

August 5, 2026, Presentation to Long Lake City Council:

This information was presented to the Long Lake City Council on August 5, 2026, with support from City staff. City Council expressed its appreciation for the work, the partnership with MCWD, and directed staff to undertake next steps in coordination with District staff to assemble an implementation plan for future Council consideration.

August 27, 2026, MCWD Board Meeting

At the August 27, 2026, MCWD Board Meeting, staff will present the findings of the Downtown Long Lake Stormwater Study to the Board of Managers, and recommends the Board accept the study and direct staff to take necessary next steps in coordination with City staff to assemble an implementation plan for Board and Council consideration.

Attachments:

1. Attachment 1 – Downtown Long Lake Stormwater Study



RESOLUTION

Resolution: 26-069
Title: Acceptance of Downtown Long Lake Stormwater Study

- WHEREAS, Long Lake is included on Minnesota's impaired waters list because it does not meet state water quality standards for nutrients, and the 2014 Upper Minnehaha Creek Watershed Total Maximum Daily Load established the phosphorus reductions needed to restore the Lake and assigned wasteload allocations to regulated municipal stormwater systems;
- WHEREAS, the Cities of Long Lake, Medina, and Orono and the Long Lake Waters Association requested a clear and actionable implementation plan, and the Minnehaha Creek Watershed District (MCWD), working with those partners, completed the state-funded Long Lake Creek Roadmap in 2023;
- WHEREAS, the Roadmap established a sequenced implementation strategy that prioritizes high-value regional treatment, advances additional landscape projects as development, infrastructure, landowner interest, and capacity create opportunities, investigates and restores upstream lakes and other phosphorus sources, and uses the resulting external load reductions and monitoring data to guide future consideration of internal load management within Long Lake;
- WHEREAS, the Roadmap identified downtown Long Lake as a priority because the 518-acre Downtown Management Unit contributes an estimated 194 pounds of phosphorus annually to Long Lake, has one of the highest nutrient concentrations of any management unit, and MCWD's refined nutrient budget establishes a target of reducing phosphorus from this area by 88 pounds annually;
- WHEREAS, MCWD secured \$174,940 in funding from the Minnesota Board of Water and Soil Resources to develop a strategic implementation plan for improved stormwater management for the City of Long Lake;
- WHEREAS, on June 12, 2025, the Board authorized release of a request for proposals for the expanded feasibility study, and on August 28, 2025, by Resolution 25-045, the Board selected HDR Engineering, Inc. and authorized a professional services contract to complete the study;
- WHEREAS, the Downtown Long Lake Stormwater Study screened 22 concepts and advanced 11 for water quality modeling, concept design, and cost estimating, evaluating anticipated water quality benefit, cost, constructability, site control, permitting, operations and maintenance, and potential ecological, community, and public realm benefits;
- WHEREAS, the study recommends five projects, including the Downtown Village Highway Pond Retrofit and Nelson Lakeside Park Restoration for Immediate Implementation planning, and Holbrook Park Floodplain Storage, Daniels Street Diversion, and the Downtown Village Greenway as Opportunity-Based projects to be coordinated with future park, infrastructure, planning, redevelopment, and landowner opportunities;
- WHEREAS, the two Immediate Implementation projects are estimated to reduce phosphorus loading by approximately 33 to 65 pounds annually, representing about 38 to 74 percent of the downtown reduction target, while advancement of any project requires additional site investigation, agency coordination, preliminary engineering, partner alignment, and development of funding, ownership, and long-term maintenance frameworks;

WHEREAS, MCWD presented the Long Lake Creek Roadmap, implementation progress, and draft study findings to the Long Lake City Council on August 5, 2026, and the Council endorsed the recommended implementation framework and directed City staff to continue coordinating with MCWD on project priorities, preliminary roles, site investigations, agency requirements, funding strategies, ownership, long-term maintenance, and timing;

WHEREAS, acceptance of the study findings will establish a shared technical and planning basis for continued coordination, but will not authorize design, funding, construction, or implementation of any recommended project or obligate MCWD or the City of Long Lake to advance or fund a project;

WHEREAS, the Minnehaha Creek Watershed District Board of Managers hereby accepts the findings of the Downtown Long Lake Stormwater Study and recognizes the study as a planning basis for continued implementation of the Long Lake Creek Roadmap;

NOW, THEREFORE, BE IT RESOLVED that the Minnehaha Creek Watershed District Board of Managers hereby accepts the findings of the Downtown Long Lake Stormwater Study and recognizes the study as a planning basis for continued implementation of the Long Lake Creek Roadmap;

NOW, THEREFORE, BE IT FURTHER RESOLVED that the Minnehaha Creek Watershed District Board of Managers hereby recognizes the Downtown Village Highway Pond Retrofit and Nelson Lakeside Park Restoration as the two concepts recommended for Immediate Implementation planning, and Holbrook Park Floodplain Storage, Daniels Street Diversion, and the Downtown Village Greenway as Opportunity-Based concepts to be preserved and reconsidered as related City or private investment opportunities arise;

NOW, THEREFORE, BE IT FURTHER RESOLVED that the Minnehaha Creek Watershed District Board of Managers hereby directs staff to continue coordination with City of Long Lake staff to develop an implementation plan for future consideration by the Board of Managers and Long Lake City Council, that would advance the projects prioritized for immediate implementation.

Resolution Number 26-069 was moved by Manager _____, seconded by Manager _____.
Motion to adopt the resolution ___ ayes, ___ nays, ___ abstentions. Date: 8/27/2026

Secretary Date: _____

Downtown Long Lake Stormwater Study

July 2026



MINNEHAHA CREEK
WATERSHED DISTRICT



EXECUTIVE SUMMARY

BACKGROUND

The Minnehaha Creek Watershed District (District), in partnership with the City of Long Lake (City), completed this Downtown Long Lake Stormwater Feasibility Study to identify and prioritize practical, cost-effective landscape projects that improve water quality in Long Lake.

This study is a direct implementation step flowing from the 2023 Long Lake Creek Roadmap, a state-funded planning effort led by MCWD with the Cities of Long Lake, Medina, and Orono, and the Long Lake Waters Association to restore impaired waters across the Subwatershed.

The Long Lake Creek Roadmap established a watershed-first implementation strategy that prioritizes regional stormwater management and local landscape projects before in-lake treatment. Accordingly, this study advances external-load management. It does not evaluate or preclude future in-lake management, which will be more effective and lasting after external loads are reduced.

Within that strategy, the Downtown Long Lake Management Unit (DMU) was identified as a priority area because it contributes disproportionately high phosphorus loads to Long Lake, relative to its size and level of urbanization.

The DMU encompasses 518 acres and contributes approximately 194 pounds of phosphorus annually to Long Lake. Under MCWD’s refined nutrient budget and implementation strategy, which updated the original Total Maximum Daily Load (TMDL) framework using in-lake sediment chemistry data, the target reduction from this area is 88 pounds per year through landscape projects.

SUMMARY OF FEASIBILITY ASSESSMENT

This study screened 22 project concepts across the DMU and advanced 11 for water quality modeling, concept design, and cost estimating.

Five projects are recommended for implementation planning and future capital programming.

Potential projects were evaluated based on expected water quality benefit, cost, constructibility, site control, permitting, and operations and maintenance.

That process resulted in five recommended projects, including two that could be advanced now and three that could be integrated into City capital improvement planning with other infrastructure and redevelopment opportunities.

RECOMMENDED IMPLEMENTATION

Immediate Implementation is recommended for two regional water quality projects. The Downtown Village Highway Pond Retrofit and Nelson Lakeside Park Restoration can advance because land control, engineering feasibility, and expected water quality benefits are sufficiently understood. Together, they are estimated to reduce total phosphorus loading to Long Lake by 33 to 65 pounds annually, representing approximately 38 to 74% of downtown’s reduction target.

Before either project enters design, the City and MCWD must confirm interest and preliminary roles, complete site-specific investigations and agency coordination, and develop funding, ownership, and long-term maintenance frameworks. This study is not intended to create a City, MCWD, or outside funding commitment.

Three additional concepts should be preserved through City planning. Holbrook Park Floodplain Storage should be evaluated with future park improvements. Daniels Street Diversion should be reconsidered with future roadway and utility reconstruction. The Downtown Village Greenway

should advance through comprehensive planning, redevelopment, regulation, and landowner coordination.

More broadly, the City should continue to integrate water into public and private redevelopment. In coordination with MCWD, the City should use its planning and regulatory tools to identify opportunities to route local runoff or surrounding regional drainage into redeveloping parcels, strengthening the downtown treatment train over time.

If all five projects are advanced, they are estimated to reduce TP loading by 50 to 88 pounds annually, representing approximately 57 to 100% of downtown’s reduction target and substantial progress within the Long Lake Creek Roadmap implementation strategy.

For retrofit projects, phosphorus reduction is presented as a range to reflect both conservative incremental benefit and broader restored treatment potential. The lower end reflects the modeled increase above current conditions, whereas the upper end reflects the added value that may be realized where a project restores or reconfigures an existing facility that is currently underperforming due to age, sediment accumulation, or hydraulic limitations.

Together, the two projects recommended for Immediate Implementation are estimated to reduce up to 74% of the phosphorus reduction target for downtown Long Lake.

Project Name	TP Reduction (lbs)	Estimated Cost	Time (Years)
Downtown Village Hwy Pond Retrofit*	16.9 - 31.9	\$700k - \$900k	2 to 5
Nelson Lakeside Park Restoration*	16.1 - 33.3	\$1.4M - \$1.8M	2 to 5
Holbrook Park Floodplain Storage**	4.5 - 6.7	\$700k - \$800k	5 to 10
Daniels Street Diversion**	8.8 - 13.2	\$600k - \$2.0M	10+
Downtown Village Greenway**	3.6	\$1.45M	10+
Total	38.7 - 85.1	\$4.9M - \$7M	10+
*Immediate Implementation Project **Opportunity-Based Project			

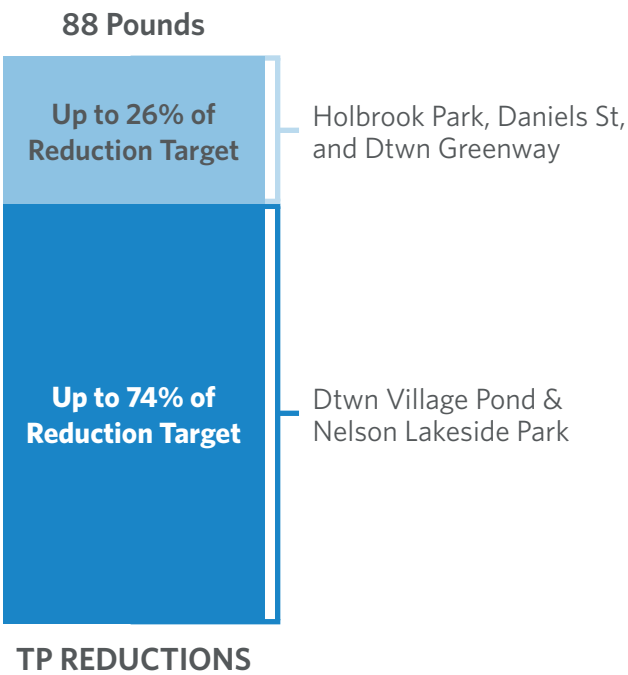


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RECOMMENDED PROJECT IMPLEMENTATION MAP

DOWNTOWN VILLAGE AREA

Area Description

The Downtown Village Area is a highly visible civic and commercial corridor in the center of Long Lake. It includes public facilities like City Hall, major transportation infrastructure, and the stream and pond system that conveys stormwater runoff from south of Highway 12 toward Nelson Lakeside Park and Long Lake. The corridor also sits adjacent to the Western Hennepin County Pioneer Association Museum, a Long Lake historical landmark, creating a long-term opportunity to pair water resource improvements with downtown identity, heritage, and public use.

Project Concept

The recommended project in this area is the Downtown Village Highway Pond Retrofit. The existing pond sits in a central location within the downtown drainage system, receives runoff from multiple directions, and is currently underperforming. The retrofit concept restores storage capacity, improves sediment capture, increases residence time, and enhances vegetation and public visibility. It is the most cost-effective project identified in the feasibility study on a per-pound basis.

The corridor also contains a stream channel adjacent to the Western Hennepin County Pioneer Association Museum. As described in the Downtown Village Greenway cut sheet, this creates a long-term opportunity to restore the stream as a multifunctional greenway connecting City Hall to Nelson Lakeside Park and Long Lake, while integrating downtown identity, historic interpretation, pedestrian access, and public gathering space.

Implementation

This project is recommended first for Immediate Implementation, due to public site ownership, engineering feasibility, and expected water quality benefit. Recommended next steps include coordination with MnDOT, infiltration testing, and development of a funding strategy, prior to moving the project into design. Longer-term corridor and placemaking opportunities should be protected through integration as concepts into the City's Comprehensive Plan, and redevelopment planning and partner coordination as future land use changes occur.

NELSON LAKESIDE PARK

Area Description

Nelson Lakeside Park is a heavily used community park along the shoreline of Long Lake, and the most downstream point of the DMU. It includes a boat access, disc-golf course, community gathering space for events like the annual Buckhorn Days, and the final set of stormwater treatment facilities before runoff from the city landscape enters the Lake. The park is therefore a major public amenity and one of the most important water quality locations in the downtown system.

Project Concept

The recommended project in this area is the Nelson Lakeside Park Restoration. The existing ponds and stormwater facilities are aging, underperforming, and expected to require substantial maintenance in the coming years.

The recommended concept builds on existing infrastructure by reconfiguring flow paths, expanding treatment function, increasing residence time, and improving hydraulic performance before stormwater runoff reaches Long Lake.

The layout of the existing disc golf course will be adjusted around the new ponds, integrating these features as creative obstacles that improve the playing experience.

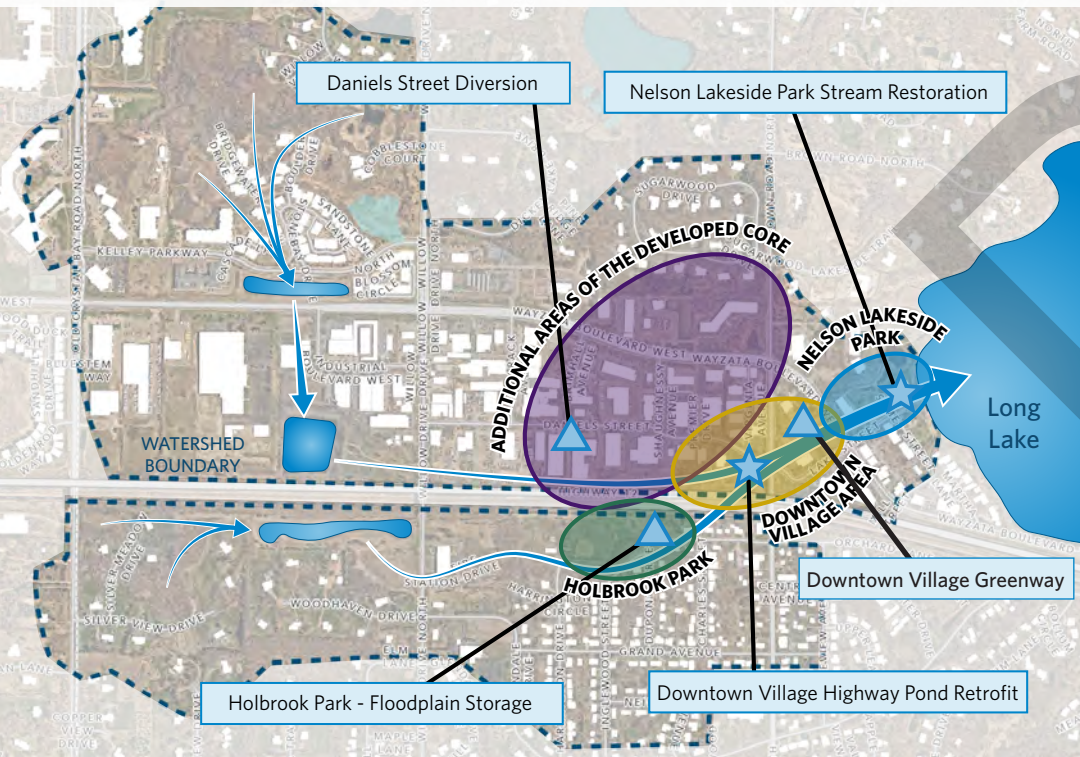
Because the park receives 100% of the downtown area's runoff, reinvestment at this location provides a major opportunity to improve treatment, while preserving and enhancing the park's core recreational uses.

Implementation

This project is recommended for Immediate Implementation, following the Downtown Village Area project. It makes sense to advance now because the City owns the site, the park's water quality role is well understood, and planned maintenance needs by MCWD create an opportunity to reinvest in a more effective long-term treatment system. Recommended next steps include site-specific infiltration testing, engagement with park users, and development of a funding strategy.

LEGEND

★ = IMMEDIATE IMPLEMENTATION PROJECT ▲ = OPPORTUNITY-BASED PROJECT



ADDITIONAL AREAS OF THE DEVELOPED CORE

Area Description

The broader developed core includes older commercial and industrial areas with limited stormwater treatment and potentially aging public infrastructure.

Project Concept

The recommended project in this area is the Daniels Street Diversion, which reroutes 21 acres of runoff to Kenobi Pond, increasing treatment before runoff reaches Long Lake. It is the strongest opportunity in this area because it targets an untreated source and uses existing treatment capacity. At the same time, it depends on future infrastructure work and adjacent landowner coordination.

Implementation

This project should only be advanced with roadway reconstruction or other major public investment. Recommended next steps include integrating the concept into future capital planning, confirming coordination needs, and refining benefits. Beyond this project, the City should use comprehensive planning, redevelopment review, and stormwater regulation to identify opportunities to integrate water into future public and private investment. Coordination with MCWD should include opportunities to route local runoff or surrounding regional drainage into redeveloping parcels, strengthening the regional treatment train.

HOLBROOK PARK

Area Description

Holbrook Park serves as the community's primary recreation hub, hosting a variety of gatherings annually. The park is bordered by a small ravine that collects runoff from the neighborhoods to the south and east. The ravine is one of the more natural landscape features remaining in the DMU and provides an opportunity to pair water quality improvements with ecological restoration and park reinvestment.

Project Concept

The recommended project in this area is the Holbrook Park Floodplain Storage, which focuses on restoring ravine function, increasing stormwater treatment, improving settling conditions, and stabilizing degraded areas while maintaining a vegetated buffer near adjacent homes.

Implementation

It was selected over the alternate stream channel concept because it provides slightly greater modeled treatment at a lower estimated cost. Concepts from the stream channel restoration and related habitat improvements could be incorporated into future park planning if the City elects to advance them. Recommended next steps include aligning the concept with park planning, performing infiltration testing, and integrating the project in future capital improvement discussions.

DOWNTOWN VILLAGE HIGHWAY POND RETROFIT

Site 2A

PROJECT AT A GLANCE

Implementation Status: Immediate, recommended first

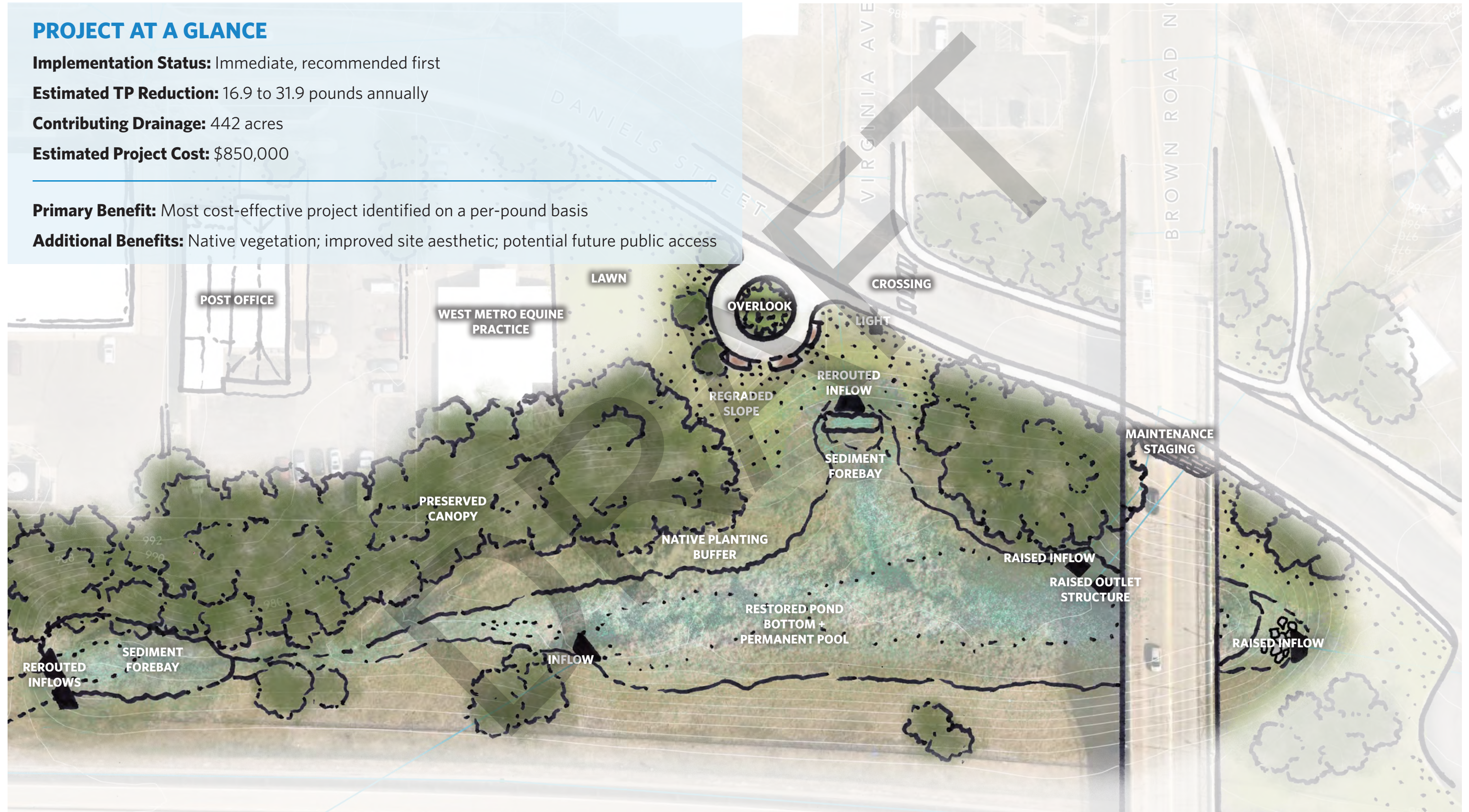
Estimated TP Reduction: 16.9 to 31.9 pounds annually

Contributing Drainage: 442 acres

Estimated Project Cost: \$850,000

Primary Benefit: Most cost-effective project identified on a per-pound basis

Additional Benefits: Native vegetation; improved site aesthetic; potential future public access



PROJECT DESCRIPTION

The Downtown Village Highway Pond Retrofit project would restore an underperforming stormwater pond located within MnDOT right-of-way near Highway 12's Brown Road overpass. The pond receives runoff from 442 acres, including flows from Daniels Street, Kenobi Pond, Holbrook Park, nearby parking areas, and the neighborhoods to the south. Despite this large contributing area, the pond provides limited detention after many storm events. Rapid through-flow reduces sediment settling and leaves much of the pond's available treatment capacity unused.

The recommended concept would dredge accumulated sediment, establish a deeper permanent pool, construct sediment forebays, and modify the outlet to increase residence time and improve sediment capture. **The project is estimated to reduce total phosphorus loading by 16.9 to 31.9 pounds annually.** The lower end of this treatment range reflects the modeled improvement over current conditions, while the upper end reflects the treatment potential that may result from restoring an aging, sediment-filled facility.

The pond is situated within MnDOT right-of-way on property presumed to be owned by MnDOT, although MnDOT has stated that it does not own or maintain the facility itself and would support a retrofit led by the City or MCWD. The charrette therefore prioritized the core stormwater retrofit and native revegetation, while also identifying a small,

optional placemaking opportunity on the adjacent West Metro Equine property, which is owned by the University of Minnesota. The lawn area immediately northwest of the pond could potentially support an overlook, seating, or small gathering space, subject to University coordination.

Over the longer term, reconstruction of Daniels Street and implementation of the Daniels Street Diversion could create additional opportunities to improve stormwater management, as well as pedestrian connections, boulevard landscaping, street trees, and lighting in this area. These broader improvements should be preserved through future redevelopment and corridor planning rather than treated as a primary driver of this pond retrofit.

This is the most cost-effective project identified in the study on a per-pound basis and is recommended for immediate implementation.

COST & FUNDING

BMP Construction	\$670,000
Optional Amenities	\$70,000
Professional Services	\$110,000
Total Project Cost	\$850,000

**Estimated maintenance is \$8,000 annually.*

The project may be considered for BWSR Clean Water Fund, MPCA Clean Water Partnership, or other applicable funding programs. Outside grant funding is not assumed in the project recommendation. Implementation will require the development of a coordinated funding plan and cooperative agreement between the City and MCWD. The optional amenity allowance should remain separate from the core water quality project cost.

IMPLEMENTATION NEXT STEPS

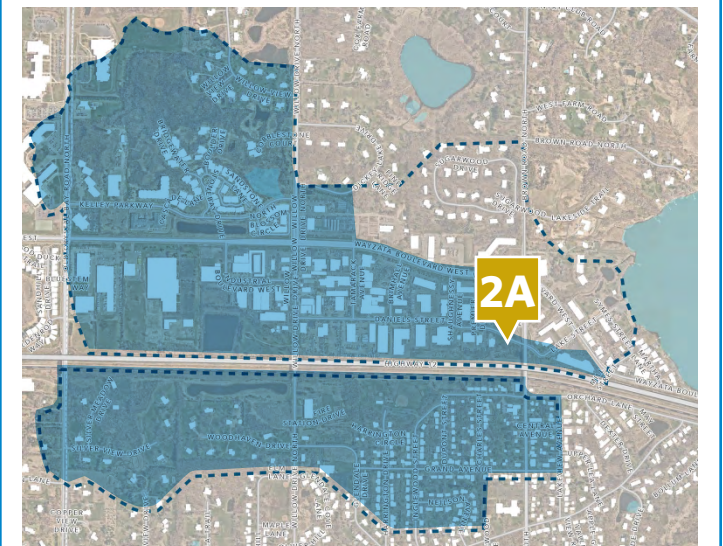
The project will require typical City and MCWD permits and construction stormwater approvals. Additional wetland or federal approvals will depend on final design and field investigation. MnDOT right-of-way coordination is the primary approval and site-control constraint affecting project advancement.

- Confirm City and MCWD interest in advancing the project and define preliminary implementation roles
- Coordinate with MnDOT to confirm right-of-way access and long-term maintenance authority
- Conduct infiltration testing and complete environmental investigations, including of the remediated spill area
- Evaluate alignment and integration with upstream road improvement projects
- Develop a preliminary funding plan and City-MCWD cooperative agreement before initiating design

OPERATIONS & MAINTENANCE

The sediment forebays should be inspected regularly and cleaned approximately every 1-2 years. Full pond dredging is estimated at 10 – 15-year intervals. Native vegetation will require inspection and maintenance during establishment. The final design should provide durable access for sediment removal and maintenance equipment, which may be achieved through the City's public works facility property.

PROJECT SITE AND DRAINAGE AREA



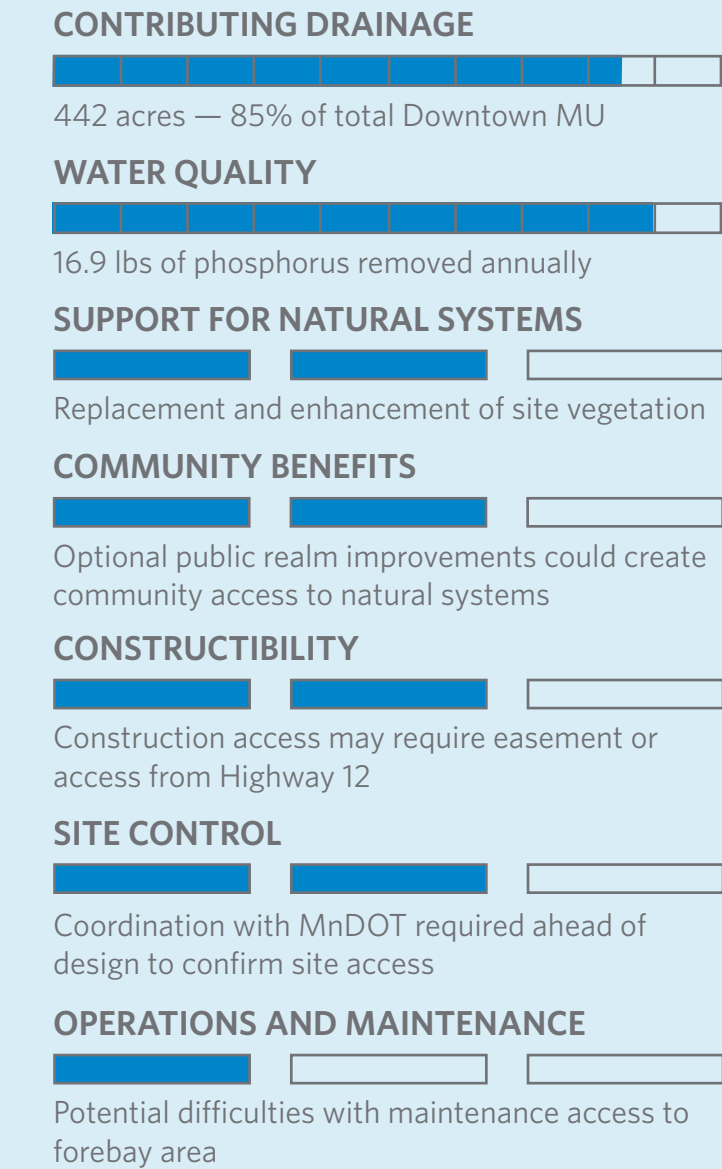
PROJECT DETAILS

- Major proposed improvements include:
- Dredging accumulated sediment to restore pond depth and treatment capacity
 - Raising and modifying the outlet to establish a deeper, 5-foot permanent pool
 - Creating sediment forebays at major inlets to concentrate settling and simplify maintenance
 - Replacing invasive or low-quality vegetation with native species to enhance habitat and aesthetics
 - Stabilizing and re-grading pond edges to improve safety, access, and erosion control
 - Providing maintenance access and staging near the Brown Road underpass

These improvements would increase residence time, create targeted sedimentation areas, and restore the pond as an effective regional treatment facility. Potential infiltration and vegetation benefits are not included in the estimated phosphorus reduction but would be evaluated ahead of design.

The principal cost drivers are dredging, outlet reconstruction, sediment forebays, slope stabilization, and constrained access near Highway 12. Significant pond expansion is limited by existing steep slopes, the MnDOT sound barrier, Daniels Street, and the Brown Road overpass piers.

PROJECT DASHBOARD



NELSON LAKESIDE PARK RESTORATION

Site 3A

PROJECT AT A GLANCE

Implementation Status: Immediate, recommended second

Estimated TP Reduction: 16.1 to 33.3 pounds annually

Contributing Drainage: 518 acres

Estimated Project Cost: \$1,810,000

Primary Benefit: Regional stormwater treatment at final location before reaching Long Lake

Additional Benefits: Park reinvestment; habitat restoration; enhanced lake access



An alternate retention pond retrofit concept was also evaluated at Nelson Lakeside Park. The recommended Park Restoration concept provides slightly greater modeled phosphorus reduction at a lower estimated cost, while more comprehensively addressing the four existing stormwater facilities, future maintenance needs, and integration with park use. Applicable elements of the alternate concept could be incorporated during preliminary design. See Appendix F.

HOLBROOK PARK FLOODPLAIN STORAGE

Site 1B

PROJECT AT A GLANCE

Implementation Status: Opportunity-Based, subject to City evaluation with future park improvements

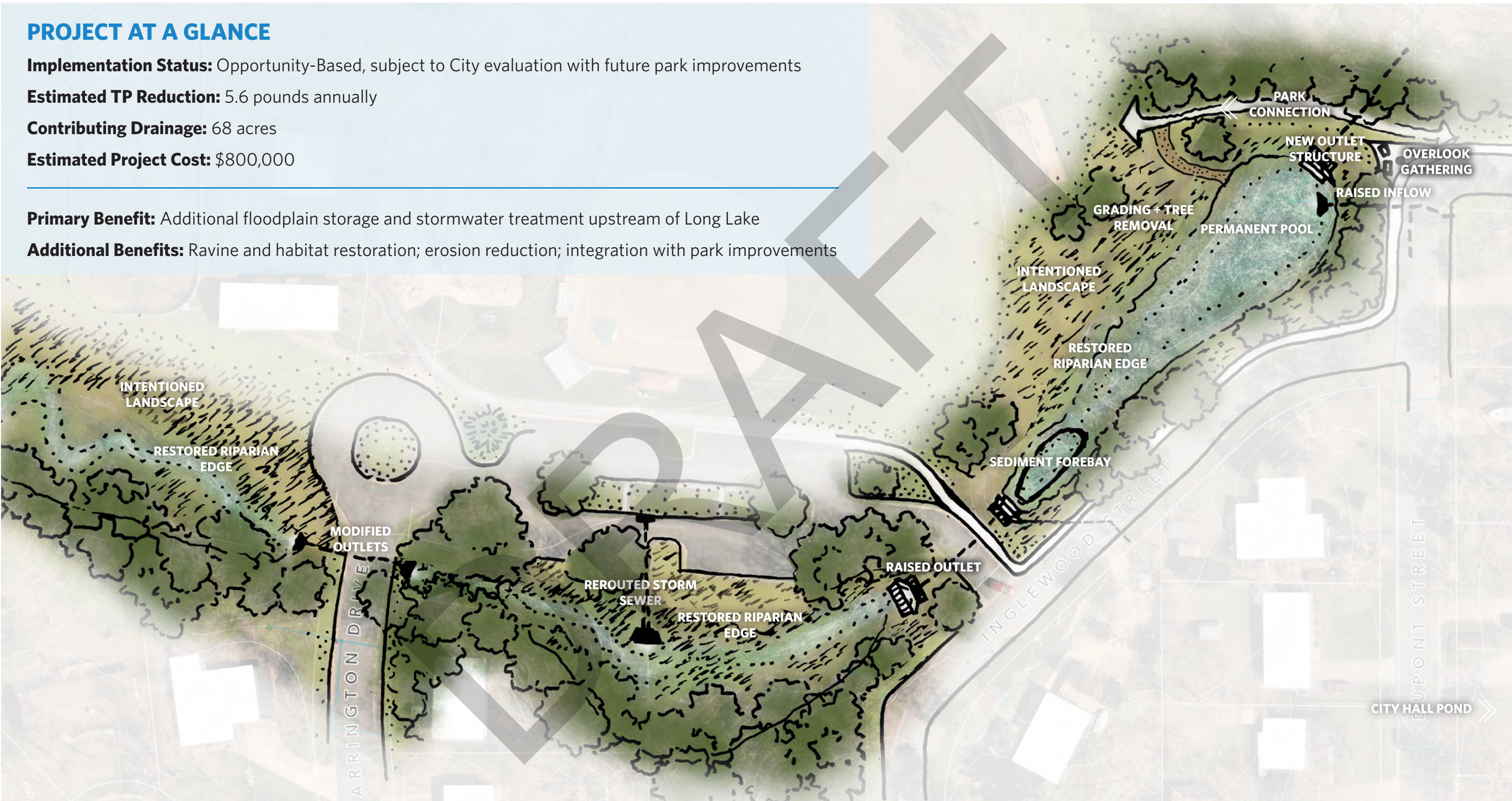
Estimated TP Reduction: 5.6 pounds annually

Contributing Drainage: 68 acres

Estimated Project Cost: \$800,000

Primary Benefit: Additional floodplain storage and stormwater treatment upstream of Long Lake

Additional Benefits: Ravine and habitat restoration; erosion reduction; integration with park improvements



Two Holbrook Park concepts were evaluated: floodplain storage and stream channel restoration. Both provide similar phosphorus reduction and could be integrated with park improvements. The floodplain storage concept was carried forward because it provides slightly greater modeled treatment at a lower estimated cost. Stream channel restoration and related habitat improvements may be incorporated into future park planning if the City elects to advance them. See Appendix F.

PROJECT DESCRIPTION

Holbrook Park is bordered by a wooded ravine between Harrington Drive and Orchard Lane. The ravine receives base flow and stormwater from surrounding neighborhoods and conveys it to the Downtown Village Highway Pond and ultimately Long Lake. The channel lies approximately 10 feet below adjacent streets and park elevations and contains steep slopes, invasive vegetation, degraded habitat, accumulated sediment, and limited maintenance access.

The recommended concept would create floodplain storage and a permanent pool in the lower ravine, add a sediment forebay, improve drainage through the upper ravine, and restore native riparian vegetation. The project is estimated to reduce total phosphorus loading by 5.6 pounds annually. Potential benefit from reduced erosion and restored vegetation are not included in the modeled estimate.

The charrette evaluated two concepts: floodplain storage and stream channel restoration. Both provide similar water quality benefits, with a 0.6-pound difference in estimated annual phosphorus reduction, and either could be integrated with improvements to the adjacent recreation areas and pedestrian connections. The floodplain storage concept was carried forward because it provides slightly greater modeled treatment at a lower estimated cost. The stream channel

concept would require more extensive and costly channel work but could provide additional stream stabilization and habitat restoration benefits. Elements of both concepts could be combined if the City advances broader park improvements. Either concept would require selective vegetation removal for construction and long-term access.

Given the project’s modest modeled phosphorus reduction relative to its estimated cost, the City may evaluate whether the combined water quality, ecological, and park benefits warrant further development. Additional field investigation and preliminary design, including infiltration testing, may identify opportunities to improve performance and better define costs and benefits.

This project is recommended as an opportunity-based project that could advance with future City-led Holbrook Park improvements.

COST & FUNDING

BMP Construction	\$690,000
Professional Services	\$110,000
Total Project Cost	\$880,000

**Estimated maintenance is \$8,000 annually.*

If the City elects to advance the concept, a funding strategy would need to be evaluated based on a refined project scope and cost-benefit analysis. The project may be considered for BWSR Clean Water Fund or applicable watershed implementation funding. Park, access, or other recreational improvements are not included in the project estimate and should be separately scoped and funded. No City, MCWD, or outside funding commitment is assumed.

IMPLEMENTATION NEXT STEPS

The project will require typical City and MCWD permits and construction stormwater approvals. Wetland, floodplain, dredging, public waters, or federal approvals will depend on field investigations and final design. Coordination with the City’s Holbrook Park planning and capital schedule is the primary implementation dependency. Construction access, temporary park impacts, and any optional public improvements will also require City and community coordination.

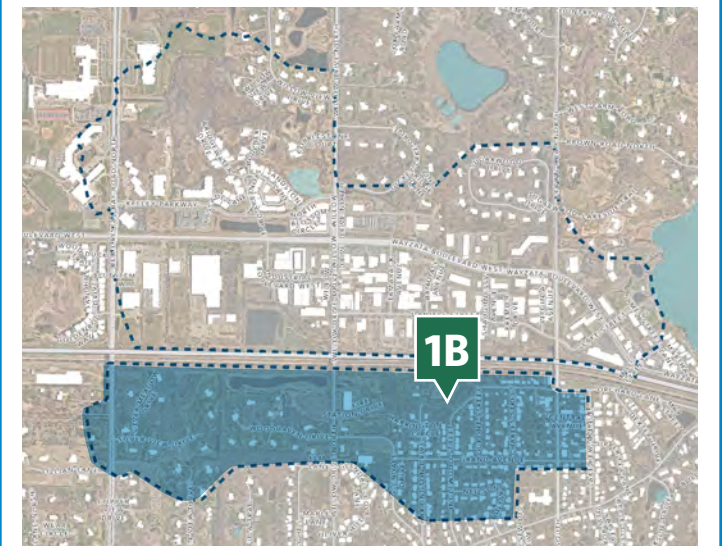
- Evaluate the concept through City park and capital planning, including whether its combined park, ecological, and water benefits warrant further efforts.
- Complete targeted field investigations and preliminary design, to refine performance, costs, permitting needs, and implementation roles.

Next steps should only be taken if the City elects to further explore the project.

OPERATIONS & MAINTENANCE

Maintain restored vegetation and control invasive or woody encroachment, especially during establishment. Inspect culverts, inlets, banks, and the outlet annually; winterize stoplogs; and remove sediment or repair erosion as needed. Preserve vehicle access from Harrington Drive and the existing park maintenance road.

PROJECT SITE AND DRAINAGE AREA



PROJECT DETAILS

Approximately 68 acres drain through the wooded ravine system bordering Holbrook Park.

Major proposed improvements include:

- Creating a permanent pool in the lower ravine to increase storage and improve settling
- Constructing a sediment forebay to capture coarse material and simplify maintenance
- Replacing the existing outlet structure with an adjustable stoplog structure
- Raising inflow pipes and completing limited grading and channel widening in the upper ravines
- Removing invasive vegetation and stabilization of degraded slopes and riparian areas

PROJECT DASHBOARD

CONTRIBUTING DRAINAGE

68 acres — 13% of total Downtown MU

WATER QUALITY

5.6 lbs of phosphorus removed annually

SUPPORT FOR NATURAL SYSTEMS

Potential for creation of new high-quality habitat

COMMUNITY BENEFITS

Improves aesthetics of natural features in a public space

CONSTRUCTIBILITY

Construction access will require tree removal

SITE CONTROL

Stormwater facilities are within existing parkland owned by City

OPERATIONS AND MAINTENANCE

Limited required maintenance within existing City capabilities

DANIELS STREET DIVERSION

Site 4B

PROJECT AT A GLANCE

Implementation Status: Opportunity-Based, subject to City evaluation with future road improvements

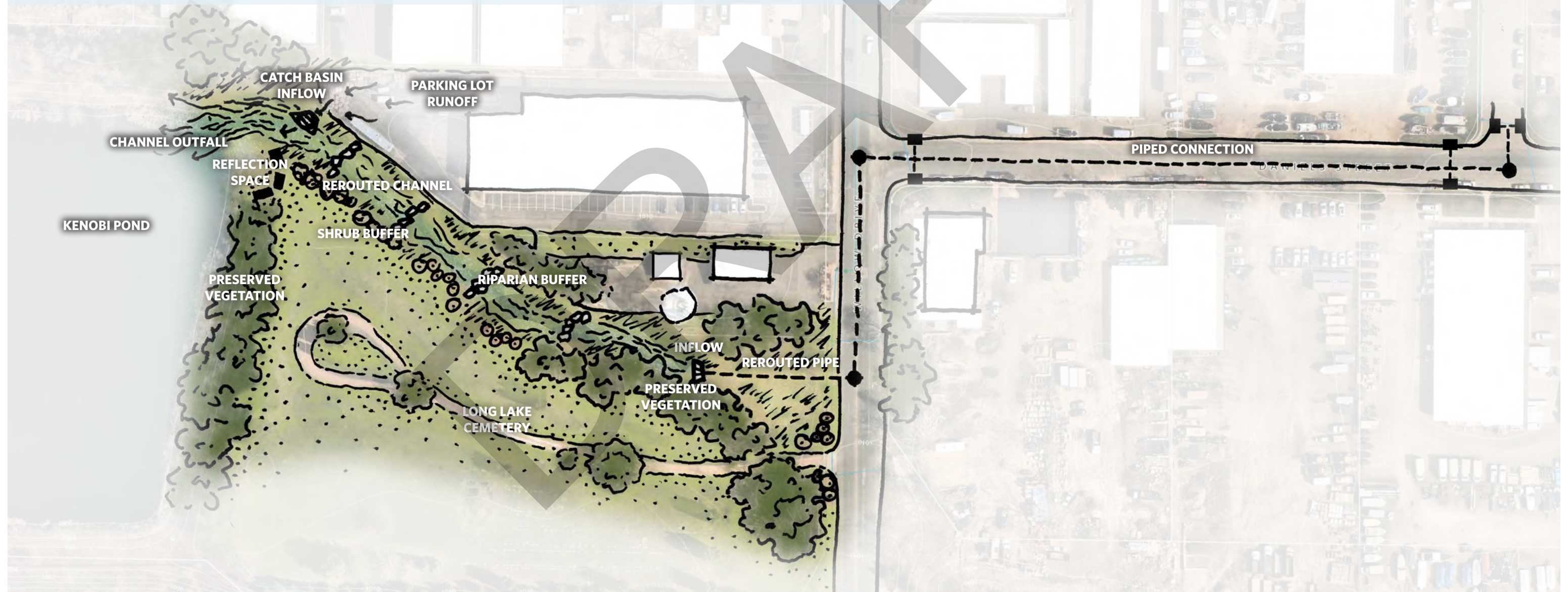
Estimated TP Reduction: 11 pounds annually

Contributing Drainage: 21 acres

Estimated Project Cost: \$2,010,000, including \$1,160,000 for corridor and amenity improvements

Primary Benefit: Reroutes runoff through Kenobi Pond before it reaches Long Lake

Additional Benefits: Corridor greening; potential pedestrian connections; improved cemetery surroundings



PROJECT DESCRIPTION

The Daniels Street Diversion would reconstruct and reroute storm sewer beneath Daniels Street between Willow Drive and the high point near Tamarack Avenue. The project would redirect runoff from approximately 21 acres of highly impervious development to the unnamed channel north of Long Lake Cemetery and then to Kenobi Pond, extending the treatment path before stormwater reaches Long Lake. The project is estimated to remove approximately 11 pounds of total phosphorus annually.

The concept was developed to focus on long-term opportunities to improve stormwater management, transportation, and the public realm. Because the project requires substantial roadway and utility work, it would only be cost-effective at the time the City determined to reconstruct Daniels Street.

The proposed alignment could create a naturalized channel and reflection space near the cemetery, while supporting future corridor greening or pedestrian connections. Impacts to cemetery plots appear avoidable but would need to be confirmed through survey, utility investigation, and coordination with the Church of Saint George.

The diversion would also reintroduce flow to a channel that currently carries limited runoff. If the City elects to advance reconstruction of Daniels Street, additional investigation

should evaluate channel stability, Kenobi Pond hydraulics, property impacts, water quality performance, and the cost-benefit of integrating the diversion with the roadway project. No reconstruction of Daniels Street is currently planned.

This concept is recommended as an opportunity-based project that could advance with City-led reconstruction of Daniels Street.

COST & FUNDING

BMP Construction	\$640,000
Amenities Construction	\$1,160,000
Professional Services	\$210,000
Total Project Cost	\$2,010,000

*Estimated maintenance is \$2,000 annually.

The estimated cost represents an integrated stormwater and corridor concept. The \$1.16 million corridor and amenity component should be evaluated as part of a future City roadway project, not as a stand-alone water quality cost. If the City elects to advance Daniels Street reconstruction, potential City, MCWD, and outside funding roles should be evaluated based on the refined scope, water quality benefit, and allocation of roadway and stormwater costs. No City, MCWD, or outside funding commitment is assumed.

IMPLEMENTATION NEXT STEPS

The project will require typical City and MCWD permits and construction stormwater approvals. Wetland, shoreline, water quality, or federal approvals will depend on field investigations and final design.

The primary implementation dependencies are City-led roadway planning, utility relocation, property and maintenance access, and coordination with the Church of Saint George. The City of Orono should also be involved because portions of the drainage area originate in Orono, and the City of Orono maintains Kenobi Pond. Construction would require temporary closures along Daniels Street and Willow Drive.

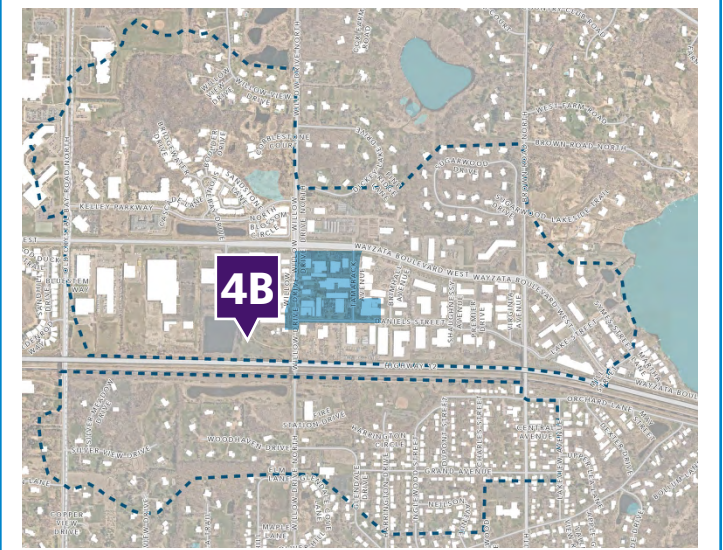
- Preserve the diversion concept through City transportation, utility, and capital planning, and reconsider it when reconstruction of Daniels Street becomes a City priority.
- Complete targeted field investigations to determine alignment, confirm cemetery and channel impacts, evaluate Kenobi Pond performance, and refine costs, benefits, permits, and roles.

Next steps should only be taken if the City elects to further explore the project.

OPERATIONS & MAINTENANCE

Install new inlets with sumps and clean them approximately every two years using a jet-vac truck. Maintain channel vegetation and repair erosion as needed. If the project advances, the Kenobi Pond maintenance agreement should be updated and permanent access for channel and pond maintenance should be secured.

PROJECT SITE AND DRAINAGE AREA



PROJECT DETAILS

Most of the modeled benefit results from routing additional runoff through Kenobi Pond, rather than treatment within the proposed channel.

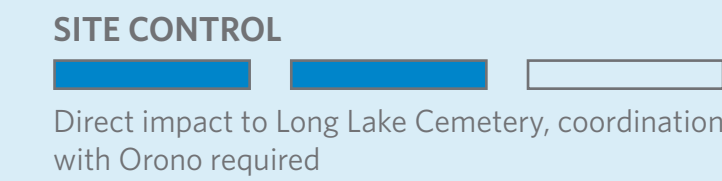
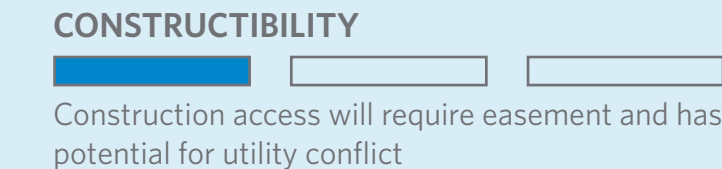
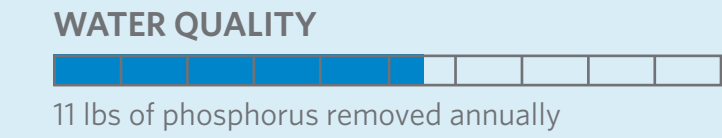
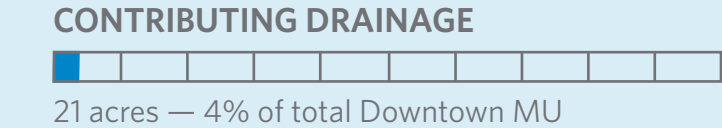
Major proposed improvements include:

- Reconstructing existing storm sewer and inlets beneath Daniels Street
- Diverting approximately 21 acres of highly impervious drainage toward Kenobi Pond
- Creating a naturalized conveyance channel upstream of Kenobi Pond
- Expanding the regional treatment train that drains to Long Lake to include Kenobi Pond

- Evaluating an optional cartridge-filter system for additional dissolved phosphorus treatment

Initial modeling indicates Kenobi Pond has sufficient storage and outlet capacity to receive the diverted runoff. Survey and additional hydraulic analysis are needed to confirm pond elevations, outlet performance, downstream effects, and the treatment benefit. The evaluation should also consider whether accumulated dissolved phosphorus could affect Kenobi Pond’s long-term performance.

PROJECT DASHBOARD



DOWNTOWN VILLAGE GREENWAY

Site 2B

PROJECT AT A GLANCE

Implementation Status: Opportunity-Based, advance through City planning and landowner coordination

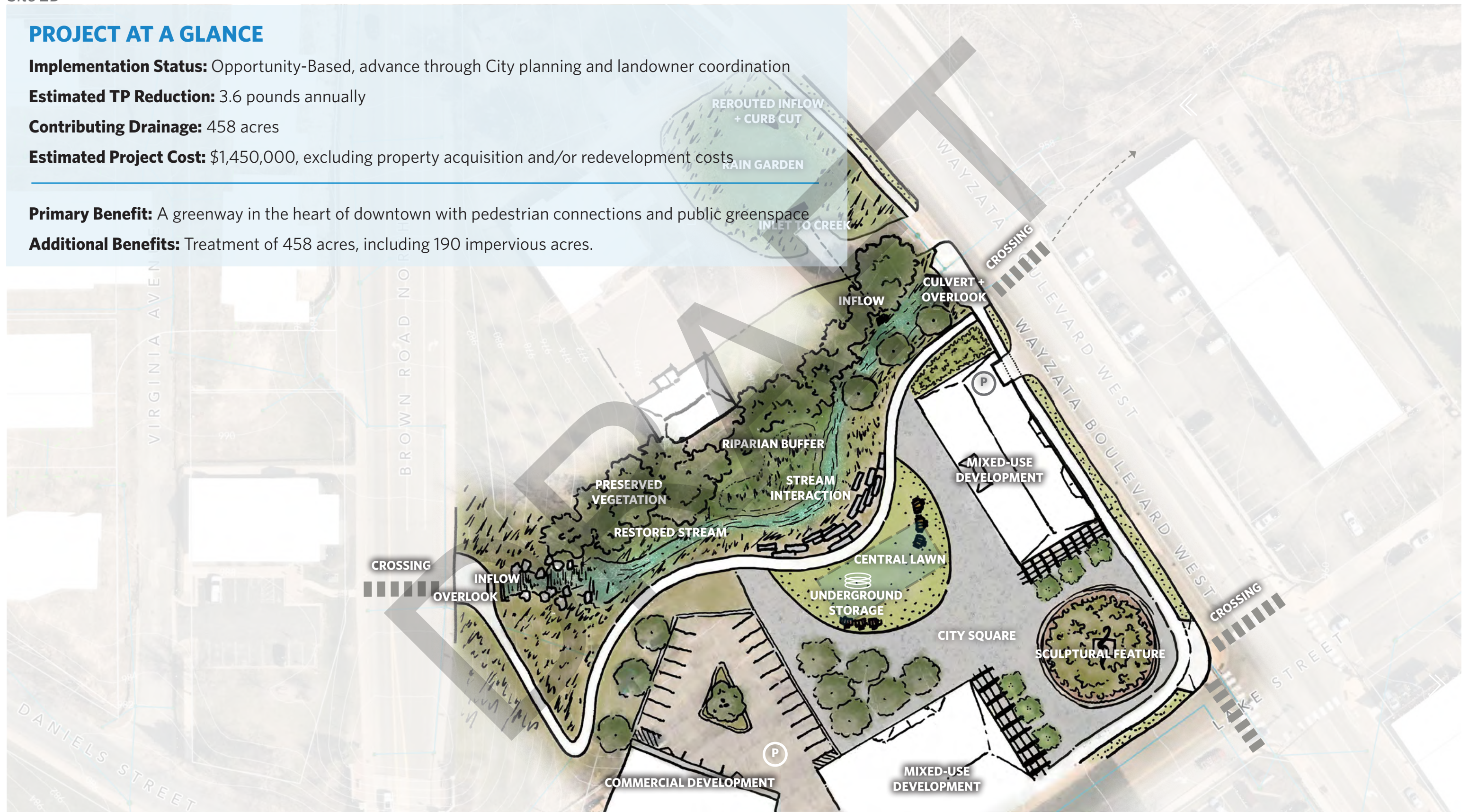
Estimated TP Reduction: 3.6 pounds annually

Contributing Drainage: 458 acres

Estimated Project Cost: \$1,450,000, excluding property acquisition and/or redevelopment costs

Primary Benefit: A greenway in the heart of downtown with pedestrian connections and public greenspace

Additional Benefits: Treatment of 458 acres, including 190 impervious acres.

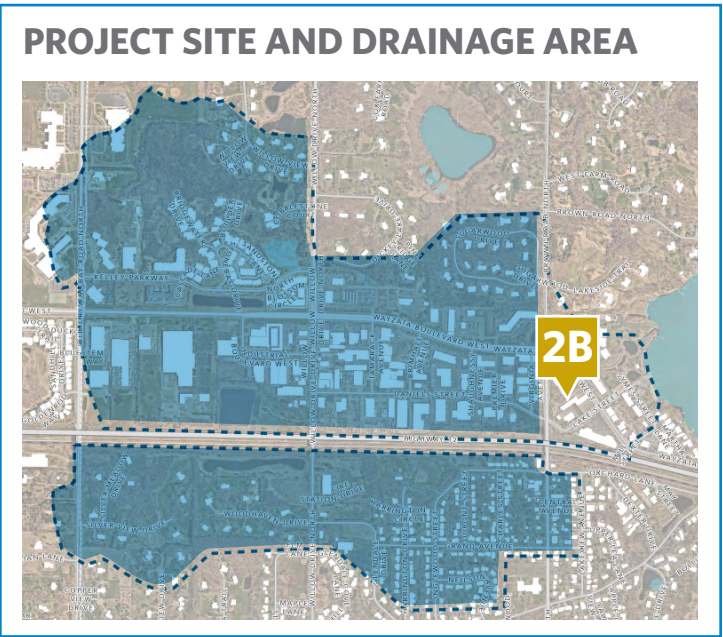


PROJECT DESCRIPTION

The Downtown Village Greenway is an approximately 350-foot urban drainage corridor between Brown Road North and Wayzata Boulevard. It is the primary flow path conveying runoff from over 450 acres toward Nelson Lakeside Park and Long Lake. The stream is tightly constrained, densely vegetated, and difficult to access. Its location between City Hall, the Pioneer Museum, Nelson Lakeside Park, and Long Lake creates an opportunity to organize redevelopment and public greenspace around a restored urban stream.

During the charrette, the City expressed interest in a bold vision for long-term redevelopment extending from a vacant City-owned parcel at the corner of Wayzata Blvd and Lake St. This concept illustrates how the area could transform over time through market-driven redevelopment, coordinated landowner engagement, and parcel assembly. It is a long-term planning vision, not a recommendation for acquisition.

The study evaluated two concepts on opposite sides of the stream; this concept is the larger vision. It includes a restored stream, underground stormwater treatment, expanded greenspace, and a gathering area integrated with future development. Site 2C complements this vision on the Pioneer Museum side with additional treatment, channel stabilization, improved museum grounds, and pedestrian access. Together, the concepts establish a greenway connecting City Hall to the shoreline through a restored stream corridor in the heart of downtown.



This project’s viability will depend on market conditions, landowner interest, City planning priorities, and parcel assembly. If the City determines broader redevelopment is not a viable pathway, it should consider partnering with the Pioneer Museum to advance a green connection, while preserving opportunities to expand if future conditions allow.

COST & FUNDING

BMP Construction	\$1,000,000
Amenities Construction	\$300,000
Professional Services	\$150,000
Total Project Cost	\$1,450,000

*Estimated maintenance is \$10,000 annually.

The estimate reflects the larger redevelopment concept. Incorporating improvements on the Pioneer Museum side into a unified corridor may change the final scope and cost.

This project may be considered for BWSR Clean Water Fund, MPCA Clean Water Partnership, Section 319, LCCMR, or other funding. Outside funding is not assumed. Stormwater improvements, public amenities, property acquisition, private redevelopment, and historic or cultural elements should be tracked separately, so funding responsibilities remain clear.

PROJECT DETAILS

Major proposed improvements include:

- Restoring and meandering portions of the stream channel to improve stability, habitat, visibility, and public access
- Creating approximately 0.25 acre-feet of stormwater storage and filtration beneath a future gathering space
- Diverting runoff from Wayzata Boulevard into a rain garden before returning treated flows to the stream
- Routing runoff from the 24-inch storm sewer through a naturalized swale on the Pioneer Museum side
- Restoring and expanding the riparian buffer on both sides of the stream
- Creating pathways, stream crossings, overlooks, and gathering areas along the corridor

IMPLEMENTATION NEXT STEPS

This concept affects multiple parcels under different ownership and should advance through cooperative planning, voluntary acquisition, easements, redevelopment agreements, or a combination. The feasibility concept does not represent commitments by the City or other agencies to acquire specific properties or change existing uses.

The City should establish the long-term corridor vision before redevelopment proposals. Early planning should identify the space needed for channel restoration, stormwater treatment, pedestrian access, public greenspace, and maintenance. Coordination with the Pioneer Museum will be important.

- Consider incorporating the Downtown Village Greenway vision into City long-range and comprehensive planning.
- Identify the space needs that should be preserved through future planning.
- Evaluate how the vacant City-owned parcel at Wayzata Blvd and Lake St could support the long-term greenway.
- Engage current landowners individually or as redevelopment opportunities emerge.
- Coordinate with the Pioneer Museum to evaluate ability to integrate historic interpretation, site access, visibility, landscape improvements, and public programming if broader redevelopment is determined non-viable.
- Develop a phased funding and implementation strategy when a viable land use opportunity emerges.

- Establishing a continuous green pedestrian connection from City Hall toward Nelson Lakeside Park and Long Lake

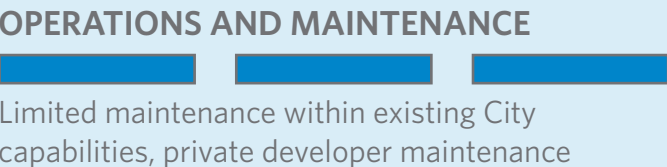
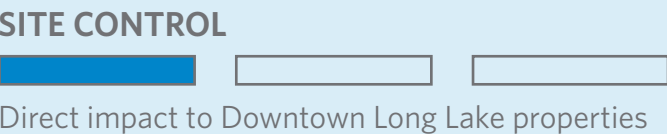
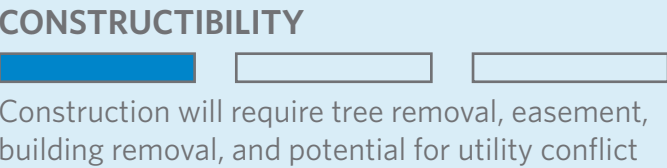
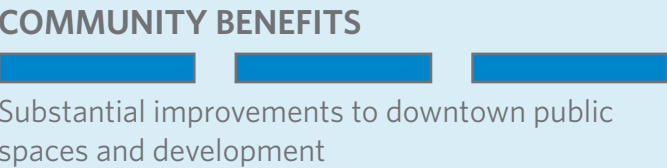
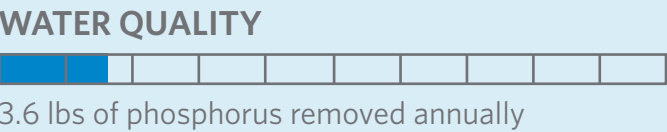
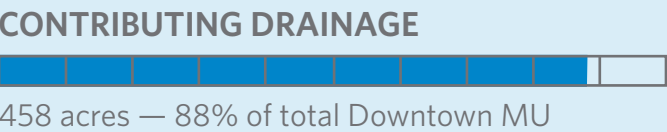
Treatment estimates for the two sides of the stream should not be added because the concepts contain overlapping drainage. The project’s broader value lies in establishing a coordinated framework for stormwater management, ecological restoration, redevelopment, public space, pedestrian circulation, and historic interpretation.

The principal cost drivers are underground infrastructure, stream excavation and stabilization, utility coordination, constrained access, and amenities. Property acquisition, building removal, private redevelopment, and parcel assembly are not included in the cost estimate.

OPERATIONS & MAINTENANCE

Project elements will require routine inspection and maintenance to preserve treatment capacity and safe conveyance. Naturalized areas will require vegetation management. The stream channel, banks, crossings, plunge pool, rock checks, and riffles should be inspected after major storms. Public amenities will require routine City or partner maintenance. Agreements should assign responsibilities among the City, MCWD, property owners, the Pioneer Museum, and future development partners.

PROJECT DASHBOARD



FEASIBILITY ASSESSMENT PROCESS

BACKGROUND

A team consisting of HDR and Damon Farber worked alongside MCWD staff to identify opportunities and evaluate the feasibility of stormwater management projects, or Best Management Practices (BMPs), located within the Downtown Management Unit (DMU) of MCWD’s Long Lake Creek Subwatershed. This task was built on a prior study performed by MCWD as part of the Long Lake Creek Roadmap.

Within that strategy, the DMU was identified as a priority area because it contributes disproportionately high phosphorus loads to Long Lake, relative to its size and level of urbanization.

The DMU encompasses 518 acres and contributes approximately 194 pounds of phosphorus annually to Long Lake. Under MCWD’s refined nutrient budget and implementation strategy, which updated the original Total Maximum Daily Load (TMDL) framework using in-lake sediment chemistry data, the target reduction from this area is 88 pounds per year through landscape projects.

The focus of this study is to identify and recommend projects that provide feasible and cost-effective water quality benefits to impaired Long Lake and downstream waterbodies. Sites were additionally evaluated based on opportunities for public amenities and restoration.

The report includes a summary of general findings and work performed. Assessed projects that include site-specific details are presented as cut sheets, found on pages 3-12 for recommended or opportunity-based projects, and in Appendix F for non-recommended projects and/or alternatives.

FEASIBILITY ASSESSMENT

The identification and evaluation of sites was conducted from a holistic perspective on a site’s feasibility and potential impact on water quality, the community, and the ecosystem in an effort to align with MCWD’s Balanced Urban Ecology approach. The following data sources supported evaluation:

- Long Lake Creek Subwatershed Assessment
- 2020-06-18_2020 Basin Survey Summary Technical Memo
- MCWD XP SWMM Model
- MCWD P8 model for the Long Lake Creek Subwatershed
- BMP Construction plans
- City of Long Lake and MCWD provided GIS Data
- Communicated history and operations of sites from City and MCWD staff
- Historic aerial photography

PROJECT IDENTIFICATION

Projects were identified via two primary paths: alternatives stemming from the Roadmap, and newly identified concepts based on desktop review or discussion with City and MCWD staff.

A total of 22 potential projects were identified across multiple typologies, including new infiltration basins, conveyance improvements, retrofits or restorations, and green infrastructure improvements. A table including each opportunity, a brief description of the work proposed, contributing drainage area, imperviousness, footprint extent, and considerations of identified constraints is included as Appendix A.

The intention of this project identification phase was to identify a holistic range of water quality and public realm improvements across the entire DMU, and focus further evaluation efforts on those deemed most impactful.

Of the 22 identified projects, 11 were recommended for further feasibility evaluation under this study. This recommendation was based on a collaborative discussion between MCWD and the consultant team.

LANDSCAPE ARCHITECTURE AND ENGINEERING

Eleven potential projects were further defined through conceptual landscape architecture and engineering design.

Using the size and characteristics of their contributing watersheds as a baseline, these alternatives were developed to target total phosphorus removal, while also leveraging adjacent areas for potential gathering spaces and accessible amenities in alignment with potential development, infill, and regional connection opportunities. A precedent analysis featuring inspirational projects and implementation strategies was assembled to broaden the team’s perspectives and inspire creative solutions. For details, refer to Appendix B.

To support feasibility-level design, a high-level HydroCAD model of the DMU was developed using available watershed parameters and stormwater conveyance inputs to simulate runoff from storm events of varying intensity.

The alternatives were further refined through site observations, maintenance preferences discussed with project stakeholders, and evaluation of potential utility and landowner constraints using City-provided GIS data. A feasibility-level engineering design concept has been developed for each of the 11 sites and has been included as Appendix C.

CHARRETTE

A design charrette was held on December 10, 2025, to convene stakeholders and develop a shared vision for the study area. The workshop began with a visioning session to establish goals and objectives, followed by a precedent analysis to inspire new ideas, and finishing with a collaborative sketching session. The project team placed a strong emphasis on creative problem-solving and integrating a balanced urban ecology strategy to improve water quality in Long Lake. This half-day event encouraged open dialogue, collaboration, and a strong sense of ownership and investment in the proposed projects.

The charrette was attended by staff from the City, MCWD, HDR, and Damon Farber. Attendees included:

- Long Lake – Amanda Nowezki
- MCWD – James Wisker, Michael Hayman, Brian Beck, Rachel Baker, Veronica Sannes
- HDR – Ryan Fucci, Andrew Judd, Chris Gice, Leah Botting
- Damon Farber – Andrew Montgomery, Jeff McMenimen, Tessa Siwek

The charrette focused on the project sites that showed the most initial potential for the greatest water quality benefit and transformational change. Teams focused on the following areas:

- Downtown Village Area
- Holbrook Park
- Nelson Lakeside Park

The charrette provided an opportunity to advance project sites identified during the subwatershed assessment and project evaluation phase, rapidly explore design alternatives, and collaboratively develop innovative solutions. Not all projects that were selected for advancement during the project identification phase were assessed as part of the charrette.

After the charrette, multiple concepts were assessed further at each location for feasibility, cost, and overall benefit. Sketches developed as part of the charrette are included as Appendix D.

MODELING ASSUMPTIONS

Water Quality Modeling using the MCWD-provided P8 model was conducted to assess the water quality benefit of proposed sites. Model outputs are included in Appendix G.

The following modeling assumptions were made to represent the performance of each of the sites in the model:

- The model was run for a 30-year period with a 1-year lead up.
- No modifications were made to existing watersheds or particle loading distributions, with the exception of dividing watersheds as part of scenarios where a proposed BMP treated only a portion of an existing watershed.
- Based on best available soils data, it was assumed that no proposed BMPs would allow for impactful infiltration.
- The impact of each BMP was measured independently in a copy of the model that maintained all other watersheds and BMPs unchanged.
- Reported phosphorus reductions represent the net improvement over existing conditions, rather than the total removal provided by an individual BMP. For retrofit and replacement projects, this accounts for the performance of the existing BMP being replaced. In addition, because the modeled watersheds are hydraulically connected, BMP benefits are evaluated based on their contribution to overall watershed phosphorus reduction, rather than pollutant removal at the BMP itself.
- A range of TP removal has been provided for some of the retrofit projects to indicate reasonable uncertainty in the existing BMP's current level of performance. Existing BMPs may be performing below their original design efficiency due to age or other factors, resulting in a range of reasonable estimates for the net improvement achieved by the proposed retrofit.

COST OPINION

Line-item cost opinions were developed for each evaluated concept. Unit costs were sourced from recent HDR and DF construction bids or MnDOT. Costs are broken down into a few major categories, including:

- BMP Construction – Estimated costs to construct the BMP, as well as necessary auxiliaries.
- Amenities Construction – Estimated costs attributed to non-water-quality focused site elements such as park amenities.
- Professional Services – Estimated field services, design, and construction observation costs as a percentage of construction costs.
- Total Project Cost – The sum of BMP, amenities, and professional services.
- Annual Maintenance – Estimated maintenance cost based on BMP type and a percentage of the overall construction cost.



Cost ranges presented in the report are based on the estimated BMP construction cost (lower estimate) and the total project cost (upper estimate). Construction cost estimates include a 25% contingency. The resulting cost opinions are presented in Appendix E.

PERMITTING SCAN

A permitting scan was conducted to document an initial review of permitting and agency coordination anticipated for each site. A matrix of anticipated permits is included in Appendix G with additional site-specific descriptions of permitting included on each cut sheet and in Appendix F.

OPERATIONS & MAINTENANCE

To extend the expected useful life and effectiveness of proposed BMPs, it is anticipated that ongoing maintenance will be required. Generalized operations and maintenance recommendations are included for each BMP. Additional site-specific maintenance considerations associated with site access or key features are included on each cut sheet. Future operations and maintenance responsibilities will be established through cooperative agreements based on ownership, existing maintenance roles, organizational capacity, and program goals. Cost estimates generally assume routine City maintenance unless otherwise noted. This study does not modify existing City or MCWD maintenance responsibilities.

Detailed operations and maintenance requirements are included in Appendix G.

EVALUATION CRITERIA

The 11 projects that were advanced to the conceptual design phase were prioritized using a weighted multi-decision criteria assessment matrix. The matrix consists of nine evaluation criteria that align with objectives identified within the Roadmap. Each project concept was evaluated and scored across each of the nine criteria.

While all of the criteria are important to overall project success, the scores were then weighted based on the relative importance of each criteria in achieving the overall goals of the Roadmap and aggregated into a total score. Proposed weighting prioritizes expected water quality benefits but also considers potential feasibility and improvements for community and habitat. For example, water quality improvement potential was weighted as 25% of the overall score, while support for natural systems represents 5% of the total score. Though it is not meant to be a strict ranking, projects with higher scores are generally recommended over those with lower scores.

Criteria	Description
Contributing Impervious Drainage	Measures potential impact based on the amount of impervious drainage area contributing to the proposed project site. Sites that are located downstream of a large drainage area will score higher.
Water Quality	Measures a project’s ability to improve effluent water quality through reductions in total phosphorus. Sites that result in more TP reductions as indicated by P8 modeling will score higher.
Support for Natural Systems	Measures potential for project to incorporate habitat enhancing features into the design of the proposed project site. This criteria is based on the type of project proposed and proximity to existing habitat. Sites that have greater potential to enhance habitat will score higher.
Support for Community	Measures a project’s potential to incorporate community enhancing features, align with other planned community projects, or be located proximate to community gathering spaces. Sites that have greater potential to improve community value will score higher.
Constructibility	Consideration of site construction access, slope and excavation requirements, clearing and grubbing needs, specialty construction needs, available space, and logistics of construction activities. Sites with less constructibility constraints will score higher.
Ownership	Consideration of site ownership with regards to the ability for a project to be built at the site. Right-of-way projects, or projects on public property, will score more highly than those that are on private property.
Permitting	Consideration of ease of permitting requirements, and identification of potential permitting challenges that may negatively impact project cost or feasibility. Sites with less complex permitting requirements will score higher.
Funding	Consideration of potential funding opportunities based on specific project elements or foreseen outcomes, and alignment with known funding sources. Sites that may qualify for more funding opportunities will score higher.
Operations and Maintenance	Measures the long-term ability of the project to maintain functionality with minimal operation and maintenance needs or anticipated replacement costs. Sites that will require simpler or less frequent operations and maintenance will score higher.



ORIENTATION KEY MAP

HOLBROOK PARK

- 1A** HOLBROOK PARK - STREAM CHANNEL
HOLBROOK PARK: OPTION 1
- 1B** HOLBROOK PARK - FLOODPLAIN STORAGE
HOLBROOK PARK: OPTION 2

DOWNTOWN VILLAGE

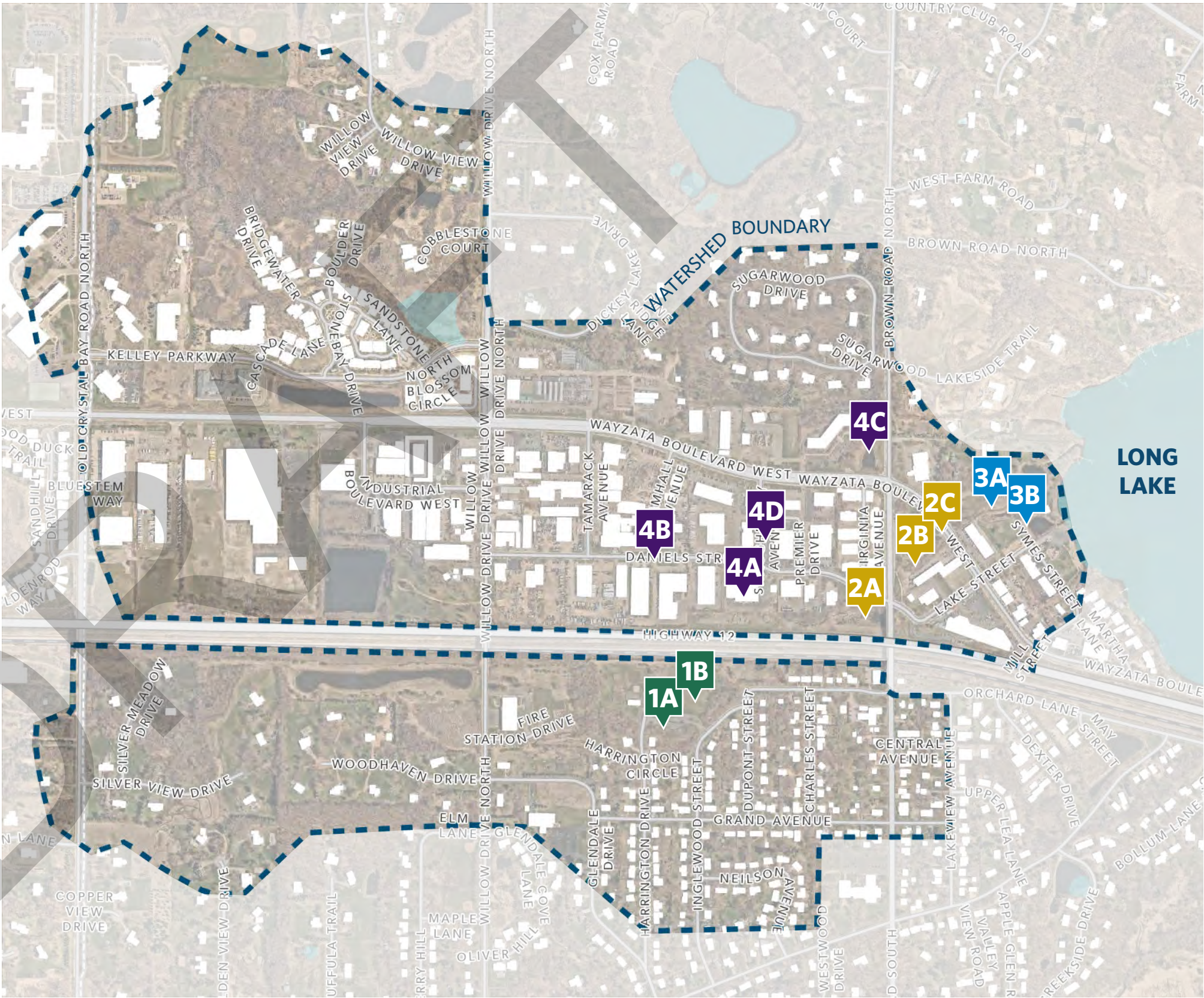
- 2A** DOWNTOWN VILLAGE HIGHWAY POND RETROFIT
- 2B** DOWNTOWN VILLAGE GREENWAY
DOWNTOWN VILLAGE: OPTION 1
- 2C** PIONEER MUSEUM BMP
DOWNTOWN VILLAGE: OPTION 2

NELSON LAKESIDE PARK

- 3A** NELSON LAKESIDE PARK STREAM RESTORATION
NELSON LAKESIDE: OPTION 1
- 3B** NELSON LAKESIDE PARK RETENTION POND RETROFIT
NELSON LAKESIDE: OPTION 2

ADDITIONAL AREAS OF THE DEVELOPED CORE

- 4A** CITY MAINTENANCE FACILITY
- 4B** DANIELS STREET DIVERSION
- 4C** WAYZATA & BROWN POND DIVERSION
- 4D** SHAUGHNESSY AVE SUBSURFACE MANAGEMENT



Appendix F: Alternative Projects

HOLBROOK PARK - STREAM CHANNEL

Site 1A

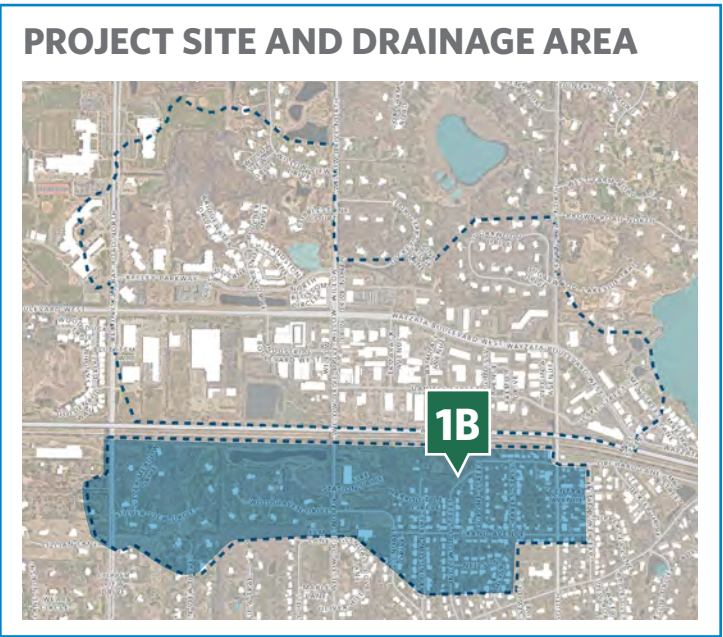


PROJECT DESCRIPTION

The edge of Holbrook Park is defined by a wooded ravine that runs between Harrington Drive and Orchard Lane. The ravine conveys both natural base flow and stormwater discharged through piped inflows from the surrounding neighborhood before exiting the ravine system into the constructed pond located south of Highway 12, and ultimately flowing to Long Lake. The ravine bottom lies roughly 10 feet below adjacent streets and park grades and shows evidence of erosion, bank instability, and slope degradation. Vegetation along the ravine is dense and dominated by dead trees and invasive shrubs, such as buckhorn, and sediment accumulation has created a wide mudflat that limits access and reduces ecological and recreational value.

Nearby park amenities include a baseball field, playground, and facility building, as well as an ice rink during the winter. There are tentative plans by the City to invest in the park and expand these amenities. Restoration of the ravine provides an opportunity to pair ecological and water quality benefits with future park improvements and enhanced pedestrian access from the neighborhood.

Construction access would require removal of existing vegetation to allow equipment to enter and maneuver safely; however, these clearings could provide improved accessibility for long-term maintenance of the restored stream channel. It



is anticipated that modifications to culvert crossings could be performed from the roadway with limited disturbance.

This is one of two options explored at the Holbrook Park stream channel. The project is an alternative to a partnership project at the same site that shows higher benefits. Elements of this project design could be incorporated into the partnership project as the design progresses.

COST & FUNDING

BMP Construction	\$830,000
Amenities Construction	\$30,000
Professional Services	\$130,000
Total Project Cost	\$990,000

*Estimated maintenance is \$3,000 annually.

The project may be considered for BWSR Clean Water Fund and EPA Section 319 funding due to its direct phosphorus reduction, streambank stabilization, and riparian habitat restoration. Because the project occurs within a park setting, complementary funding could potentially support park or recreation enhancements through programs such as the MnDNR Outdoor Recreation Grant Program or Hennepin County park partnership funding. No City, MCWD, or outside funding commitment is assumed.

PROJECT DETAILS

This project proposes targeted restoration across all three ravine segments that border the park, each which receives stormwater from degraded headwalls and are interconnected by culverts beneath the park road crossings. The upstream, middle, and downstream ravines drain approximately 24, 25, and 19 acres, respectively. The existing outlet control structure in the downstream ravines sends low flows to the highway 12 pond through a small pipe, while a grated overflow structure is activated during larger storm events.

Major proposed improvements include:

- Creating additional floodplain storage by widening the channel and adding a riparian buffer to enhance habitat.

PERMITTING & COORDINATION

The project will require typical City and MCWD permits in addition to waterbody crossing and shoreline permits from MCWD, and MPCA NPDES permit coverage. Potentially required permits include an MCWD wetland protection permit, an MCWD floodplain alteration permit, an MCWD dredging permit, an MN DNR public waters work permit, an MPCA section 401 permit, a USACE section 404 permit, and a City of Long Lake conditional use permit.

The project should be coordinated with the City of Long Lake’s tentative park improvement projects.

- Incorporating the project with larger park improvements could provide an opportunity for nature-based recreation and learning.
- Opening the dense canopy in the ravine may provide opportunities for native plantings to create a more stabilized floodplain.
- Creation of storage within this area by impounding stormwater must consider upstream impacts.

- Modifying culverts to better control flow during small- to mid-sized storm events and improve hydraulic function.
- Removal of localized sediment deposited in the ravine and invasive vegetation clearing.
- Improving interconnectivity to the surrounding park spaces where feasible.

The most substantial modifications occur in the downstream ravine, which currently lacks a defined channel and consists primarily of a silty, unstable bottom.

The system provides a reduction in annual TP loading of 5 pounds through metering of low-flow events and increases residence time.

OPERATIONS & MAINTENANCE

Regular maintenance for the site includes vegetation management. As vegetation is establishing, repair of eroded banks may be necessary following high-flow events. Stormwater conveyance features should be inspected annually. Removal of sediments from forebays and sumped structures is recommended annually

The proposed design incorporates maintenance access near the existing crossings of the ravine on Harrington Drive.

PROJECT DASHBOARD

CONTRIBUTING DRAINAGE

68 acres — 13% of total Downtown MU

WATER QUALITY

5 lbs of phosphorus removed annually

SUPPORT FOR NATURAL SYSTEMS

Potential for creation of new high-quality habitat

COMMUNITY BENEFITS

Creates community access to natural systems in existing park

CONSTRUCTIBILITY

Construction within ravine may require dewatering

SITE CONTROL

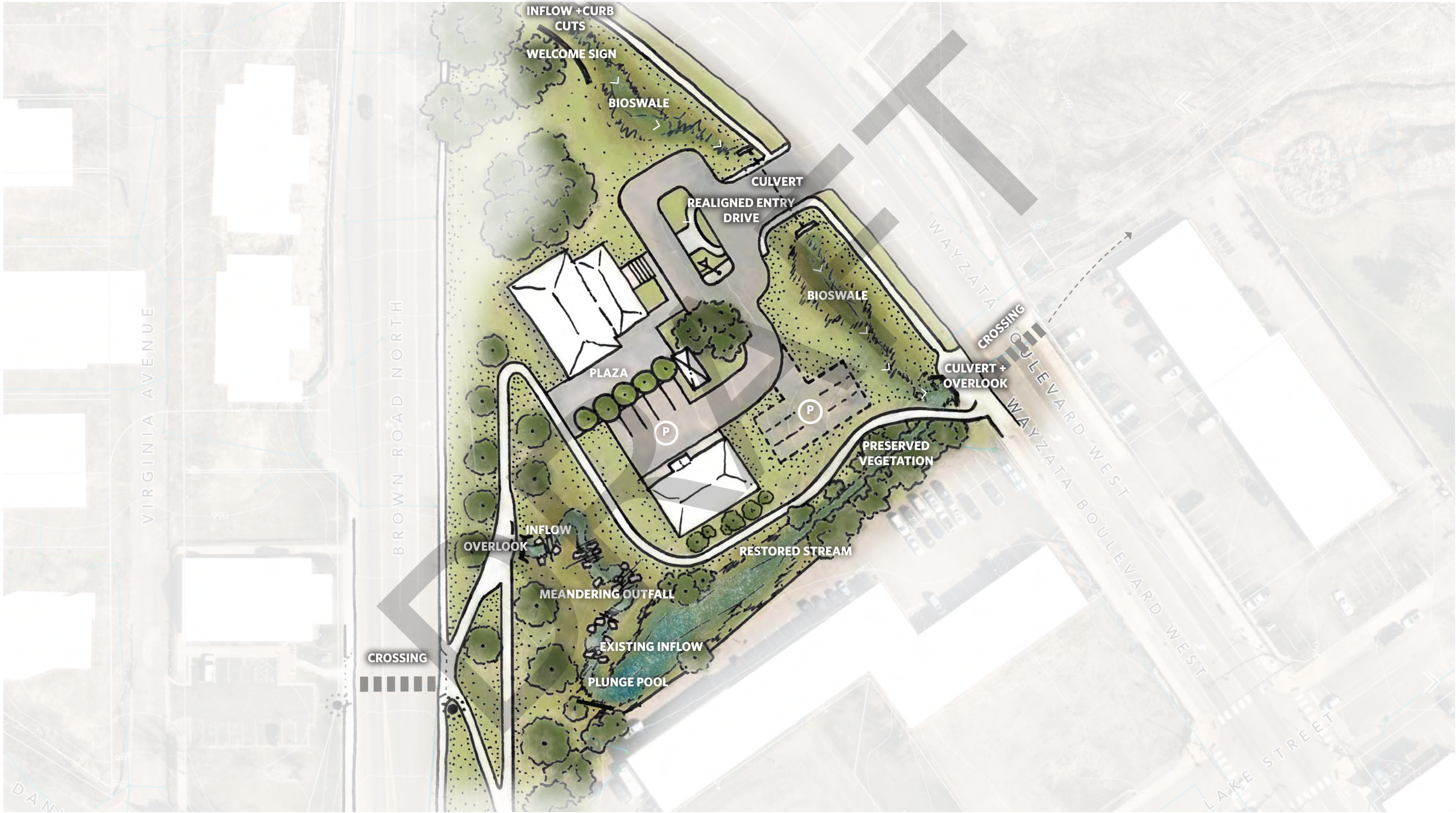
Stormwater facilities are within existing parkland owned by City

OPERATIONS AND MAINTENANCE

Limited required maintenance within existing City capabilities

PIONEER MUSEUM BMP

Site 2C



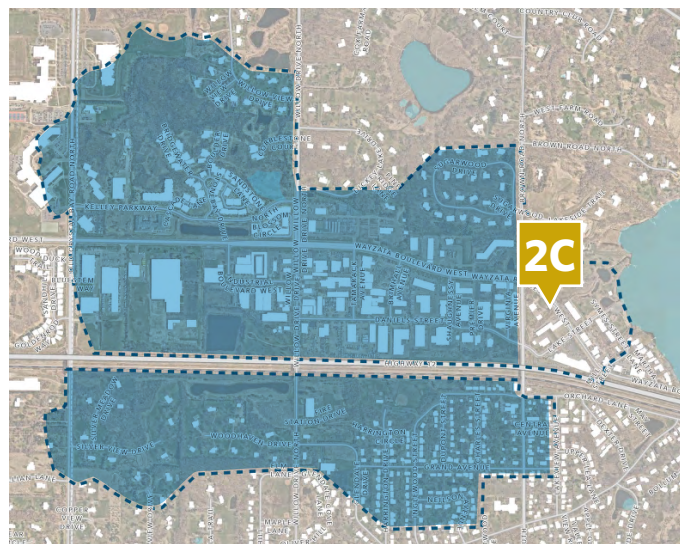
PROJECT DESCRIPTION

The project area consists of a 350-foot stretch of a tightly constrained stream corridor located between Brown Road N and Wayzata Boulevard. This corridor functions as the primary flow path conveying runoff from an estimated 458-acre drainage area toward Long Lake. Stormwater enters the reach through two primary outfalls: a 42-inch RCP from the Downtown Village Area Highway Pond and a 24-inch RCP from the Brown Road N trunk line, which drains an estimated 16 acres of heavily impervious area.

The channel is densely vegetated and difficult to access, which limits the City's ability to inspect and maintain stormwater infrastructure within the channel and restricts opportunities for the public to experience or appreciate this natural feature.

Because in-channel modification options are limited by the narrow corridor dimensions and an adjacent commercial development to the south, the project emphasizes using available greenspace on the Pioneer Museum property to create mutually beneficial stormwater and site-enhancement features. Proposed concepts include stabilizing and reshaping portions of the channel, targeted reconfiguration of stormwater inflows to reduce nutrient loading, and improvements to the appearance and accessibility of the stream corridor.

PROJECT SITE AND DRAINAGE AREA



This is one of two options explored for the Downtown Village area stream channel. This project is not recommended due to long-range coordination or alignment needs with development. It may be tactically revisited in the future as opportunities arise.

COST & FUNDING

BMP Construction	\$620,000
Amenities Construction	\$330,000
Professional Services	\$100,000
Total Project Cost	\$1,050,000

*Estimated maintenance is \$4,000 annually.

The project may be considered for BWSR Clean Water Fund and EPA Section 319 grants because it combines stormwater treatment, channel restoration, and habitat enhancement to improve Long Lake water quality. Interpretive or historical elements incorporated into the project corridor could also align with programs such as the Minnesota Historical Society Heritage Partnership Program or local cultural heritage grants. No City, MCWD, or outside funding commitment is assumed.

PROJECT DETAILS

Stormwater will be rerouted to available upland space for pre-treatment, and targeted channel work to improve stability where feasible. Treatment features along Wayzata Boulevard provide additional water quality benefits before runoff reconnects with the stream.

Major proposed improvements include:

- Diverting 16 acres of impervious runoff to a naturalized swale between the Pioneer Museum and Brown Rd N line.
- Providing erosion control and energy dissipation with a new plunge pool at the existing 42-inch outfall.
- Promoting sedimentation and reducing flow velocities with rock checks and riffles.

PERMITTING & COORDINATION

Permitting is expected to require typical City and MCWD construction permits and may trigger additional permitting under MCWD's wetland protection and streambank stabilization rules.

Easements or property agreements with the Pioneer Museum and Club Mutts will be necessary to construct and maintain the proposed BMPs, including access for future maintenance of the swales and rain garden.

- Deep storm sewer infrastructure should be inspected for stability prior to modification.
- Road closures and monitoring will likely be required during construction.
- Infiltration rates will guide the selection of engineered media and long-term maintenance needs for the rain garden and bioswale.

- Treating the first-flush event by diverting flow into a new bioswale + rain garden treatment train on Wayzata Blvd.
- Stabilizing the channel by removing debris and vegetation and selectively widening portions of the stream section.
- Improving pedestrian access with a crossing and trail connection linking Wayzata Boulevard and Brown Road N.

The combined system will provide removal of 2.8 pounds of TP per year. These numbers include estimated removals for the bioswale, rain garden, and increased flood capacity of the stream corridor.

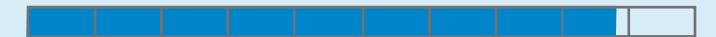
Impacts to the Pioneer Museum's property should be further evaluated to ensure the rain garden and swale system can function as intended.

OPERATIONS & MAINTENANCE

Recommended tasks include periodic removal of sediment and debris from the plunge pool and surface swales, vegetation management, and monitoring of the stream channel for blockages or erosion. The rain garden will require seasonal inspections to ensure the media remains uncompacted, and that overflow pathways remain unobstructed. Because several features are located on Pioneer Museum property, ongoing coordination will be required between the City and property owner(s) to establish responsibilities and access.

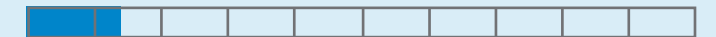
PROJECT DASHBOARD

CONTRIBUTING DRAINAGE



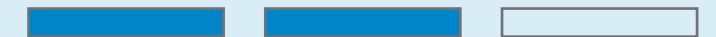
458 acres — 88% of total Downtown MU

WATER QUALITY



2.8 lbs of phosphorus removed annually

SUPPORT FOR NATURAL SYSTEMS



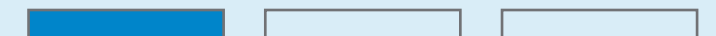
Replacement and enhancement of site vegetation

COMMUNITY BENEFITS



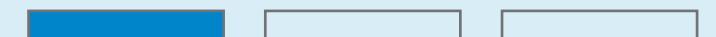
Connects City Hall, Pioneer Museum, and Nelson
Lakeside Park

CONSTRUCTIBILITY



Construction access will require tree removal and easement, and potential for utility conflict

SITE CONTROL



Direct impacts to Pioneer Museum property

OPERATIONS AND MAINTENANCE



Limited required maintenance within existing City capabilities

NELSON LAKESIDE PARK RETENTION POND RETROFIT

Site 3B



PROJECT DESCRIPTION

Nelson Lakeside Park is located at the downstream most point of the Downtown Management Unit, receiving all runoff prior to it reaching Long Lake. The site, in its current condition, includes four BMPs—two maintained by MCWD, and two owned by the City of Long Lake. According to MCWD monitoring data, these existing BMPs are not performing as expected, and the MCWD-maintained ponds are scheduled to be dredged in the near future. This project removes the filter BMPs, expands the filter ponds, establishes sediment forebays, iron enhanced filter benches, and redirects more flow from the stream channel into the ponds.

The site is home to a pavilion and disc golf course both donated by the Lions Club. Beyond this it includes additional community amenities including a boat launch, playground, beach, and a veteran’s memorial. The park is located near downtown, and a number of apartments and condo buildings, though pedestrian access to the park is not as straightforward as it could be, causing many residents to walk up to Wayzata Boulevard if they wish to access the park. The highlight of this concept is a pedestrian connection to the apartment complex located to the north. It also encourages connection to nature by providing more access to native vegetation areas and a picnic lawn. As shown, the concept allows for the pavilion to be maintained; however, the disc golf course

and boat trailer parking areas may need to be reduced in size to accommodate the other site features.

This concept is one of three options explored at Nelson Lakeside Park. The project is an alternative to a partnership project at the same site that shows higher benefits. Elements of this project design could be incorporated into the partnership project as the design progresses.

COST & FUNDING

BMP Construction	\$1,900,000
Amenities Construction	\$100,000
Professional Services	\$290,000
Total Project Cost	\$2,290,000

*Estimated maintenance is \$16,000 annually.

This project may be considered for Clean Water Fund or Clean Water Partnership grants because it increases nutrient removal and improves stormwater treatment before runoff reaches Long Lake. No City, MCWD, or outside funding commitment is assumed.

PERMITTING & COORDINATION

The project will require typical City and MCWD permits in addition to an MN DNR public waters work permit, and MPCA NPDES and Section 401 permit coverage. Wetland protection, waterbody crossing & structure, dredging, and shoreline & streambank stabilization permits from MCWD, as well as USACE section 404 and City of Long Lake conditional use permits may also be required.

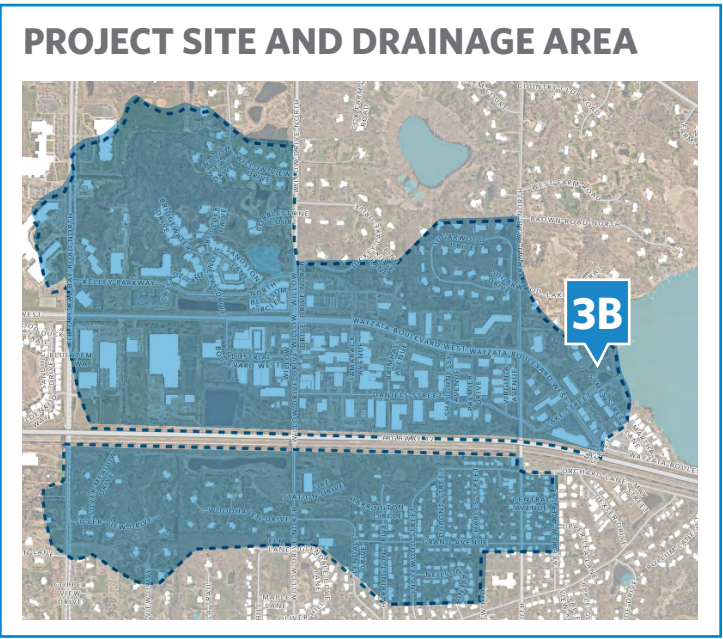
The project will require coordination with the City and adjacent private property owners. The project site is also the location of the annual Buckhorn Days festival; construction should be scheduled to avoid impacting this event.

- In-channel diversion structure design may include concrete structure with internal weir.
- A secondary connection between the lower pond and the stream channel could be explored to limit the impact to the existing fish grate.
- Inclusion of iron enhanced filter benches is contingent on soil and groundwater characteristics.
- Replacement of the existing fish grate should consider fish migration and City staff maintenance concerns.
- Site includes multiple utility mains that were avoided based on assumed depths to be confirmed.

OPERATIONS & MAINTENANCE

The site will require regular vegetation maintenance. Early inspections should monitor erosion within channel sections and deposition within sediment forebays after storm events to look for and remediate preferential flow paths.

Storm sewer infrastructure should be checked regularly for wear or blockages. The proposed disc golf course, picnic tables, bridges, and other site amenities will require maintenance in accordance with manufacturer recommendations.



PROJECT DETAILS

Flows primarily reach the park through a 90-inch culvert beneath Wayzata Blvd that conveys runoff from nearly 500 acres, or three pipes that meet at the south pond.

Major proposed improvements include:

- Rerouting of the outfall beneath Wayzata Boulevard to a sediment forebay and expanded pond.
- Providing an emergency spillway to allow water to bypass the ponds during high flow events.
- Orienting inlets and outlets to increase residence time and reducing short-circuiting.
- Metering of flow to the downstream-most pond through a new outlet control structure.

- Including iron-enhanced sand filter benches to treat dissolved phosphorus during high-stage events.
- Retrofitting auxiliary overflow weir to reduce maintenance needs and increased sediment forebay volume.
- Creating approximately 2.5 acre-feet of storage.

The project will provide removal of 8.9 pounds of TP per year. These numbers include estimated removals for the iron enhanced sand filters shown, which could be replaced by underground cartridge filter BMPs depending on feasibility. This concept does not preserve the filter BMPs due to the understanding that they are not performing properly and would likely require significant remediation to regain function.

PROJECT DASHBOARD

CONTRIBUTING DRAINAGE

518 acres — 100% of total Downtown MU

WATER QUALITY

8.9 lbs of Phosphorus removed annually

SUPPORT FOR NATURAL SYSTEMS

Potential for creation of new high-quality habitat

COMMUNITY BENEFITS

Reimagining of Nelson Lakeside Park with improved access, but less unprogrammed recreational space

CONSTRUCTIBILITY

Site elevations and groundwater may impact storage capacity

SITE CONTROL

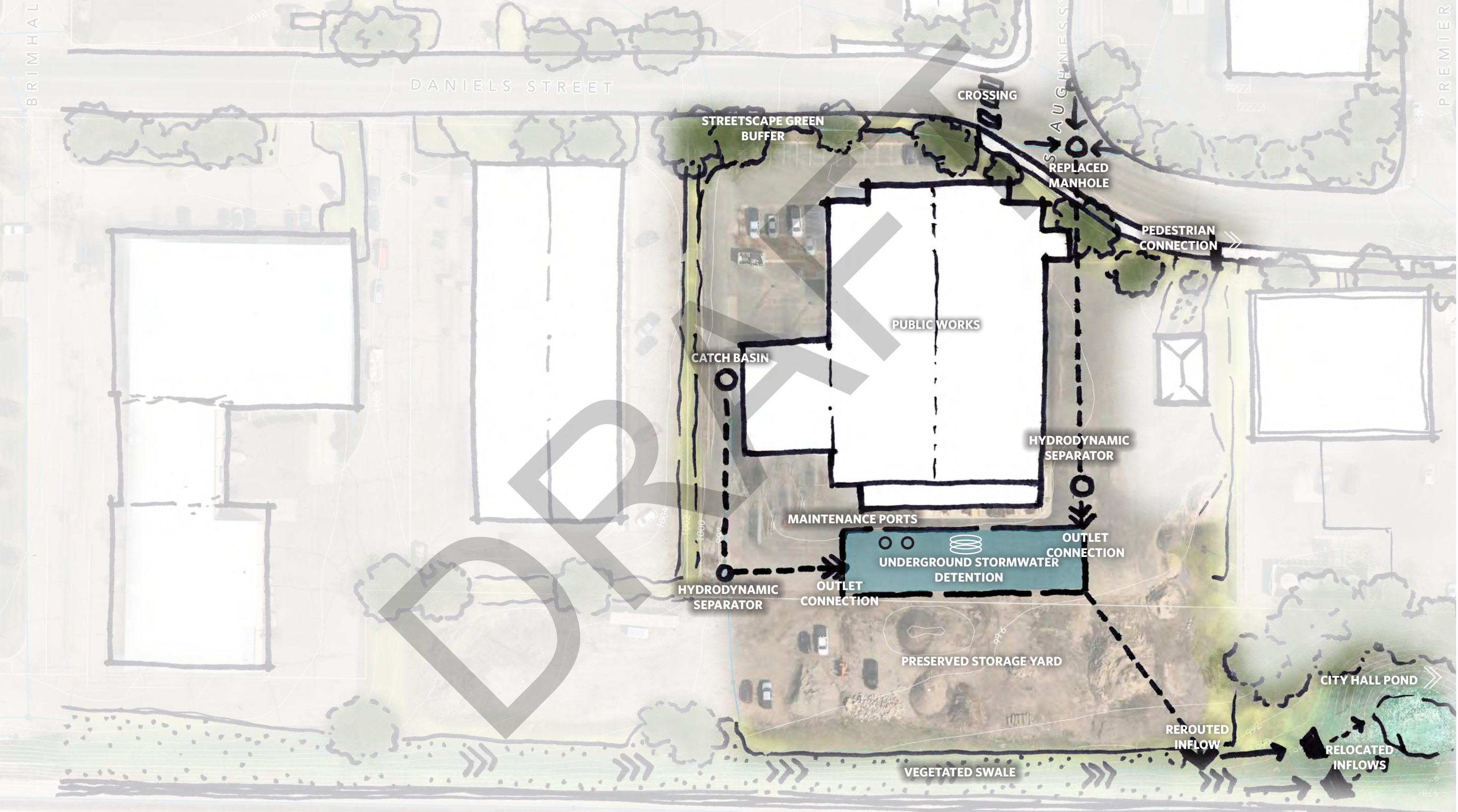
Stormwater facilities are within existing parkland owned by City

OPERATIONS AND MAINTENANCE

Most maintenance within City capabilities, iron enhanced sand will require replenishment

CITY MAINTENANCE FACILITY

Site 4A



PROJECT DESCRIPTION

The project includes the alteration of the existing storm sewer and installation of structural underground storage system beneath the rear portion of the City of Long Lake’s public works facility located at 2145 Daniels Street. The site is owned by the City of Long Lake. The location of the proposed BMP is currently used by public works staff as a material and equipment storage area. While the site would be disturbed during construction, this use would be restored post-construction due to the BMP being located entirely underground and rated for heavy equipment use. The proposed BMP will maintain a minimum 10-foot offset from the existing onsite structure.

Given the site’s limited public access and primary use by City staff, public realm amenities are not recommended; however, the project could be coupled with general site improvements, such as repaving, landscaping, improved material storage, and improvements to the drainage channel that runs longitudinally along the noise barrier.

The project is not recommended due to low water quality benefits. If further geotechnical investigation reveals favorable soils, this project should be reconsidered.

PROJECT SITE AND DRAINAGE AREA



COST & FUNDING

BMP Construction	\$1,300,000
Amenities Construction	\$-
Professional Services	\$200,000
Total Project Cost	\$1,500,000

**Estimated maintenance is \$13,000 annually.*

The project would be eligible for BWSR Clean Water Fund or watershed implementation funding as a municipal stormwater retrofit that reduces pollutant loading to Long Lake. No City, MCWD, or outside funding commitment is assumed.

PERMITTING AND COORDINATION

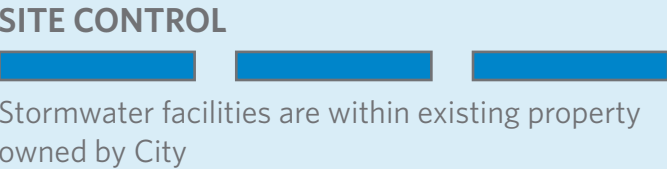
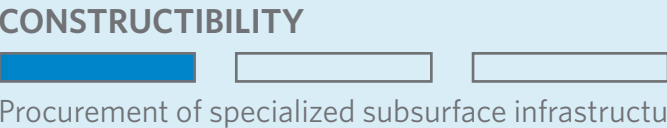
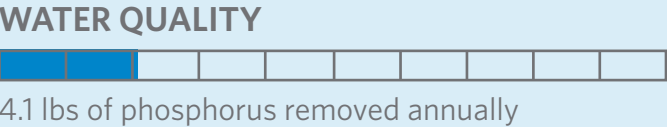
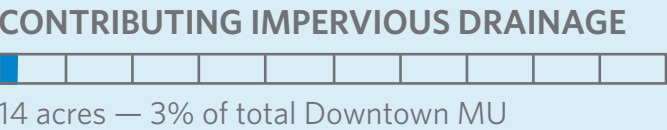
The project will require typical City and MCWD permits in addition to an MCWD waterbody crossing and structures permit, and MPCA NPDES permit coverage.

- The City has recently sold a portion of this parcel, which is reflected in the layout, but should be further coordinated during detailed design.
- Information on infiltration rates and water table depth should be collected.
- As-built information on upstream storm sewer is incomplete.

OPERATIONS & MAINTENANCE

The system and associated access structures will need to be cleaned using a combination jet/vac truck on a regular basis. It is recommended that these cleanings occur bi-annually, though frequency will be dependent on sediment accumulation. Maintenance work within the street may require a partial lane closure of Daniels Street and a temporary obstruction of typical City activities within their materials storage yard.

PROJECT DASHBOARD



PROJECT DETAILS

The proposed BMP is a structural underground storage system that provides stormwater storage, rate control, settling of particulate TSS and TP, and limited potential for stormwater infiltration.

Major proposed improvements include:

- Rerouting of runoff from approximately 20 acres of highly impervious drainage area by replacing an existing manhole in Daniels Street.
- Metering outflow of stormwater through an orifice to reduce peak flow and encourage settling.
- Optionally including a hydrodynamic separator to target trash and larger sediments.

- Repaving disturbed asphalt to maintain existing site use as storage yard.
- Creating 0.7 acre-feet of subsurface stormwater storage.

The system reduces annual TP loading by 4.1 pounds. This BMP type does not typically improve small grain size or dissolved phosphorus unless stormwater is able to infiltrate.

It is assumed that onsite soil conditions may limit the potential to infiltrate the stormwater volume, which would further increase water quality outcomes. It is recommended that soil borings be collected during detailed design to better understand this potential.

WAYZATA & BROWN POND DIVERSION

Site 4C



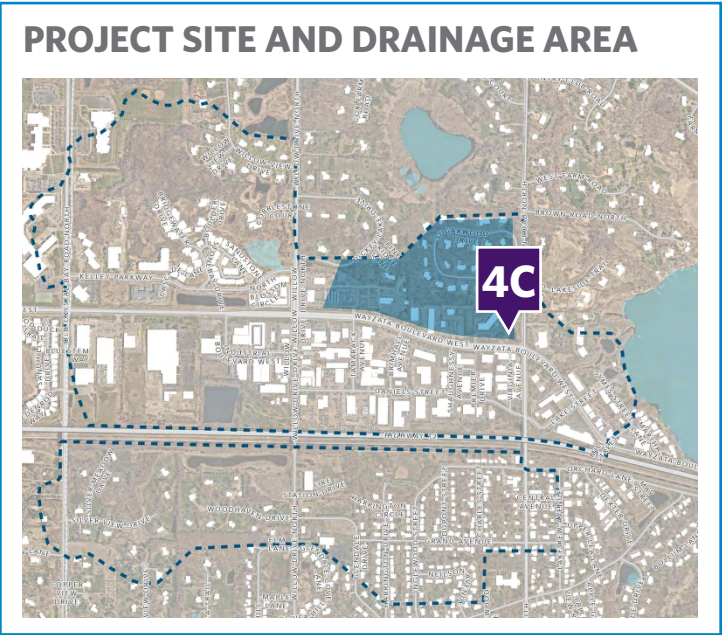
PROJECT DESCRIPTION

In its current condition, the pond at the intersection of Brown Road and Wayzata Boulevard is often green with algae, likely due to it being undersized relative to the contributing watershed. Due to the site’s grading constraints, the retrofit focuses on providing additional pre-treatment to piped stormwater prior to reaching the open water of the pond.

The project site is located along the heavily trafficked Wayzata Boulevard. Both Brown Road and Wayzata Boulevard have sidewalks adjacent to the pond, with the pedestrian facilities along Wayzata doubling as a mixed-use biking trail that, following a recent project by Hennepin County, connects the intersection with the Orono Public School Campus. Public realm enhancements could provide a resting space for pedestrians and bikers, as well as public art visible to vehicular traffic.

There are several visible utilities located on site including sanitary and electrical utilities visible from Wayzata Boulevard. It is likely that an 8” PVC sanitary connection will need to be relocated in order to construct the project.

This project is not recommended due to its low water quality benefits.



COST & FUNDING

BMP Construction	\$630,000
Amenities Construction	\$70,000
Professional Services	\$100,000
Total Project Cost	\$800,000

*Estimated maintenance is \$4,000 annually.

The project may be considered for BWSR Clean Water Fund priority funding because it improves nutrient removal and stormwater treatment capacity in an existing pond system. No City, MCWD, or outside funding commitment is assumed.

PERMITTING AND COORDINATION

The project will require typical City and MCWD permits in addition to MCWD waterbody crossing and dredging permits, and MPCA NPDES permit coverage. An MCWD wetland protection permit, MPCA section 401 permit, and USACE section 404 permit may also be required.

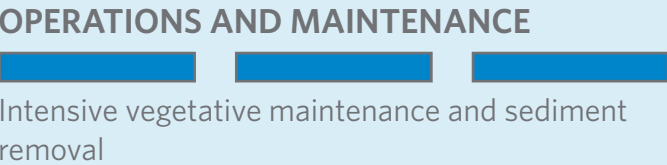
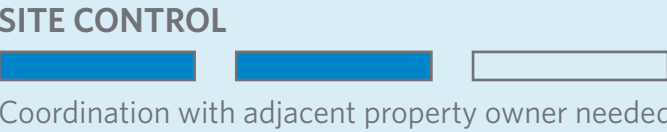
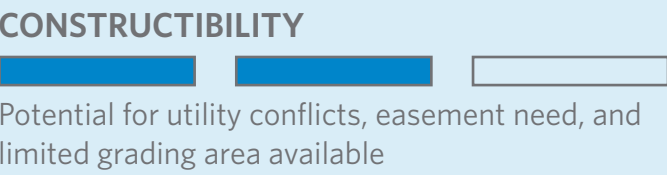
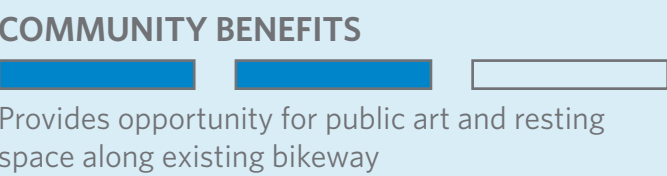
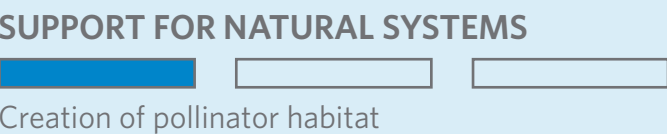
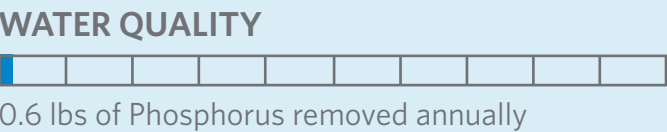
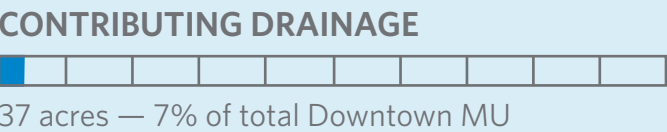
While part of the Downtown Management Unit, the project is located in Orono and will require coordination with the City of Orono and the owner of the adjacent apartment building, the Orono Housing and Redevelopment Authority.

- Further coordination and attention to the nearby and onsite utilities is required.
- Alterations to the outlet structure could result in increased performance, but would require additional hydraulic modeling once more information about the Orono storm sewer is known.
- Due to the proximity to a high-volume roadway, there are opportunities to incorporate public art or other signature design elements.

OPERATIONS & MAINTENANCE

Regular maintenance of this site will primarily focus on the sediment forebay and bioswale area. Maintenance of the bioswale area should be performed 2-4 times annually during establishment. Removal of sediments from the forebay is recommended annually. Dredging of the primary basin is expected every 10-15 years. Easement should be coordinated if necessary, but maintenance vehicles can likely use the existing pull-off on Wayzata Boulevard.

PROJECT DASHBOARD



PROJECT DETAILS

The retrofit will not significantly increase the total amount of pond volume in the permanent pool but instead create a shallow vegetated pre-treatment area to focus sedimentation of particulate phosphorus. The pond receives runoff from two inflows totaling approximately 37 acres.

Major proposed improvements include:

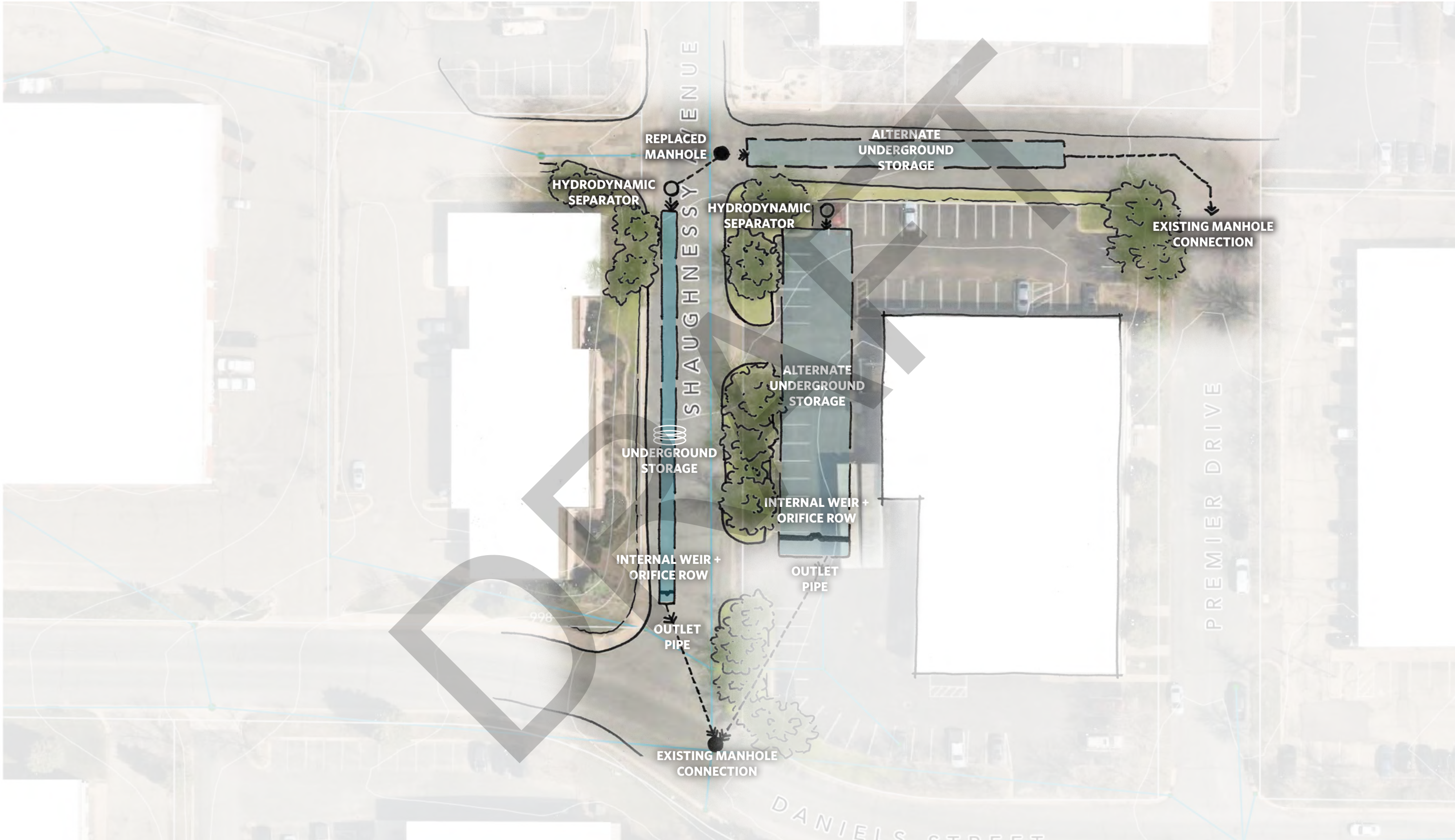
- Grading of sediment forebays to concentrate sedimentation and simplify maintenance.
- Creating a bioswale that will dry between storms, leaving excess nutrients to be used by the vegetation.
- Maintaining the existing outlet riser located at the pond’s southeast corner toward Nelson Lakeside Park.

- Optionally including an aerator to increase oxygenation of existing undersized pond.

Significant expansion of the pond is constrained by developed uses surrounding the pond. Modeling indicates only a slight improvement in phosphorus reduction compared to the existing condition.

SHAUGHNESSY AVE SUBSURFACE MANAGEMENT

Site 4D



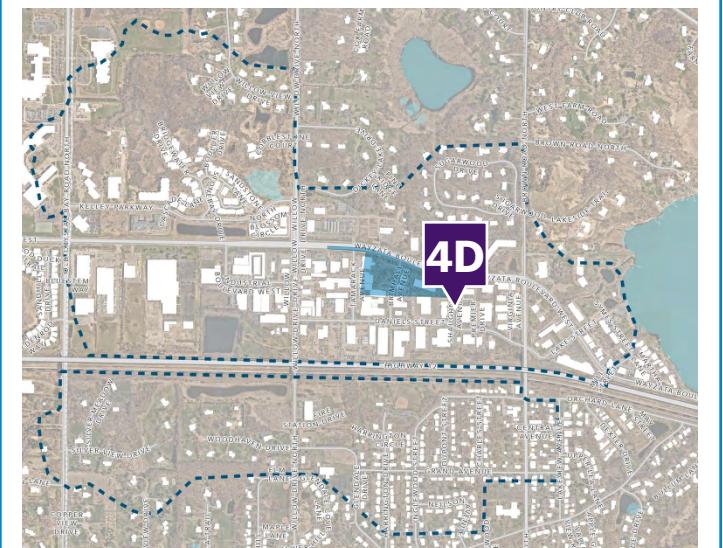
PROJECT DESCRIPTION

The project includes the alteration of existing public storm sewer and installation of a structural underground storage system beneath Shaughnessy Avenue between Premier Drive and Daniels Street. The concept also indicates alternate locations on Premier Drive west of Shaughnessy Avenue, and in the parking lot of the private property located at 1 Premier Drive. Only one of the three presented alternatives will need to be constructed to realize the water quality benefits presented.

The project is located on a side street within a largely industrial area and does not appear to be a strong candidate for the inclusion of public realm amenities. Information about the depth of the storm sewer is unknown and was assumed to be 6 feet below grade for the purposes of assessing feasibility.

The project is not recommended due to its low water quality benefits. If further geotechnical investigation reveals favorable soils, this project should be reconsidered.

PROJECT SITE AND DRAINAGE AREA



COST & FUNDING

BMP Construction	\$750,000
Amenities Construction	\$-
Professional Services	\$120,000
Total Project Cost	\$870,000

*Estimated maintenance is \$8,000 annually.

The project may be considered for BWSR Clean Water Fund or watershed implementation funding as a municipal stormwater retrofit that reduces pollutant loading to Long Lake. No City, MCWD, or outside funding commitment is assumed.

PROJECT DETAILS

The proposed BMP is recommended to be a structural underground storage system that functions similarly to an underground pond.

Major proposed improvements include:

- Diverting 15 acres of highly impervious drainage area via diversion structure.
- Creating 0.25 acre-feet of subsurface stormwater storage and settling basin.
- Metering outflow of stormwater through an orifice to reduce peak flow and encourage settling.
- Concentrating sediment and phosphorus in sumped structures and header row.

PERMITTING AND COORDINATION

Permitting is expected to require typical City and MCWD construction permits. Street closures would be needed for utility work within the right-of-way.

The alternative location on Premier Drive would require permission and easement from the property owner, which could be incentivized through repaving of the parking area.

- Feasibility is contingent on verification of storm sewer elevations, and locating of underground utilities.
- The proposed system could additionally provide localized flood reduction.
- The alternative located on private property provides the most available space and design flexibility.
- Soils should be tested for infiltration. If favorable, the system could reduce dissolved phosphorus.
- If soils are not conducive to infiltration, this location could include cartridge filter systems.

- Optionally including a hydrodynamic separator to target trash and larger sediments.

The system reduces annual TP loading by 4.3 pounds annually. This BMP type does not typically improve small grain size or dissolved phosphorus unless stormwater is able to infiltrate.

It is assumed that onsite soil conditions may limit the potential to infiltrate. It is recommended that soil borings be collected during detailed design of the BMP to better understand this potential. Additional dissolved phosphorus could be removed by including an underground cartridge filter.

OPERATIONS & MAINTENANCE

The system will need regular cleaning using a combination jet/vac truck. The system will be designed to concentrate sedimentation in hydrodynamic separator or upstream sumped structures. Subsurface storage header rows will be provided to further concentrate sediment accumulation and isolate maintenance. It is recommended that these cleanings occur annually or biannually. Maintenance vehicle access will require partial closures. It is anticipated maintenance can be completed in a single day.

PROJECT DASHBOARD

