Minnehaha Parkway Phase I Feasibility Report

Minnehaha Creek Watershed District
Feasibility Report

Prepared for:

Minneapolis Thriving Waters Partnership

Minnehaha Creek Watershed District
15320 Minnetonka Blvd.
Minnetonka, MN 55345

Minneapolis Parks and Recreation Board
2177 West River Road
Minneapolis, MN 55414

The City of Minneapolis Surface Water and Sewers
250 South 4th St, Room 300
Minneapolis, MN 55414

Prepared by:

Stantec Consulting Services Inc.

October 31, 2025

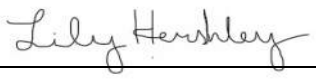
Project/File:
227707285

Disclaimer

The conclusions in the Report titled Minnehaha Parkway Phase I Feasibility Report are Stantec's professional opinion, as of the time of the Report, and concerning the scope described in the Report. The opinions in the document are based on conditions and information existing at the time the scope of work was conducted and do not consider any subsequent changes. The Report relates solely to the specific project for which Stantec was retained and the stated purpose for which the Report was prepared. The Report is not to be used or relied on for any variation or extension of the project, or for any other project or purpose, and any unauthorized use or reliance is at the recipient's own risk.

Stantec has assumed all information received from Minnehaha Creek Watershed District (the "Client") and third parties in the preparation of the Report to be correct. While Stantec has exercised a customary level of judgment or due diligence in the use of such information, Stantec assumes no responsibility for the consequences of any error or omission contained therein.

This Report is intended solely for use by the Client in accordance with Stantec's contract with the Client. While the Report may be provided by the Client to applicable authorities having jurisdiction and to other third parties in connection with the project, Stantec disclaims any legal duty based upon warranty, reliance or any other theory to any third party, and will not be liable to such third party for any damages or losses of any kind that may result.

Prepared by 
Signature

Lily Hershley
Printed Name

Reviewed by 
Signature

Sylvia Doerr
Printed Name

Approved by 
Signature

Nick Wyers
Printed Name

Table of Contents

List of Tables

List of Figures

List of Appendices

Executive Summary

Stantec Consulting Services (Stantec), Hoisington Koegler Group, Inc. (HKGI), Inter-Fluve, Inc. (Inter-Fluve), and 106 Group collaborated to provide a Phase One Feasibility Analysis for the Minnehaha Creek Parkway corridor. The consultant team worked closely with the project Partners including Minnehaha Creek Watershed District (MCWD), Minneapolis Park and Recreation Board (MPRB), and the City of Minneapolis / Surface Water & Sewers (City/SWS). The partnership, named Minneapolis Thriving Waters Partnership (MTWP), between MCWD, MPRB, and City/SWS was created to address water quality issues within the overlapping boundaries of the City of Minneapolis and MCWD and is based on the Clean Water Partnership (CWP) developed in the 1990's to address significant water quality issues in the Minneapolis Chain of Lakes. The CWP was initially a joint effort involving MPRB, the City of Minneapolis, MCWD, and the Minnesota Pollution Control Agency (MPCA). The partnership's preliminary focus was to develop highly impactful projects along the Minnehaha Creek Parkway corridor. Through the collaborative partnership the Partners have identified leveraging of the Minnehaha Parkway Regional Trail Master Plan (2020) as a catalyst framework to initiate implementation of impactful projects. The Partners requested the development of a feasibility analysis focused on metrics such as water quality, water quantity, and ecological integrity by investigating stormwater Best Management Practices (BMPs), re-meandering of the creek, and floodplain restoration. In addition, passive and active recreational amenities, accessibility upgrades, and interpretive elements were considered.

The feasibility analysis assessed projects that were originally outlined in the Minnehaha Parkway Regional Trail Master Plan. The Master Plan was adopted in November 2020 and guides improvements for parkland and trails surrounding Minnehaha Creek over the next 20 to 30 years. The Master Plan breaks up the regional trail into four segments and multiple focus areas for improvements. The MTWP collaborated to identify high impact projects introduced in the Master Plan which could move to implementation within a 1–2-year time frame. The specific projects from the Master Plan that are assessed in the Feasibility Analysis include the Penn-Newton-Morgan Focus Area located in Segment 1, the Nicollet Hollow Focus Area located in Segment 2, and an area near Cedar Avenue located in Segment 3. See Figure 1 in Section 1.0 for a graphic including Segments 1-3 and focus areas from the Master Plan.

The consultant team worked closely with MCWD, MPRB, and the City/SWS to collaborate on the potential benefits for multiple approaches or "options" at each of the three project sites along the Minnehaha Creek corridor. The three project locations and options along the corridor include the following:

- Site 1 - Area between Bloomington Avenue and Cedar Avenue which will be referred to as the "Cedar" site in this report. Two alternatives (options) were assessed for this site which incorporate multiple projects for each alternative: Option 1, smaller multi-cell stormwater footprint with no major circulation adjustments, and Option 2, larger multi-cell stormwater footprint with major circulation adjustments.
- Site 2 - Area just west of Nicollet Avenue which will be referred to as the "Nicollet" site in this report. Two alternatives were assessed for this site which incorporate multiple projects for each alternative: Option 1, creek re-meander with a smaller stormwater basin, and Option 2, one larger stormwater and flood storage basin.

- Site 3 - Area east of Penn Avenue and an area between Newton Avenue and Morgan Avenue where the creek meanders in the north-south direction which will be referred to as the “Penn-Newton” site in this report. This location physically includes two sites within one larger area in terms of BMP feasibility. This report will generally discuss both sites together and will discuss the site-specific elements as appropriate. Two alternatives with multiple projects were assessed for this site: Option 1, stormwater treatment train and stormwater treatment basin, and Option 2, check dams and stormwater basin with filtration basin.

Several meetings were conducted with project stakeholders including a kickoff meeting (September 23rd, 2024) and two workshop engagement meetings (November 13th and December 18th, 2024). The findings and discussions of these meetings will be discussed in conjunction with the feasibility analysis to help memorialize the decisions made, and to provide a baseline understanding of items that will need to be considered as the project enters the design phase.

The feasibility analysis considered each project option to identify project benefits such as improvements to water quality, ecological lift, user experience, and ease of implementation. A prioritization matrix was created to compare the benefits of each option for each site. The prioritization matrix was also used to assess the feasibility of implementing the projects at each site to help determine a recommended phased approach. The full prioritization matrix is included in Appendix C and a summary is included in section 4 of the report. The feasibility analysis has resulted in the following recommended Phase I Project sequence:

1. Cedar (design anticipated 2025-2026)
2. Penn-Newton (the project would be split into sub elements):
    a. Spillway repair and creek stabilization (design anticipated 2025-2026)
    b. 53rd Street and Penn stormwater (lowest priority. To be evaluated against other projects)
3. Nicollet (concept planning and community engagement anticipated 2026-2027 given the project complexities)

Acronyms / Abbreviations

Acronym / Abbreviation	Full Name
BMP	Best Management Practice
CSO	Combined Sewer Overflow/System
CWA	Clean Water Act
CWP	Clean Water Partnership
EAW	Environmental Assessment Worksheet
EOPCC	Engineer's Opinion of Probable Construction Cost
FEMA	Federal Emergency Management Agency
H&H	Hydraulic and Hydrologic Modeling
MCES	Metropolitan Council Environmental Services
MCWD	Minnehaha Creek Watershed District
MDNR	Minnesota Department of Natural Resources
MPCA	Minnesota Pollution Control Agency
MPRB	Minneapolis Park & Recreation Board
MTWP	Minneapolis Thriving Waters Partnership
NPDES	National Pollutant Discharge Elimination System
NWI	National Wetland Inventory
O&M	Operations and Maintenance
RPBB	Rusty-patched bumble bee
SWS	City of Minneapolis Surface Water & Sewers division of the Public Works Department
TCB	Tri-colored bat
TP	Total Phosphorous
USACE	United States Army Corps of Engineers
USFWS	United States Fish and Wildlife Services
WCA	Wetland Conservation Act

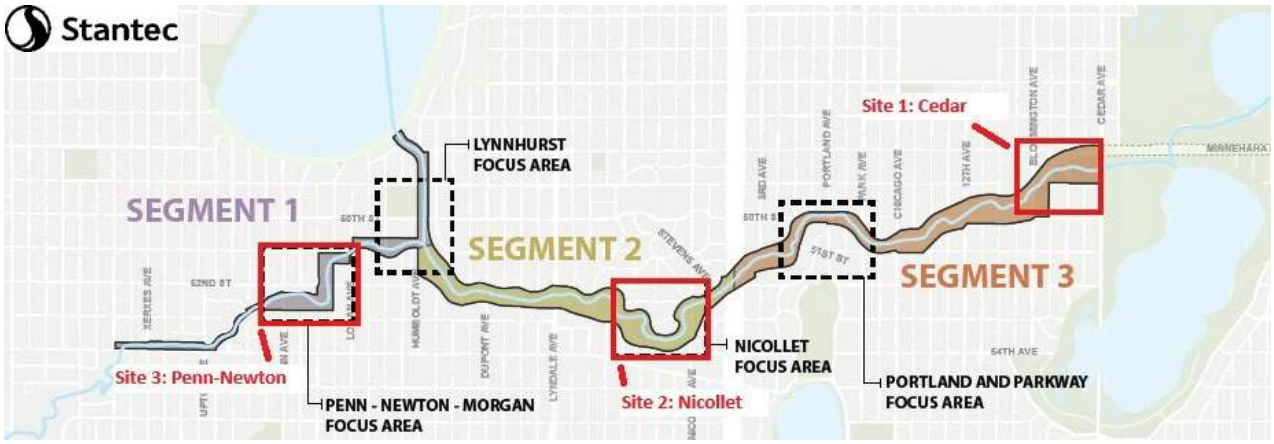
Glossary

Term	Definition
Best Management Practice (BMP)	Techniques or control measures used to manage the quantity and improve the quality of stormwater runoff.
Floodplain Storage	The capacity of a floodplain to temporarily store excess stormwater during high-flow events, reducing downstream flooding and improving water quality.
Hydrologic and Hydraulic (H&H)	Computer modeling used to analyze how water moves through a watershed and how it flows through channels.
Re-meandering	The process of restoring a stream to a more natural, winding path to improve ecological function, reduce erosion, and enhance floodplain connectivity.
Total Phosphorous (TP)	A key water quality metric representing the total concentration of phosphorous in water.

1.0 Introduction

Stantec Consulting Services (Stantec), Hoisington Koegler Group, Inc. (HKGI), Inter-Fluve, Inc. (Inter-Fluve), and 106 Group have conducted a Phase One Feasibility Analysis for the Minnehaha Creek Parkway corridor. The three project locations are outlined in Section 3.0 including Section 3.1 pertaining to the Cedar location, Section 3.2 pertaining to the Nicollet location, and Section 3.3 pertaining to the Penn-Newton location. Figure 1 is a diagram of segments and focus areas shown in the Minnehaha Parkway Regional Trail Master Plan and shows the general site locations studied in the feasibility analysis.

Figure 1: Site Locations



A summary of preceding contextual studies is provided below:

- 2007: City/SWS staff investigated the potential to disconnect CSO 055, where a storm main is connected to the sanitary sewer at the intersection of Cedar Ave and 48th St. A subsequent investigation was conducted in 2014. Both efforts concluded it was not possible without additional measures to offset the increased flows to the Minnehaha Creek, which would require a larger collaborative effort. These studies were not included in the current feasibility analysis.

- 2012: MCWD contracted with Inter-Fluve to complete a series of geomorphic and biologic assessments within the Minnehaha Creek watershed to evaluate existing stream networks, channel stability, and water quality. A similar assessment was conducted in 2003 and 2004. The 2012 study included ground reconnaissance to evaluate system changes and provide recommendations for potential improvement areas.

- 2013: Regional study to look at volume management opportunities along the parkway. MCWD separately studied opportunities for infiltration-based green infrastructure adjacent to Minnehaha Creek and subsequently received Clean Water Legacy funding for implementation.

- 2014: Minnehaha Creek experienced record flooding throughout the District resulting in road closures, sustained standing water, bank failures, and in-stream erosion issues. As a result, MCWD, in consultation with Wenck Associates, Inc. (Wenck), completed a field assessment where 47 sites along Minnehaha Creek were identified as flood damage locations. Of the 47 sites, 35 were submitted and approved for Federal Emergency Management Agency (FEMA) federal funding

assistance for stream bank stabilization. FEMA approved funding for 35 sites targeting stream bank stabilization that generally focused on standardized riprap material, channel bank re-sloping, erosion control practices, and, to a lesser extent, integrated design to improve the in-stream condition using bioengineered practices.

- Early August 2017: Inter-Fluve and Wenck staff completed a visual assessment of the 47 sites identified in 2014. This confirmed project site elements still required action and identified other project constraints (e.g. infrastructure, cultural resource issues). Based on this high-level screening and dialogue with MCWD, 16 of the 35 FEMA funded sites and three of the 12 non-FEMA funded sites were recommended for preliminary design in Stage 1.
- 2017: City/SWS contracted HR Green to study alternatives to reduce urban flooding and manage stormwater in the subwatershed to the southwest of Lake Harriet with input by MCWD and MPRB. The final report included a recommendation to add a BMP at the 52nd St outfall to Minnehaha Creek.
- April 2018: HKGI, Wenck, and Inter-Fluve conducted an analysis and issued a report to enable filtering of high impact projects which could align with potential partner capital improvement projects and FEMA repairs to create efficiency in implementation. The report addresses stormwater best management practices (BMPs) that may be constructed independently of or in conjunction with FEMA funded projects. 13 potential BMPs were identified. The objective of this report was to provide stakeholders (i.e. MCWD, the City of Minneapolis, MPRB, etc.) with a list of potential BMP locations, pollutant removal efficiency, and cost of identified BMPs. The information in this report was intended to identify BMPs for independent construction, direct future master planning efforts, and direct the integration of BMP projects as part of related infrastructure improvement projects.
- 2018: As part of its regular asset management program, the City/SWS evaluated the condition of pipes and outfalls to Minnehaha Creek in the years leading up to 2018. The condition and priorities for replacement were shared with the partners as part of the ongoing collaboration in the area. The City/SWS continues to collect missing data as conditions allow.
- 2020: The Minnehaha Parkway Regional Trail Master Plan was completed by MPRB, MCWD, and the City of Minneapolis with the help of consultants including Wenck, Inter-Fluve, and HKGI, and with extensive community engagement. The plan was officially adopted by MPRB in November of 2020. The plan is intended to guide capital improvements over the next 20-30 years for parkland and trails surrounding Minnehaha Creek.

The above information, along with the continued efforts by the project stakeholders, led to the three selected sites discussed in this analysis. This analysis, and the cooperative agreement consisting of the three primary stakeholders (MCWD, MPRB, City/SWS), is part of a long-term partnership between the agencies to focus on improvements related to water quality and stormwater benefits within the City. This feasibility analysis focuses on metrics such as water quality, water quantity, and ecological integrity by investigating stormwater BMPs, re-meandering of the creek, and floodplain restoration. In addition, passive and active recreational amenities, accessibility upgrades, and interpretive elements were considered.

As the MTWP looks to make investments along the creek corridor through Minneapolis, each project has the possibility to include recreational components. Some potential recreational features such as trail realignments around stormwater features or creek re-meanders will be integral to maintaining multi-modal

connectivity along Minnehaha Parkway; others are unrelated to specific stormwater improvements but may benefit from being planned and constructed alongside these projects to capture some efficiency in cost. These recreational projects are considered “à la carte” and are noted in the body of this report and in the cost estimate (Appendix B) as such. A study on the proposed recreational features was done by HKGI and is summarized in the report. The recreational projects explored in this feasibility study, whether they relate directly to proposed water quality improvements or not, are grounded in the 2020 Minnehaha Parkway Regional Trail Master Plan, and are included here to ensure continuity of planning intent as the agencies look to implement this first phase of creek improvements. MPRB and MCWD should continue to work together to select which of the à la carte recreational projects should be folded into the scope of the selected water quality projects.

2.0 Data Sources

Various sources of data were obtained to evaluate any potential regulatory requirements that would influence alternative designs and to serve as a baseline for concept exploration. Technical constraints were also revisited at each location to help focus alternative development. Technical constraints investigated include infrastructure needs, potential tree conflicts, historic structures, and groundwater influences. An outline of data sources reviewed are listed below.

MCWD provided the following information:

- Existing hydrologic and hydraulic (H/H) and water quality models associated with the 2018 study
- Preliminary concept sketches associated with the 2020 Parkway Master Plan

MPRB provided the following information:

- Historic maps
- Historic photos
- Historic corridor improvement figures
- The Master plan survey
    - LiDAR, tree survey, infrastructure survey
- Site specific concerns including locations of ice dams, flooding, foot traffic, turtle movement, etc.

The City of Minneapolis provided the following information:

- Two City of Minneapolis H/H (XPSWMM) models and a water quality model (P8)
- Prioritized list of outfall repairs
- Markups of GIS figures to show project concerns. Those items include:
    - City utilities
    - Original boundary for CSO 055
    - Metropolitan Council Environmental Services (MCES) utilities
    - Historic information and site specific improvement concerns.

2.1 Discovery/Desktop Data Collection and Review

A desktop review was completed to evaluate regulatory requirements and timelines for the implementation of each site, including but not limited to threatened and endangered species, wetland permitting, and environmental review need.

Threatened and Endangered Species

A threatened and endangered species desktop review was conducted to determine potential impacts to rare species as part of the potential site modifications. If any federal funds are to be used for this project, official United States Fish and Wildlife Service (USFWS) consultation would be required. Coordination with the Minnesota Department of Natural Resources (MDNR) may also be encouraged or required. Rare species that may potentially be impacted as well as potential measures to mitigate impacts are included below:

Rusty-patched bumble bee (RPBB): The RPBB may be present at each site. Nests are typically one to four feet underground in abandoned rodent nests or mammal burrows and occasionally at the soil surface (excludes pavement, wetlands and waterbodies). Overwintering sites are typically in upland forest and woodlands but tall vegetation in uplands can be utilized as well. To avoid adverse effects, ground disturbance in overwintering and nesting habitats should either be less than 0.25 acres or occur outside the overwintering timeframe (October 11 – April 14) or outside the nesting timeframe (April 15 to October 10th). Removal of foraging resources should either be less than 2.0 acres or occur outside the nesting timeframe.

Tri-colored bat (TCB): The TCB may be present at the Nicollet site. Tree clearing and culvert/bridge work would need to be conducted in the winter to avoid impacts to TCB habitat.

Pugnose shiner: The shiner is likely present at all sites. The proposed site modifications at the Cedar and Penn-Newton sites are not anticipated to require substantial mitigative action. Potential re-meandering associated with the Nicollet site may require further assessment and mitigative measures. Mitigation may include appropriate erosion and sediment controls.

Blandings turtle: The turtle may be present at the Cedar and Nicollet sites but is not anticipated to require substantial action. Education protocols such as educating construction workers and inspectors about the turtle and posting flyers with MDNR contacts would be followed. Mitigation may include appropriate erosion and sediment controls.

The lake sturgeon, least darter, and forster's tern may also be present at each site, however the proposed site modifications are not anticipated to require substantial action. Appropriate erosion and sediment controls could be implemented as a mitigative measure. The forster's tern uses marshy edges for nesting and generally occurs in colonies in wetlands less than 50 acres in size. If the forster's tern or an active nest is spotted, it should be reported to the MDNR for next steps.

Wetland Permitting

A desktop review of wetland presence and potential regulated impacts was conducted to determine any required permitting associated with site modifications proposed at each site. Permitting through the United State Army Corps of Engineers (USACE) under Section 404 of the Clean Water Act (CWA) and permitting through the MDNR under the Wetland Conservation Act (WCA) will likely be required for the Cedar site and may be required for the Nicollet site. Further evaluation for each site is included in Section 3.0.

Environmental Review Need

A mandatory Environmental Assessment Worksheet (EAW) would be required by Subpart 26 of Statute 4410.4300 for stream re-meandering of over 500 feet in length. An EAW is anticipated to be needed for re-meandering associated with Option 1 at the Nicollet site. Further evaluation of Option 1 and associated site modifications is included in Section 3.0.

Other Anticipated Permits and Coordination

Other permits and agency coordination may be needed for the implementation of each site. Table 1 summarizes all anticipated permits/coordination for each site and its proposed options. See Section 3.0 for further evaluation of each option.

Table 1: Anticipated Permits and Coordination

Site/Option and Agency	Cedar		Nicollet		Penn-Newton	
	Option 1	***Option 2***	***Option 1***	***Option 2***	***Option 1***	***Option 2***
FEMA	No rise certificate	No rise certificate	CLOMR/LOMR	CLOMR/LOMR	No rise certificate	No rise certificate
MPCA NPDES	NPDES/SDS Construction Stormwater General Permit	NPDES/SDS Construction Stormwater General Permit	NPDES/SDS Construction Stormwater General Permit	NPDES/SDS Construction Stormwater General Permit	NPDES/SDS Construction Stormwater General Permit	NPDES/SDS Construction Stormwater General Permit
City of Minneapolis	Coordination with SWS. CH 54 Erosion Control Private Utility connections	Coordination with SWS. CH 54 Erosion Control Private Utility connections	Coordination with SWS. CH 54 Erosion Control Private Utility connections	Coordination with SWS. CH 54 Erosion Control Private Utility connections	Coordination with SWS. CH 54 Erosion Control Private Utility connections	Coordination with SWS. CH 54 Erosion Control Private Utility connections
MCWD	Erosion Control, Floodplain Alteration, Stormwater Management, Wetland Protection and Streambank Stabilization Permits	Erosion Control, Floodplain Alteration, Stormwater Management, Wetland Protection and Streambank Stabilization Permits	Erosion Control, Floodplain Alteration, Stormwater Management, Wetland Protection and Streambank Stabilization Permits	Erosion Control, Floodplain Alteration, Stormwater Management, Wetland Protection and Streambank Stabilization Permits	Erosion Control, Floodplain Alteration, Stormwater Management, Wetland Protection and Streambank Stabilization Permits	Erosion Control, Floodplain Alteration, Stormwater Management, Wetland Protection and Streambank Stabilization Permits
MPRB	Permits for disturbance/work within the parkway	Permits for disturbance/work within the parkway	Permits for disturbance/work within the parkway	Permits for disturbance/work within the parkway	Permits for disturbance/work within the parkway	Permits for disturbance/work within the parkway

Site/Option and Agency	Cedar		Nicollet		Penn-Newton	
	Option 1	***Option 2***	***Option 1***	***Option 2***	***Option 1***	***Option 2***
MCES	Sanitary line coordination and/or relocation	Sanitary line coordination and/or relocation	N/A	N/A	Sanitary line coordination and/or relocation	Sanitary line coordination and/or relocation
MDNR and USACE	Coordination and/or permits for work below the Ordinary High-Water Level (OHW)	Coordination and/or permits for work below the Ordinary High-Water Level (OHW)	Coordination and/or permits for work below the Ordinary High-Water Level (OHW)	Coordination and/or permits for work below the Ordinary High-Water Level (OHW)	Coordination and/or permits for work below the Ordinary High-Water Level (OHW)	Coordination and/or permits for work below the Ordinary High-Water Level (OHW)
	Wetland permitting likely	Wetland permitting likely	Potential wetland permitting	Potential wetland permitting	N/A	N/A
Hennepin County	Coordination for impacts to County Roads	Coordination for impacts to County Roads	N/A	N/A	N/A	N/A
Metro Transit	Coordination with impacts to bus routes and stops	Coordination with impacts to bus routes and stops	Coordination with impacts to bus routes and stops	Coordination with impacts to bus routes and stops	Coordination with impacts to bus routes and stops	Coordination with impacts to bus routes and stops

3.0 Feasibility Sites

3.1 Cedar

3.1.1 Overview

The Cedar site consists of large open green space along the north side of the creek between the Bloomington Avenue and Cedar Avenue sections of the creek. There is potential at the site to address stormwater and floodplain issues, create significant ecological lift, and optimize the overall recreational use of the area. The primary objectives for this site included analyzing the potential for a stormwater BMP to reduce localized flooding, incorporating wetland and nature-based solutions, and revising trail and circulation patterns.

Figure 2: Cedar Site – Existing Conditions

3.1.2 Technical Feasibility / Constructability Review (Infrastructure Analysis)

The Cedar site was evaluated for five projects with 2 alternatives (Option 1 and Option 2) for the projects. The five projects include creek re-meander (Project A), riparian habitat restoration (Project B), bank re-naturalization (Project C), multi-basin stormwater wetland (Project D1/D2), and combined sewer (CSO) separation (Project E). The site was also evaluated for two à la carte projects including recreation and circulation improvements (Projects F and G). See Figures 3 and 4 for a quick look and Appendix A for detailed concept drawings of each option and associated projects. The alternatives were reviewed to determine constructability of each option prior to developing feasibility costs. The only difference between the two alternatives is the multi-basin stormwater wetland (Project D1/D2).

Option 1 grades the stormwater wetland to minimize tree impacts. Option 2 includes a larger stormwater wetland that has boardwalks included for the pedestrian walking path through this park. Option 2 also includes circulation adjustments that considered a pedestrian trail under Cedar Avenue. It was determined that including a trail with this project would not be feasible, as its location below the creek elevation would require flood walls and stormwater pumps to keep it dry.

Through feasibility it was determined that the existing stormwater infrastructure would be adjusted to change the routing of the existing storm sewer from the current creek outlet to the newly constructed stormwater wetland. The review determined the elevations would be feasible to complete.

The feasibility of separating the CSO was also evaluated. The CSO area on Cedar Avenue is likely feasible and can be coordinated with other infrastructure improvements. While a moratorium is currently in place due to a recent Hennepin County improvement project, the City has indicated that this is an administrative process and does not prevent work from occurring in the area. The CSO storm sewer in question connects to an MCES sanitary interceptor in the intersection of Cedar Ave and 48th Street and extends north and west through an alley. Achieving gravity drainage will require replacing the existing pipe at a higher elevation. As part of this project, stormwater improvements along the parkway will be designed to support future CSO separation.

There are two sanitary sewers that are in the site:

- The first sanitary sewer is a 11-foot horseshoe concrete pipe built in 1926. The Metropolitan Council owns this interceptor line. It runs diagonally across the site, crossing Minnehaha Creek near 16th avenue south and crossing Cedar Avenue north of E Minnehaha Parkway. In 2022, MCES inspected the interceptor line and found it to be in good condition. There are no plans to complete any rehabilitation work in the near future, however MCES has expressed interest in additional evaluation of this system when the stormwater wetlands are moved forward in design.
- The second sanitary sewer is a 21-inch clay pipe that was built in 1930 and is owned by the City. It runs diagonally through the site and connects to the MCES pipe in the park south of 48th St. The City/SWS does not want the proposed stormwater wetland above their system due to concerns about accessing it for maintenance and concerns about clear water inflow into the sanitary sewer from the ponded water. During the feasibility report generation, the City/SWS televised the system to assess its condition. The televising showed there currently is significant inflow into it from the groundwater, and lining it is not recommended due to the current level of inflow. The City/SWS has expressed tentative interest in relocating the sanitary sewer farther east if a reasonable alignment can be found that does not compromise the hydraulics of the system. Funding for relocation effort would need to be secured if that is pursued.

Figure 3: Cedar Site - Option 1

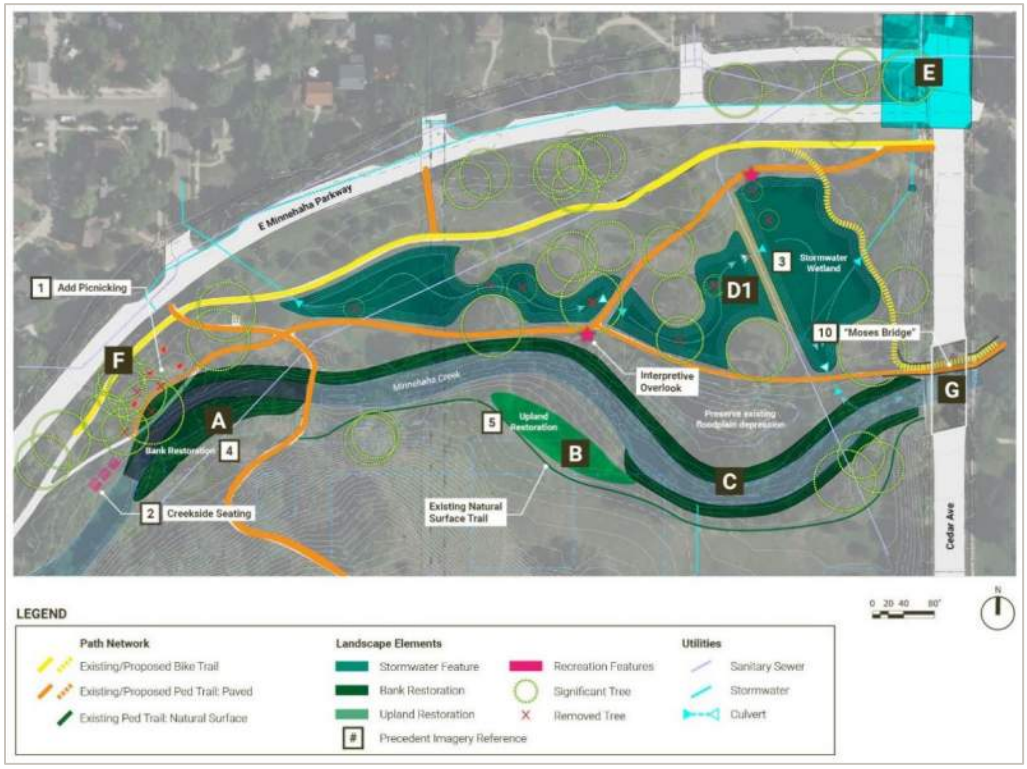
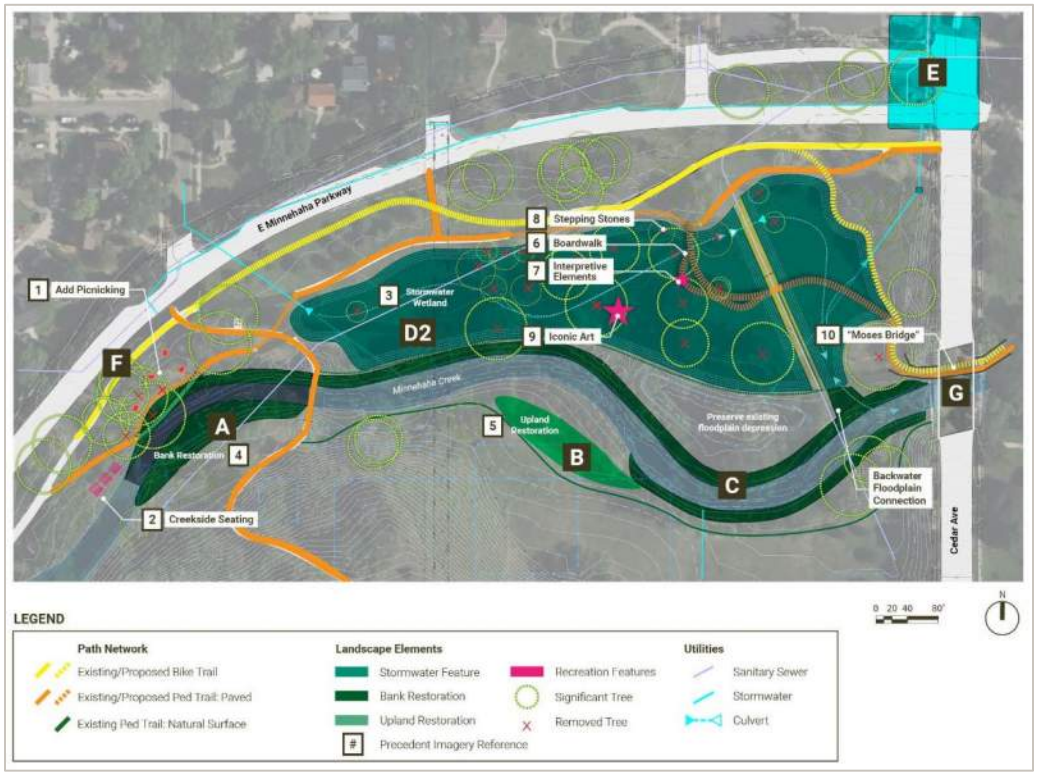


Figure 4: Cedar Site - Option 2



3.1.3 Permitting and Wetlands

A list of anticipated permits is included in Section 2.1.

The existing creek and riparian forest wetland areas on the north and south sides of the creek are wetlands according to the National Wetland Inventory (NWI). Specific design considerations for the proposed ponds should be considered in final design to demonstrate compliance with WCA rules. The available information indicates that modification of these existing areas would create excess standing water and/or conversion of the areas to stormwater ponding resulting in certain WCA permitting requirements. Final design should take into consideration the existing wetland type(s) and prioritize minimal excavation to preserve the wetland's natural characteristics. The goal should be to ensure that any modifications support wetland functionality rather than transforming these areas into cattail-dominated stormwater ponds. Maintaining features that resemble natural wetlands will strengthen the case that the proposed changes do not constitute a conversion of wetland to non-wetland under WCA. Additionally, there are existing gas line markers in the vicinity of this site, so further due diligence and coordination with local utility companies shall be expected to determine the exact locations of utilities prior to construction.

The project is in a regulatory floodway and is not anticipated to increase the existing flood elevations within the 100-year floodway. Prior to receiving any permits for site modifications, a no-rise certificate must be obtained through the proper FEMA procedure. The certificate must be supported by technical data and signed by a registered professional engineer. Any local floodplain requirements would also be addressed.

3.1.4 Water Quality

The existing Total Phosphorous (TP) loading for the Cedar tributary area is 63.1 lbs/yr. P8 models were created for both options utilizing data from the Minneapolis water quality model for calibration purposes. See Appendix D for results of the P8 modeling. The watershed areas were split between hydrologic soil groups (HSG) D and A with most of the tributary areas being grassed areas due to the high percentage of residential housing land use. Option 1, with three separate ponds, proposes each pond captures flows from their respective watershed and discharges south to Minnehaha Creek. This option consists of a western pond that captures runoff from a 95-acre watershed, primarily consisting of residential housing, with some park area, and an eastern pond that captures water from a 19-acre watershed that includes a mix of residential areas, parkways, and industrial zones. The west pond has limited removal efficiencies due to the pond footprint size in relation to its contributing drainage area whereas the east pond has higher removal efficiencies for its respective contributing drainage area.

Option 2, with two larger combined ponds, modifies the model by implementing just one device that captures both watersheds. The combined pond is more appropriately sized for the watershed area and thus provides removal efficiency in line with Nationwide Urban Runoff Program (NURP) pond TP removal percentages. The west pond associated with Option 1 has a reduced efficiency because the watershed area (95 acres) in comparison to the pond size is much larger. TP loading was compared to the Minneapolis water quality model; the modeled loads varied by 5%.

Table 2: Cedar - Water Quality Total Phosphorus (TP) Removal Summary

Option	Watershed Inflows (lbs/yr)	Removals (lbs/yr)	% Removal
Option 1			
East Pond (19 acres tributary)	13.4	8.7	65%
West Pond (95 acres tributary)	49.7	17.6	35%
Total	63.1	26.3	42%
Option 2			
Combined Pond/Total	63.1	37	58%

3.1.5 H&H

The City's XP-SWMM model was used to evaluate the level of risk of exacerbating street flooding by adding ponding features to the green space at the site. See Appendix E for the results of the SWMM modeling. The tributary drainage area for the proposed BMP(s) is approximately 114 acres. The proposed BMP(s) will add storage below the approximate 100-year flood elevation of 821 with proposed storage elevations between elevations 816 to 817. Option 1 provides about 1.25 acre-feet of additional flood storage, and Option 2 provides approximately 2.4 acre-feet of additional flood plain storage.

Due to the existing conditions where many existing pipes and manholes have inverts with reverse slopes or inverts below the creek elevation, there are some potential challenges with demonstrating a decrease in the 100-year flood elevation associated with the pond improvements when utilizing the City's XP-SWMM model for proposed updates. Even with the addition of extra storage below the 100-year elevation, preliminary updates to the model indicate 0.02 to 0.08 feet of rise in the upstream pipe depending on the option under consideration which could be within the tolerances of the model. It was determined this rise would not increase the risk of off-street flooding. Final design will require further analysis of this topic, taking into consideration potential updates to the city storm sewer infrastructure around this site.

3.1.6 Site Amenities

At the Cedar site, circulation adjustments are integral projects related to the proposed stormwater and creek restoration improvements. Option 1 requires only a small trail realignment to skirt the creek re-meander stabilization at Project A. Option 2 requires more significant trail realignment as part of project D2 but moves these trails out of the floodplain to improve year-round usability. Also included in project D2 is a 12' wide boardwalk across the new multi-basin stormwater wetland, which would offer a unique recreational experience along Minnehaha Parkway and provide an opportunity for an interpretive overlook related to the restored wetland. À la carte recreation at Cedar includes the addition of picnic tables beneath existing trees near project A. Additionally, a "Moses Bridge" shared use path extension beneath Cedar Avenue was proposed in the master plan in order to reduce at-grade crossings of busy Cedar Avenue and could also be accommodated with either of the proposed stormwater wetland projects. An existing packed earth natural surface trail along the south side of the creek may need to be realigned to skirt the riparian restoration area; this will likely be achieved naturally over time through foot traffic.

The project features associated with the Cedar site provide opportunities to enhance interpretive programming along the regional trail. A study done by 106 Group found that development of the multi-basin stormwater pond and riparian habitat restoration provide the most significant opportunity for incorporating interpretive enhancements. The boardwalk and overlook platforms would provide views to these features and would be an excellent forum for introducing trail users to the topic of “engineered nature”. Other potential opportunities include playful interactive features for young audiences, and guided ranger talks led by MPRB or partner agency staff. See Appendix G for the full interpretive foundations assessment and recommendations.

Figure 5: Cedar - Proposed Site Amenities

3.1.7 Stream Assessment

Significant erosion was observed near the pedestrian path and recently installed amenities near the west end of the project extents. A meander is recommended in this location along with shifting of the trail. Re-meandering (Project A) at this location would add approximately 25 feet of stream length. Bank restoration (Projects A and C) is proposed along a total of 1,810 feet of stream bank, 560 feet associated with Project A and 1,250 feet associated with Project C. Geomorphic reconnaissance efforts and conceptual design development for stream modifications were completed by Inter-Fluve and summarized in a technical memorandum included in Appendix H.

3.1.8 Cost

Stantec produced detailed cost estimates for the site and each option based on work items such as recreational improvements, general construction, engineering, and permitting. The detailed cost estimates also accounted for Inter-Fluve's Engineer's Opinion of Probable Construction Costs (EOPCC), which considered work items specific to stream restoration. Appendix B includes the detailed cost estimate for the site and Appendix H includes Inter-Fluve's EOPCC. Table 3 below summarizes the cost estimate without the à la carte recreation and circulation improvements.

Table 3: Cedar - Cost Summary

Cedar	
Option 1	**Option 2**
Smaller pond footprint w/o major circulation adjustments	Larger pond footprint w/ major circulation adjustments
$ 1,020,000	**$ 3,080,000**

3.1.9 Operation and Maintenance

An initial understanding of the maintenance required for each option was provided during the project workshops. The level of effort for operation and maintenance (O&M) for Option 1 (smaller pond) is moderate, and the level of O&M effort for Option 2 (larger pond with boardwalk) is considered high due to the boardwalk adding complexity. The City of Minneapolis would be responsible for O&M related to wet ponds (visual inspections and removal of sediment/debris), stormwater wetlands (visual inspection and removal of sediment/debris), and the existing grit chamber (inspections and cleaning). MPRB would be responsible for O&M related to wet ponds (vegetation maintenance), stormwater wetlands (vegetation maintenance), trails and boardwalks (maintenance, plowing, and surface management), streambank restoration and streambank re-meander (vegetation maintenance), and native vegetation (herbicides and prescribed burns, inspection for disease, and mowing invasives). Contractors would be hired to help with O&M of streambank restoration and re-meander (vegetation establishment, maintenance, and inspections). O&M responsibilities outlined above are based on asset ownership and preliminary conversations with the MTWP. See Appendix F for detailed meeting minutes and slide decks from the workshops. Implementation and ownership of O&M will be a continued discussion between the contributing agencies as design and implementation progresses. The final arrangement will need to be finalized through project agreements.

3.1.10 Site Summary

There is significant potential for addressing stormwater and floodplain issues, creating ecological lift, and optimizing recreational use at the Cedar site. The key objectives include integrating stormwater BMPs, wetland and nature-based solutions, and revising the trail and circulation patterns. The benefits of Option 1 include expansion of the ponding area to achieve pollutant removal without requiring boardwalks which is the main cost driver of Option 2. Option 1 is overall the lowest cost option, however it removes only 42% of TP inflows compared to Option 2 which provides 60% removal of inflows. Option 1 would also require less

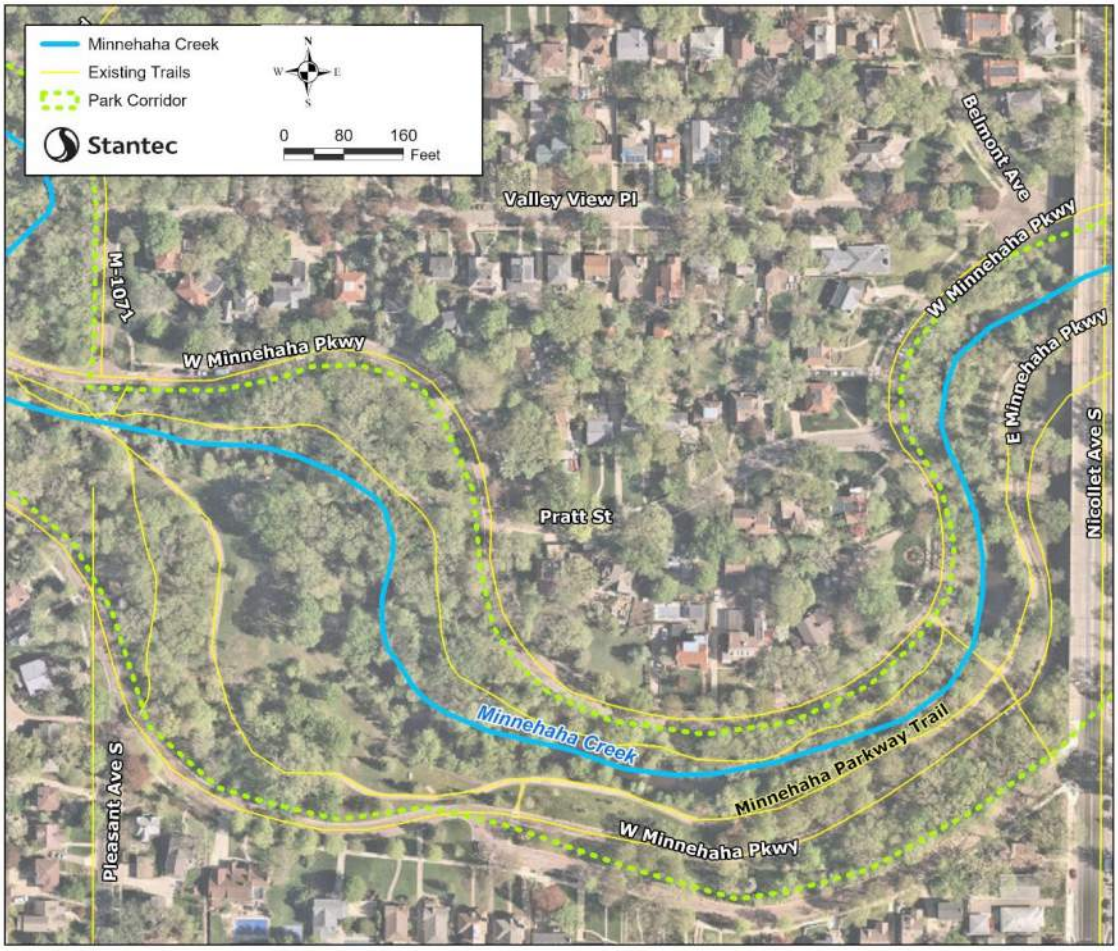
O&M as it doesn't include the boardwalk which adds complexity to Option 2. Option 2 has the potential to provide a net gain in flood storage volume of approximately 4,000 cubic yards, while Option 1 has the potential to provide 2,000 cubic yards. The bank restoration for both options would provide a significant habitat benefit, though Option 1 would preserve a greater number of trees and Option 2 would provide a larger wetland habitat. The proposed pond design for each option would maintain wetland function, thus there would not be any significant wetland permitting obstacles. The implementation of either option provides the opportunity for CSO separation at Cedar Avenue. The land footprint efficiency is greater for Option 1, as the pond proposed in Option 2 would have a greater land footprint. Overall, both options have a high potential for addressing floodplain issues and uplifting the ecosystem.

3.2 Nicollet

3.2.1 Overview

The Nicollet site consists of a large green space along the south side of the creek just west of Nicollet Avenue. The primary objectives for this site included the analysis of integrating a stormwater BMP to provide water quality benefits and additional floodplain storage, integrating stream restoration, wildlife restoration and nature-based solutions, and revised trail and circulation patterns. The BMP analysis considered two options that differ in the amount of storage provided in the BMP(s).

Figure 6: Nicollet Site - Existing Conditions



3.2.2 Technical Feasibility / Constructability Review (Infrastructure Analysis)

The Nicollet site was evaluated for six projects with two alternatives (Option 1 and Option 2). The six projects include bank restoration (Project A), circulation adjustments (Project B), stormwater/flood storage wetlands & re-meander (Project C1/C2), in-stream habitat improvements (Project D), additional circulation adjustments (Project E1/E2) and a grit chamber (Project F). The site was also evaluated for à la carte recreation improvements (Project G). See Figures 7 and 8 for a quick look at the concept drawings and see Appendix A for detailed concept drawings of each option and associated projects. The alternatives were reviewed to determine constructability of each option prior to developing feasibility costs. There are a few key differences between the two alternatives. Option 1 includes re-meander of the creek between the wetland and preserved trees, removal of the former roadway embankment to improve floodplain storage and connectivity, an interpretive overlook, and in-stream habitat features to force micro pools and provide complexity. Option 2 includes excavation to create a single wetland basin while preserving the trees in the center, and bank stabilization adjacent to the proposed stormwater outfall. Option 2 would provide greater stormwater and floodplain storage.

Through feasibility, it was determined that the elevation of the storm sewer on the east side of the site, coming from the parking lot on Minnehaha parkway, is too low for a stormwater pond to have beneficial water quality treatment. A grit chamber was included as an option to provide water quality in this location.

Discrepancies were observed between historic information and the model at the Diamond Lake Road storm sewer and it was unknown whether a weir structure was installed. Minneapolis sent staff out to inspect the storm sewer and found the weir in place. It was determined that the majority of water from the upstream drainage area is flowing north on Pleasant Ave to the Nicollet site. After this was determined, the stormwater pond in Option 2 was upsized to maximize the water quality benefit.

Figure 7: Nicollet Site - Option 1

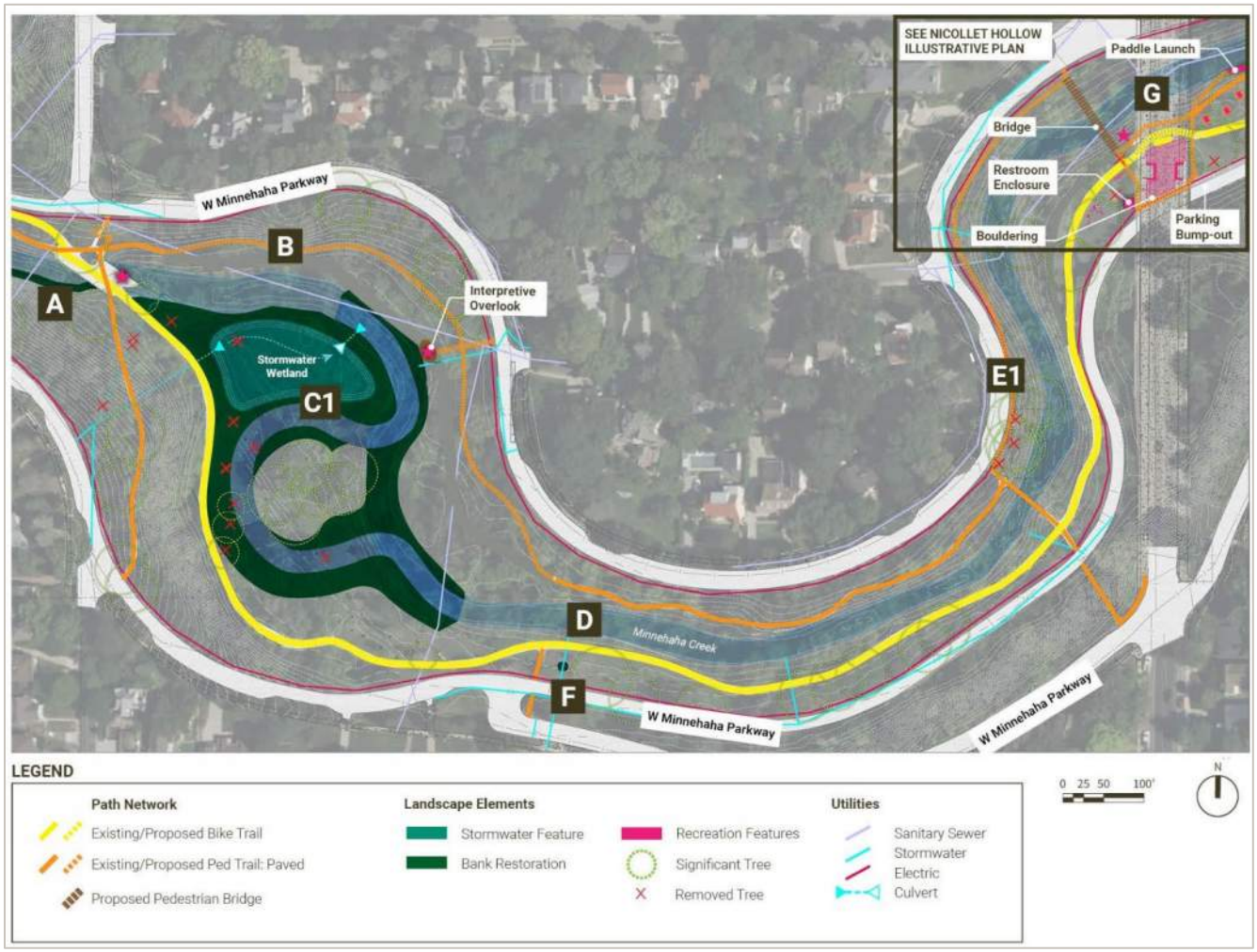
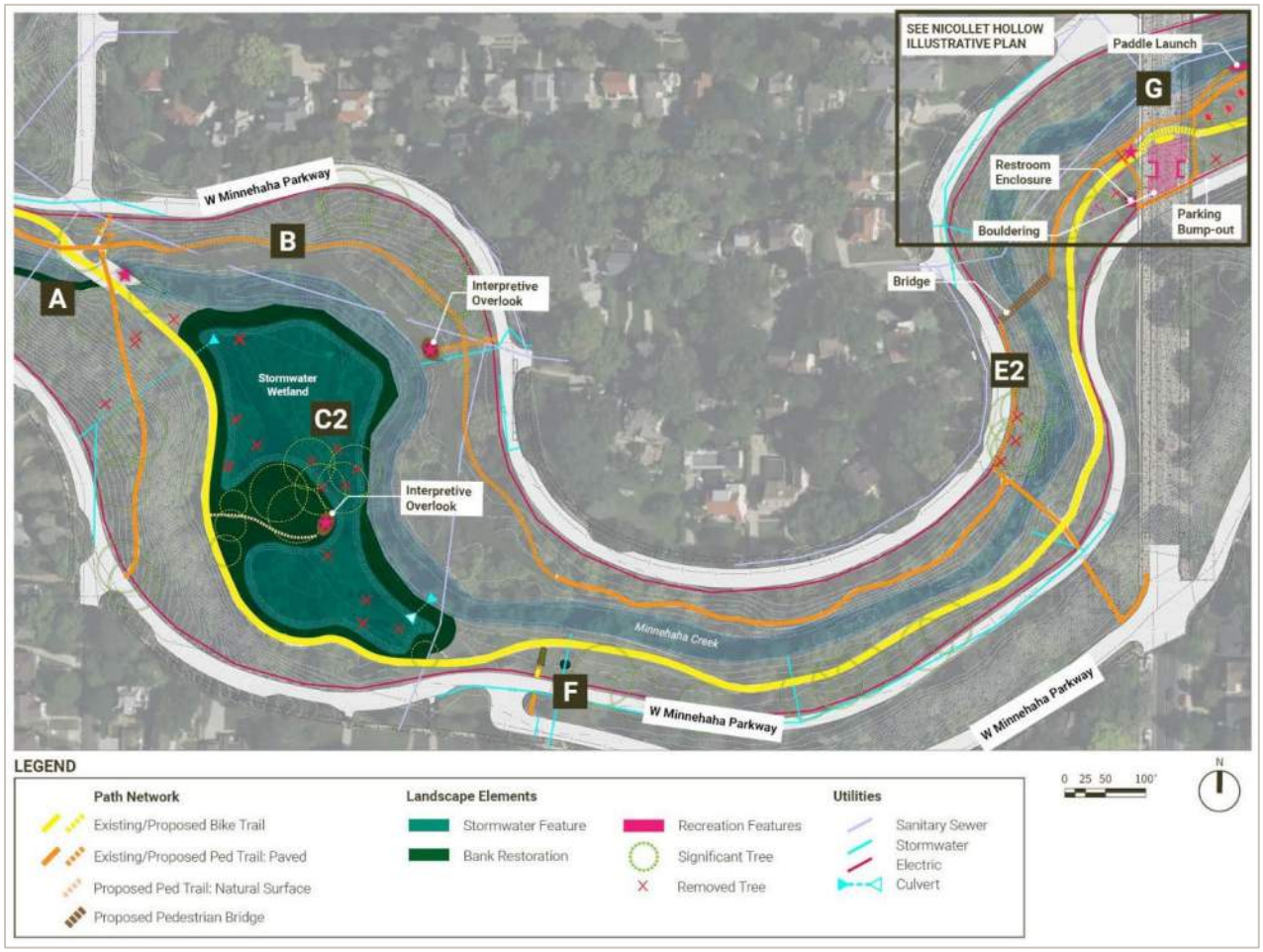


Figure 8: Nicollet Site - Option 2



3.2.3 Permitting and Wetlands

A list of anticipated permits is included in Section 2.1.

Based on available information, there does not appear to be likely wetland impacts resulting from the proposed improvements to the Nicollet site. If wetland impacts are identified as the design progresses, the proper protocol would be followed to demonstrate compliance with WCA rules.

The movement of the channel would likely result in a substantial change to the regulated floodplain, triggering the need to obtain a letter from FEMA officially revising the current National Flood Insurance Program (NFIP) map to show the changes to the floodplain, regulated floodway, or flood elevations.

The re-meandering associated with Option 1 would trigger the need for state environmental review in the form of an EAW.

3.2.4 Water Quality

The current TP loading for the Nicollet tributary area is 71.6 lbs/yr. A P8 water quality model was used to evaluate the removal efficiency of the two Nicollet options. Option 1 features a pond with 0.5 acre-feet of dead pool storage, while Option 2 increases the dead pool storage to 1.7 acre-feet. Both options capture water from an approximate 107-acre watershed. The watershed areas were split between HSG D and A with most of the tributary areas being grassed areas due to the high percentage of residential housing land use. The H&H analysis determined that there is a flow splitter within a manhole structure located near the intersection of Diamond Lake Road and Pleasant Ave that allows for low flows to continue to the north, and for higher flows to split to Pleasant Ave and Diamond Lake Road. The storm sewer system that continues north down Pleasant Ave is part of the watershed that is captured by the BMP analyzed at this location, and the storm sewer downstream of this flow split that runs east down Diamond Lake Road is not able to be captured due to the depth of the pipes by the time the sewer reaches the proximity of this site.

The increased pond size in Option 2 results in higher removal efficiency. The P8 model was used to investigate the balance between dead pool storage and TP removal, aiming to optimize pond size and removal efficiency.

Table 4: Nicollet - Water Quality Total Phosphorus (TP) Removal Summary

Option	Watershed Inflows (lbs/yr)	Removals (lbs/yr)	% Removal
Option 1			
Nicollet Pond / Total	71.6	17.0	24%
Option 2			
Nicollet Pond / Total	71.6	30.3	42%

3.2.5 H&H

The City's XP-SWMM model was used to evaluate whether adding ponding at the site would increase the risk of off-street flooding. The updates to the model demonstrate no increase in high water levels for the upstream manholes/nodes. Additionally, the MCWD XP-SWMM model was reviewed to address concerns that higher peak flows in the creek could reduce the proposed pond's water quality benefits. The tributary drainage area for the proposed ponding is approximately 107 acres. Based on the XP-SWMM model, peak flows occur about six to seven days after the storm event. The City's XP-SWMM model utilizes starting depths in the downstream nodes at elevation 835.8'. This starting elevation from the City model corresponds to an elevation between the 2-year and 5-year event from the MCWD model. Assuming that smaller water quality storm events (less than the 1-year event) are generating most of the pollutants in the first flush type events, it seems feasible that the ponds should still have sufficient time to remove pollutants by treating the water in the first 24 to 48 hours after a first flush event unless there are first flush events that occur during that 6 to 7 day period after a larger storm event.

The proposed BMPs in both options will add storage below the approximate 100-year flood elevation of 836-837'. Option 1 provides about 0.7 acre-feet of additional flood storage, and Option 2 provides approximately 2.4 acre-feet of additional flood plain storage. The tributary drainage area for this pond is

approximately 107 acres, but it should be noted that a significant portion of this area is intercepted by a flow diversion structure such that low flows drain to the ponds, and high flows divert to a storm network that is not captured by the ponds. From a water quality standpoint, it is assumed that the low flows are associated with the water quality events, and from a hydrologic/hydraulics standpoint, higher flows are diverted to bypass the ponds.

3.2.6 Site Amenities

Similar to Cedar, circulation adjustments at the Nicollet site are important recreational investments that address flooding and safety issues along the regional trail. Project B moves an existing trail segment further outside of the floodplain to improve year-round usability. An interpretive overlook is included in this project in order to educate visitors/users about the stormwater wetland improvement project that will be visible across the creek, and a new interpretive panel is included at the existing bridge crossing Minnehaha Creek at the western edge of the project area.

Project alternatives E1 and E2 offer solutions to the dangerous shared use trail around the curve on the southeast side of the creek near Nicollet. Both options move pedestrian circulation to the north/west side of the creek to avoid keeping a combined trail along the tight creek meander and allow conversion of the shared-use trail on the south/east bank to a bicycle-only path. A new pedestrian bridge will be required in order to accomplish this. Option E1 sites the bridge at the narrowest point of the creek for cost efficiency and requires fewer tree removals and less new trail to be installed. Option E2 sites the bridge at the location noted in the master plan, which requires a larger bridge span, longer path extension and more tree removals, but will be more convenient for neighborhood residents arriving from the north along Belmont Avenue. Option E2 will allow recreational investments at Nicollet Hollow to function better as neighborhood park amenities, a need noted throughout engagement for the master plan.

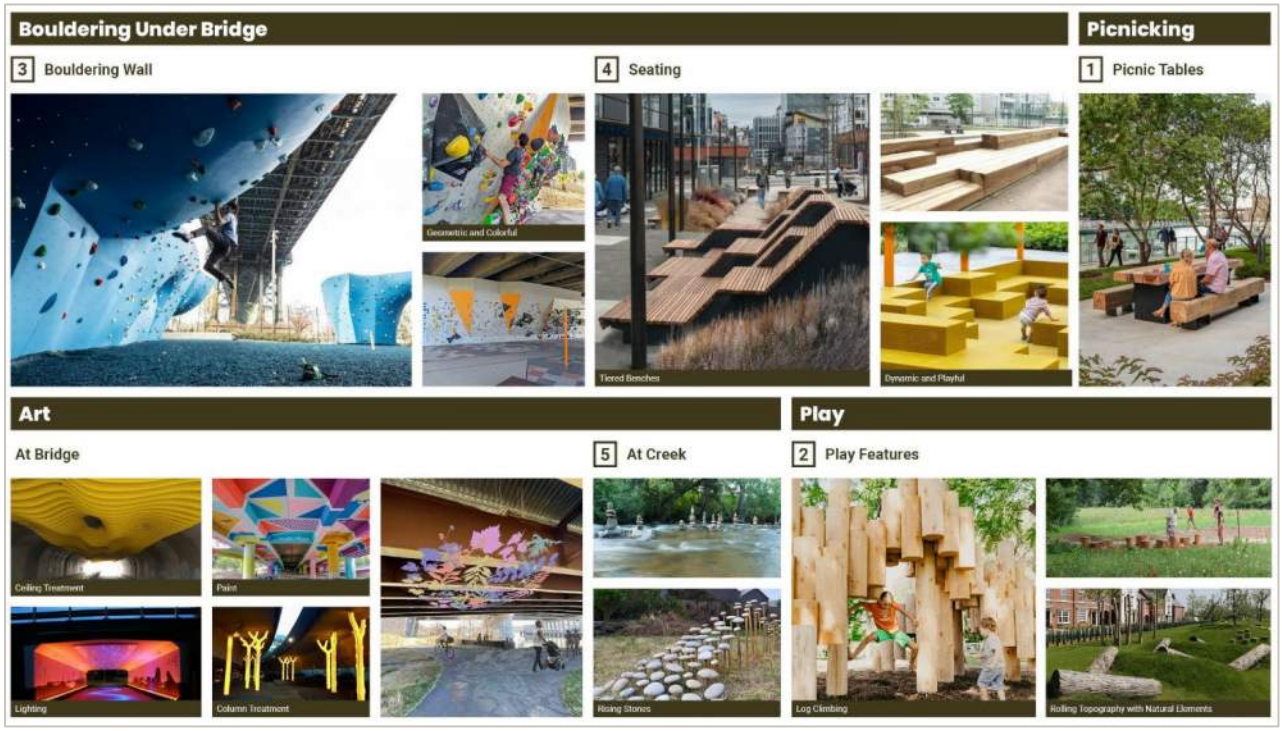
Both proposed stormwater/flood storage options along Minnehaha Creek have the potential to include interpretive overlooks that offer visitors viewing platforms for wildlife watching and insight into the significance of these green infrastructure investments.

À la carte recreation at Nicollet includes the creation of “Nicollet Hollow,” which should be tied to improvements to the Nicollet Avenue Bridge if possible. The master plan proposed the addition of a bouldering area beneath the bridge, and would involve the installation of climbing holds, safety surfacing, signage, lighting, and a viewing/gathering space for climbers or observers. Other improvements proposed as part of the Nicollet Hollow project include additional picnic tables and seating, a drinking fountain, pollinator lawn seeding, playful public art features, a portable restroom enclosure, circulation additions or realignment as needed, and a new ADA-accessible paddle launch. A small parking bump out of three parallel parking spaces along Minnehaha Parkway on the creek’s south side would facilitate use of this new creek access facility.

The study done by 106 Group found that the creek re-meander and development of the stormwater wetland provide the most significant opportunities for incorporating interpretive enhancements. Interpretive messaging would highlight how Minnehaha Creek once functioned in its natural state and how human interference with the natural system both helped and hindered the creeks’ core functions. Self-guided interpretive media would provide the best medium for relaying this message. Other potential opportunities include recreation and interpretive features under the Nicollet Avenue bridge and highlighting adaptive

recreation opportunities at the proposed ADA accessible launch. See Appendix G for the full interpretive foundations assessment and recommendations.

Figure 9: Nicollet - Proposed Site Amenities



3.2.7 Stream Assessment

Depending on the design concept, the concrete pipes, fallen portions of the parkway bridge wall, and damaged trees are recommended to be removed and replaced. Re-meander of the stream (Project C1) is proposed for Option 1 and would add approximately 375 feet of stream length. The banks are recommended to be stabilized with bioengineering practices and would restore approximately 1,130 feet of stream bank for Option 1, and 740 feet of stream bank for Option 2. Geomorphic reconnaissance efforts and conceptual design development for stream modifications were completed by Inter-Fluve and summarized in a technical memorandum included in Appendix H.

3.2.8 Cost

Stantec produced detailed cost estimates for the site and each option based on work items such as recreational improvements, general construction, engineering, and permitting. The detailed cost estimates also accounted for Inter-Fluve's EOPCC, which considered work items specific to stream restoration.

Appendix B includes a detailed cost estimate for the site and Appendix H includes Inter-Fluve's EOPCC. Table 5 below summarizes the cost estimate without the à la carte recreation improvements.

Table 5: Nicollet - Cost Summary

Nicollet	
Option 1	**Option 2**
Creek Re-meander w/ smaller stormwater basin	Larger Stormwater & Flood Storage basins
$ 2,270,000	**$ 2,370,000**

3.2.9 Operation and Maintenance

An initial understanding of the maintenance required for each option was provided during the project workshops. The level of effort for operation and maintenance (O&M) for both Option 1 (creek re-meander and smaller stormwater wetland) and Option 2 (larger stormwater and flood storage wetlands) are considered moderate. The City of Minneapolis would be responsible for O&M related to stormwater wetlands (visual inspections and removal of sediment/debris). MPRB would be responsible for O&M related to stormwater wetlands (vegetation maintenance), trails, bridges, and overlooks (maintenance, plowing, and surface management), and streambank restoration and streambank re-meander (vegetation maintenance). Contractors would be hired to help with O&M of streambank restoration and re-meander (vegetation establishment, maintenance, and inspections). O&M responsibilities outlined above are based on asset ownership and preliminary conversations with partners. See Appendix F for detailed meeting minutes and slide decks from the workshops. Implementation and ownership of O&M will be a continued discussion between the contributing agencies as design and implementation progresses. The final arrangement will need to be finalized through project agreements.

3.2.10 Site Summary

There is potential for addressing stormwater and floodplain issues, stream restoration, and optimizing the recreational use at the Nicollet site. The key objectives include providing water quality benefits and additional floodplain storage, restoring the stream and wildlife habitats, and revising the trail and circulation patterns to improve safety and accessibility. Based on the factors assessed in the feasibility study, Option 1 and 2 are similar in cost-effectiveness, though Option 2 provides a greater percentage removal of TP inflows. Option 1 has the potential to provide a net gain in floodplain storage of 1,000 cubic yards, while Option 2 has the potential to provide 4,000 cubic yards. The O&M for both options is similar and considered moderate in effort and complexity.

Regarding habitat improvement, both options would benefit the ecosystem through creation of stormwater wetlands, though the re-meandering associated with Option 1 would significantly benefit the creek and riparian habitat. There would be some permitting obstacles for both options relating to disturbance to the floodplain. The re-meandering associated with Option 1 would also require environmental review which

requires a significant amount of time. The larger stormwater and flood storage wetlands proposed in Option 2 would have a greater land footprint when compared to Option 1. The recreational amenities proposed for both options would have a large impact as there is currently a major gap in amenities along this portion of the regional trail within the neighborhood park. Overall, implementation of either project option at the Nicollet site would address floodplain issues, improve water quality, and provide a significant recreational benefit to the area.

3.3 Penn - Newton

3.3.1 Overview

The Penn-Newton site consists of two main areas with the first area being just east of Penn Avenue and south of the creek, and the second area located at the southeast corner of the intersection of Newton Avenue and W 52nd Street. The primary objectives for the Penn Avenue area include integrating a stormwater BMP to provide water quality benefits, maintaining existing trees, and creek and floodplain forest restoration. The project at the Newton Avenue area will consist of implementing a series of small stormwater treatment cells/basins that will reduce the flow velocities of drainage from the contributing drainage area. The existing Newton area consists of a concrete flume that daylights to the creek. The intent is to manage that flow through a series of BMPs instead of utilizing the drainage flume, which would be removed. There is also an area north of Morgan Avenue, described in this report as the Penn-Newton North project, where bank restoration is proposed.

Figure 10: Penn-Newton Site - Existing Conditions

3.3.2 Technical Feasibility / Constructability Review (Infrastructure Analysis)

The Penn-Newton site was evaluated for five project options with two alternatives (Option 1 and Option 2). The projects include a stormwater treatment train or check dams (Project A1/A2), bank restoration (Project B), oak savanna restoration (Project C), a water access point (Project D), a stormwater treatment/filtration basin near Penn Avenue (Project E1/E2), and bank restoration within the Penn-Newton North project (Project F). The site was also evaluated for à la carte recreation improvements (Project G). See Figures 11,12, and 13 for a quick look at the concept drawings and see Appendix A for detailed concept drawings of each option and associated projects. The alternatives were reviewed to determine constructability of each option prior to developing feasibility costs. This review included the analysis of the large drainage area that outlets through a 60” pipe from Morgan Avenue. The pipe was reviewed to determine elevations and pipe routes to capture it in the stormwater basin near Penn Avenue. To route the stormwater to the west would include significant impacts to the landscape including multiple desirable oak trees being removed and significant landscape and trail impacts. These land impacts were discussed during initial workshops and the treatment of this drainage area determined to not be feasible. Infiltration was also considered for the basins. It was determined that high creek water levels and assumed clay soils would not be conducive for infiltration.

There are a few key differences between the two alternatives. Both alternatives would remove the existing stormwater flume near Newton Avenue, however Option 1 would include three stormwater basins as a replacement and Option 2 would include meandering check dams to reduce flow velocities, reduce erosion risks, and trap sediments. Additionally, Option 1 would include two flat-bottomed turf style stormwater treatment basins in a series near Penn Avenue to maintain playable recreation surface, whereas Option 2 would include a southern turf style stormwater treatment basin and a northern filtration basin with sand filter and drain tile.

Figure 11: Penn-Newton Site - Option 1

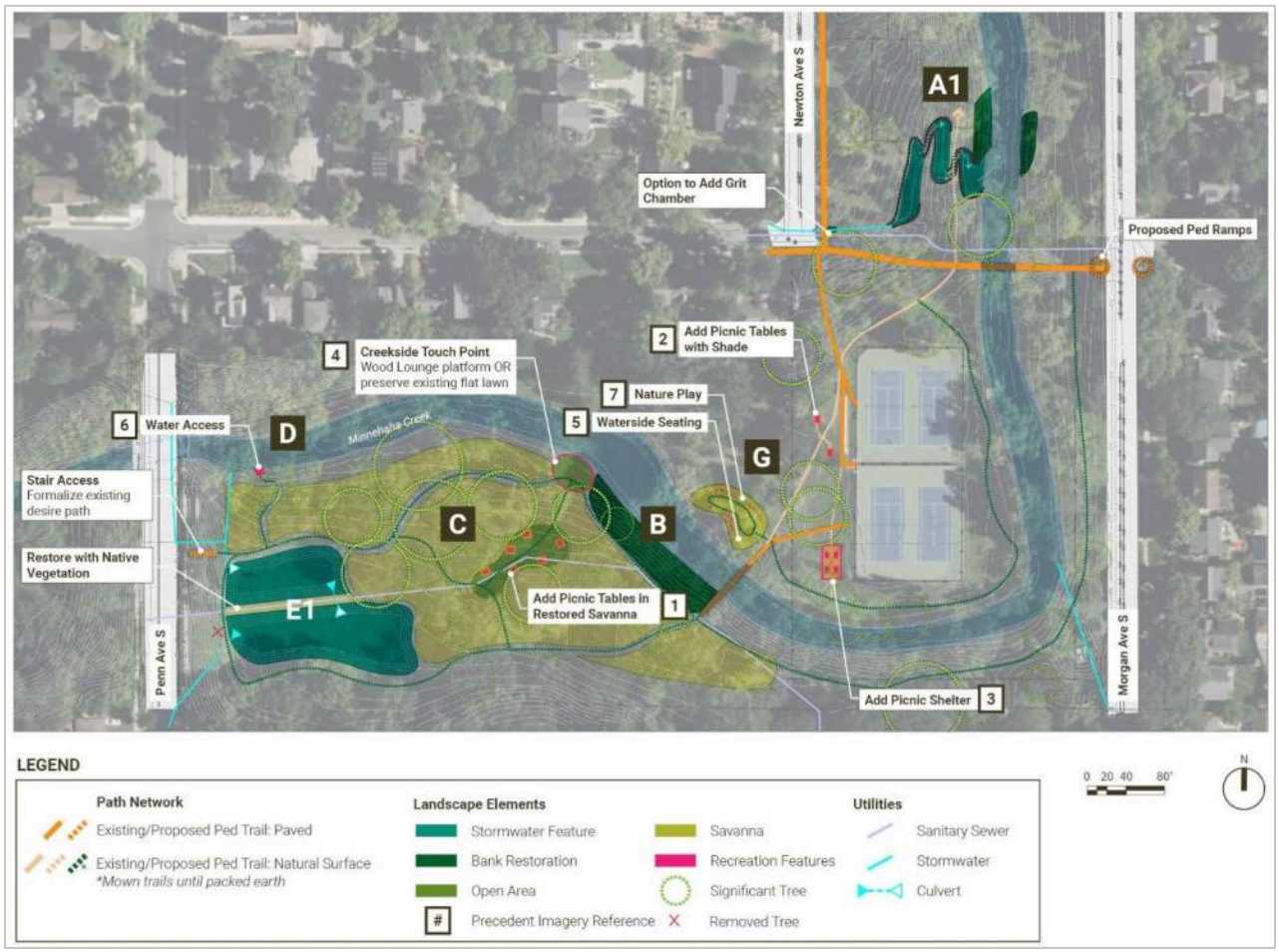


Figure 12: Penn-Newton Site - Option 2

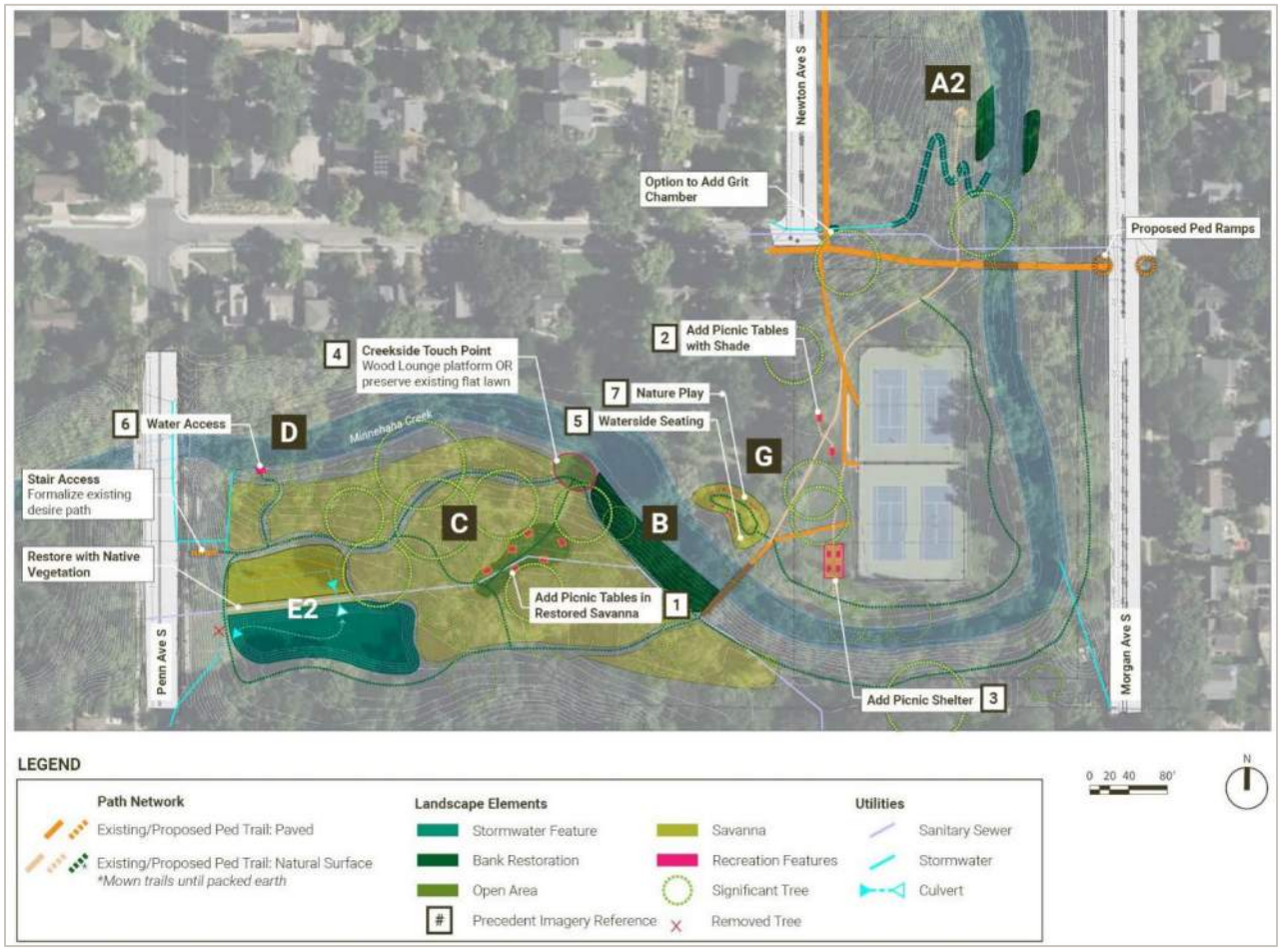


Figure 13: Penn-Newton North

3.3.3 Permitting and Wetlands

A list of anticipated permits is included in Section 2.1.

Based on available information, there do not appear to be any likely wetland impacts resulting from the proposed improvements to the Penn-Newton site.

The project is in a regulatory floodway and is not anticipated to increase the existing flood elevations within the 100-year floodway. Prior to receiving any permits for site modifications, a no-rise certificate must be obtained through the proper FEMA procedure. The certificate must be supported by technical data and signed by a registered professional engineer. Any local floodplain requirements would also be addressed and adhered to.

3.3.4 Water Quality

The TP loading for the Penn tributary area is 5.7 lbs/yr, and TP loading for the Newton tributary area is 8.2 lbs/yr. A P8 water quality model was used to model the removal efficiency for two BMP site locations, the Newton step pool ponds and the Penn BMPs. The Newton step pools receive water from a 14.5-acre watershed west of the pool locations and north of Minnehaha Creek comprised of residential housing. The check dams in Option 2 are considered as an option to decrease flow rates and have negligible TP removal.

The Penn site consists of two BMP options receiving stormwater from 8.6 acres of residential housing collected by the Penn Avenue pipeshed area. The two options utilize a treatment train, one with two ponds in series and another with a pond and sand filter. The treatment trains utilize a southern pond with 0.2 acres of dead pool storage. In Option 1 the southern pond discharges north to a small pond with 0.05 acres of dead storage. In Option 2 the pond discharges to a sand filter. The sand filter basin was assumed to have a filtration rate of one inch/hour.

Table 6: Penn - Water Quality Total Phosphorus (TP) Removal Summary

Option	Watershed Inflows (lbs/yr)	Removals (lbs/yr)	% Removal
Option 1			
Penn Wet Pond	5.7	3.3	58%
Option 2			
Penn Sand Filter	5.7	3.6	63%

Table 7: Newton - Water Quality Total Phosphorus (TP) Removal Summary

Option	Watershed Inflows (lbs/yr)	Removals (lbs/yr)	% Removal
Option 1			
Newton Series of Ponds	8.2	3.2	38%

3.3.5 H&H

The tributary drainage area for the Penn pond is approximately 8 to 9 acres, and the tributary drainage area for the Newton tiered pond is approximately 14 to 15 acres.

The City's XP-SWMM model was used to evaluate the level of risk of exacerbating street flooding by adding ponding to the green space at the Penn site. The updates to the model demonstrate no increase in high water levels for the upstream manholes/nodes, but the improvements will likely require upsizing a portion of the existing storm sewer east of the street right-of-way. This existing storm sewer would be rerouted from the existing manhole just east of the Penn Avenue extents to the new pond which requires a revised pipe orientation and outlet elevation. Due to the proposed pond elevation, the resulting proposed pipe slope is flatter than existing which would require upsizing the pipe from 18" to 24" to maintain pipe capacity and maintain high water levels and flow rates to the creek. The proposed BMPs will not add storage below the

approximate 100-year flood elevation of 846. The tributary drainage area for the pond is approximately 8 to 9 acres, and the tributary drainage area for the Newton tiered pond is approximately 14 to 15 acres.

For the Newton site, HydroCAD models were created to determine potential benefits for the tiered pond system. Based on existing conditions, approximately 1.4 acres drain to the creek via overland flow within the Newton Avenue curb infrastructure that drains to an existing concrete flume, and approximately 13.1 acres drain to an existing 18" storm sewer pipe via a series of existing storm inlets. The confluence of the concrete flume and outlet of the storm sewer pipe occurs about midway between the road and the creek on the hill sloping from the road down to the creek. In the existing conditions, velocities at that point are around 7-10 feet per second. Introducing three small ponds/depressions, with weir overflows acting as flow spreaders to each subsequent pond that ultimately drain to the existing creek, results in flow velocities around 1.5 - 3 feet per second. This demonstrates potential for the ponds to provide some scour reduction benefits on the steep slope. The proposed BMPs will not add storage below the approximate 100-year flood elevation of 845.

3.3.6 Site Amenities

Recreational projects proposed as part of the Penn-Newton site are the same regardless of which stormwater or creek restoration projects are selected. The primary feedback heard through the master plan's engagement process was to maintain the grove of oaks just east of Penn Avenue and to preserve the existing sledding hill at the corner of Newton Avenue and 51st Street. The creek is eroding the outer bend of its shoreline at the base of the sledding hill. In order to prevent failure of this bank, the project proposes bank restoration and stabilization. The existing natural surface trail along the creek here is packed earth and may need to be realigned to skirt the restored slope. This will likely be achieved naturally over time through foot traffic. There is no consistent paved section of Minnehaha Parkway Regional Trail through this area, and MPRB's maintenance staff have expressed that they are unable to take on further trail maintenance at this time; therefore, packed earth natural surface trails are the preference here. Where trails traverse native vegetation rather than turf, they are intended to be mown until compacted enough to remain packed earth trails.

From a recreational standpoint, only project D, the proposed limestone water access along Minnehaha Creek, is an integral project to any of the stormwater and creek restoration work. Conducting this project concurrently with the bank restoration in projects A, B, and F will offer cost savings in equipment mobilization. The remainder of the recreational projects at Penn-Newton are considered à la carte and can be completed at any time. An existing "desire path" down the embankment from Penn Avenue could be converted to a stairway for improved access to this portion of the Creek. Installation of steps would help to prevent erosion of this steep slope. Note that once Penn Avenue requires reconstruction, a set of creek overlooks will be proposed per the master plan to offer an experience of Minnehaha Creek for visitors with mobility impairments where access down to its banks is not easily achieved. An ADA-accessible trail down this slope from Penn to the water access point was explored as part of this study, but it was decided that since few ADA-accessible trails are available along the Creek in this segment, this option should not be pursued at this time. ADA-accessible water accesses are proposed at other areas of the creek where bituminous trails are readily available. Where there is a section of paved path at 52nd Street between Newton and Morgan, curb ramps are proposed east of the existing bridge to facilitate access where there are curbs blocking access.

Picnicking was desired as part of the master plan and is shown here in a central clearing within the oaks south of the creek, ideally to be installed once the surrounding savanna seeding is complete. Additional picnicking is proposed on the north side of the creek near the tennis courts (two tables with umbrellas, and four tables beneath a small shelter). Finally, a small nature play area was suggested in the master plan and is shown here along with Adirondack chair seating on the north side of the creek near the tennis courts.

The study done by 106 Group found that restoration of the oak savanna habitat and the creekside bank restoration provide opportunities for incorporating interpretive enhancements. Interpretation addressing the oak savanna restoration could serve multiple subthemes and topics such as natural resources, cultural resources, and species recreation by installing wayside exhibits or having guided ranger talks. The creekside viewsheds provide great opportunities for wayside exhibits highlighting the partners' effort to reduce shoreline erosion and improve downstream water quality. Another potential opportunity is to include an interpretive element at the public water access since trail users are likely to pause here. See Appendix G for the full interpretive foundations assessment and recommendations.

Figure 14: Penn-Newton - Proposed Site Amenities

3.3.7 Stream Assessment

For the Newton site, the existing stormwater discharge location is recommended to be maintained for the new stormwater outfall, and it is recommended that the banks on both sides of the creek be stabilized adjacent to the new outfall location. Stabilization at the Newton site (Project A) would restore approximately 160 feet of stream bank. For the Penn site, there is bank erosion located upstream of the pedestrian bridge which is downstream of Penn Avenue. It is recommended to rebuild approximately 175 lineal feet of bank with stone toe and engineered soil lifts (Project B). Bank stabilization is also proposed within the Penn-Newton North project (Project F) and would restore approximately 450 feet of stream bank. Geomorphic

reconnaissance efforts and conceptual design development for stream modifications were completed by Inter-Fluve and summarized in a technical memorandum included in Appendix H.

3.3.8 Cost

Stantec produced detailed cost estimates for the site and each option based on work items such as recreational improvements, general construction, engineering, and permitting. The detailed cost estimates also accounted for Inter-Fluve's EOPCC, which considered work items specific to stream restoration. Appendix B includes a detailed cost estimate for the site and Appendix H includes Inter-Fluve's EOPCC. Table 8 below summarizes the cost estimate without the à la carte recreation improvements.

Table 8: Penn-Newton - Cost Summary

Penn-Newton	
Option 1	**Option 2**
Stormwater treatment basin and tiered pools	Stormwater filtration basin and check dams
$ 1,440,000	**$ 1,410,000**

3.3.9 Operation and Maintenance

An initial understanding of the maintenance required for each option was provided during the project workshops. The level of effort for operation and maintenance (O&M) for both Option 1 (surface pond and treatment trains) and Option 2 (underground filtration and treatment trains) is moderate. The City of Minneapolis would be responsible for O&M related to wet ponds (visual inspections and removal of sediment/debris), underground filtration (visual inspections, removal of sediment/debris, drawdown maintenance and filter replacement), tiered ponds (visual inspection and removal of sediment/debris), and the grit chamber (inspections and cleaning). MPRB would be responsible for O&M related to wet ponds (vegetation maintenance), tiered ponds (vegetation maintenance), trails (maintenance, plowing, and surface management), recreation features including water access points and picnic areas (maintenance and surface management), streambank restoration (vegetation maintenance), and oak savanna (herbicides and prescribed burns, inspection for disease, and mowing invasives). Contractors would be hired to help with O&M of streambank restoration and check dams (vegetation establishment, maintenance, and inspections). O&M responsibilities outlined above are based on asset ownership and preliminary conversations with partners. See Appendix F for detailed meeting minutes and slide decks from the workshops. Implementation and ownership of O&M will be a continued discussion between the contributing agencies as design and implementation progresses. The final arrangement will need to be finalized through project agreements.

3.3.10 Site Summary

The key objectives of the Penn-Newton site include integrating stormwater BMPs to improve water quality and restoring the creek and floodplain forest while maintaining the existing trees. There are also significant opportunities to incorporate recreational amenities and realign existing trails. Based on the factors assessed in the feasibility study, Option 2 is the most cost-effective option while providing a similar percentage removal of TP inflows when compared to Option 1. Overall, the water quality benefit and addition of flood storage capacity would be quite minimal for both options at the Penn-Newton site. The greatest benefits of implementing the projects at the site would be a clear permitting pathway with very few obstacles and addressing adjacent projects/infrastructure such as the deteriorating concrete flume near Newton Avenue and bank stabilization upstream of the pedestrian bridge, adjacent to the proposed stormwater outfall and at Penn-Newton North, to decrease erosion. The proposed savanna restoration and stormwater basins associated with both projects would provide habitat improvements. O&M of stormwater basins for both options would be moderate, and the land footprint efficiency would be similar. Overall, the implementation of either option at the Penn-Newton site would improve water quality and the floodplain forest habitat while also creating significant recreational improvements.

4.0 Decision/Prioritization Matrix

The Prioritization Matrix was completed to determine the feasibility of the alternatives proposed at each site and to assess the recommended phasing of each site. The primary factors considered include capital cost, water quality benefit, operation and maintenance (O&M) and flood resiliency. The secondary factors considered include ecosystem lift, pathway to permitting, adjacent infrastructure and projects, efficiency of the land footprint, and community amenities. Each alternative option was assigned a score for each of the factors considered. Scoring ranges from 1 to 3, where 1 indicates lower feasibility or benefit, and 3 indicates higher feasibility or benefit. Scores are then added up to reach a total score. The higher the total score, the more feasible the alternative is. The full prioritization matrix is included in Appendix C. A summary of the prioritization matrix results for the primary factors and the total scores is included in Table 9 below.

Table 9: Prioritization Summary

Site Name	Alternative Concept	Capital Cost	Water Quality Benefit (lb TP/yr)	Potential Gain in Floodplain Storage (CY)	O&M Level of Effort	Total Score
Cedar	Option 1	$1,020,000	26	2,000	Moderate	21
	Option 2	$3,080,000	37	4,000	High	21
Nicollet	Option 1	$2,270,000	17	1,000	Moderate	17
	Option 2	$2,370,000	30	4,000	Moderate	18
Penn-Newton	Option 1	$1,440,000	7	n/a	Moderate	18
	Option 2	$1,410,000	4	n/a	Moderate	18

Based on the results of the prioritization matrix, the Cedar site has the greatest opportunity for maximization of project benefits and feasibility of project implementation. Option 1, the alternative with the smaller stormwater pond footprint, is the lower cost of the two options, while still providing a significant water quality benefit. The level of effort for O&M is a bit higher for Option 2 compared to Option 1. The flood storage capacity would be significantly increased in both options. See Appendix C for details on the secondary factors considered. Secondary factors such as the pathway to permitting and addressing adjacent infrastructure increase the feasibility of the Cedar site.

The Penn-Newton site has the next best opportunity for maximization of project benefits and feasibility of implementation. Options 1 and 2 have similar benefits and feasibility. Option 1, stormwater treatment basin and tiered pools, is the most cost efficient and provides a similar water quality benefit as Option 2, stormwater filtration basin and check dams. Option 2 has slightly lower water quality benefits as the check dams do not provide any measurable TP removal. The level of effort for O&M is moderate for both options. The addition of flood storage for both options would be minimal, however bank and slope stabilization would help with flood resiliency. Secondary factors such as the pathway to permitting and addressing adjacent infrastructure increase the feasibility of the Penn-Newton site.

The Nicollet site has the lowest opportunity for maximization of project benefits and feasibility of implementation. Options 1 and 2 have similar benefits and feasibility. Option 1, creek re-meander and smaller flood storage wetland, is slightly lower cost than Option 2, larger stormwater and flood storage wetland. Option 2, however, provides a significantly greater water quality benefit compared to Option 1. The level of effort for O&M for both options is moderate, and the flood storage capacity would be significantly increased for both options. Secondary factors such as the pathway to permitting provide lower benefits for the Nicollet site, decreasing its feasibility when compared to the other two sites.

5.0 Recommendations

The feasibility analysis considered each project option to identify project benefits such as improvements to water quality, ecological lift, and user experience. Ease of implementation was also highly considered for each of the project options. The feasibility analysis has resulted in the following recommended Phase I Project Sequence:

1. Cedar (design anticipated 2025-2026)
2. Penn-Newton (the project would be split into sub elements):
    a. Spillway repair and creek stabilization (design anticipated 2025-2026)
    c. 53rd Street and Penn stormwater (lowest priority. To be evaluated against other projects)
3. Nicollet (concept planning and community engagement anticipated 2026-2027 given the project complexities)

This approach is designed to maximize the benefits of water quality improvements, ecological enhancements, and user experience while ensuring ease of implementation and cost efficiency. The next step towards implementation is to move these recommendations to the detailed design phase with the goals of creating a long-term implementation process for improving the parkway.

Appendix A

HKGI Concept Drawings

PROJECTS

A) CREEK REMEANDER

- Realign creek to add meander bend along its current trajectory
- Stabilize banks and restore floodplain bench
- Relocate path and bench away from top of slope

B) RIPARIAN HABITAT RESTORATION

- Convert mowed lawn to native tallgrass prairie, oak savanna, and/or riparian forest

C) BANK RENATURALIZATION

- Remove plastic mesh, remove/reset existing boulders, and reconstruct top of bank with bioengineering treatments

D1) MULTI-BASIN STORMWATER WETLAND

- Preserve some trees in this area vs. option D2. Incorporates native and wetland vegetation

E) CSO SEPARATION

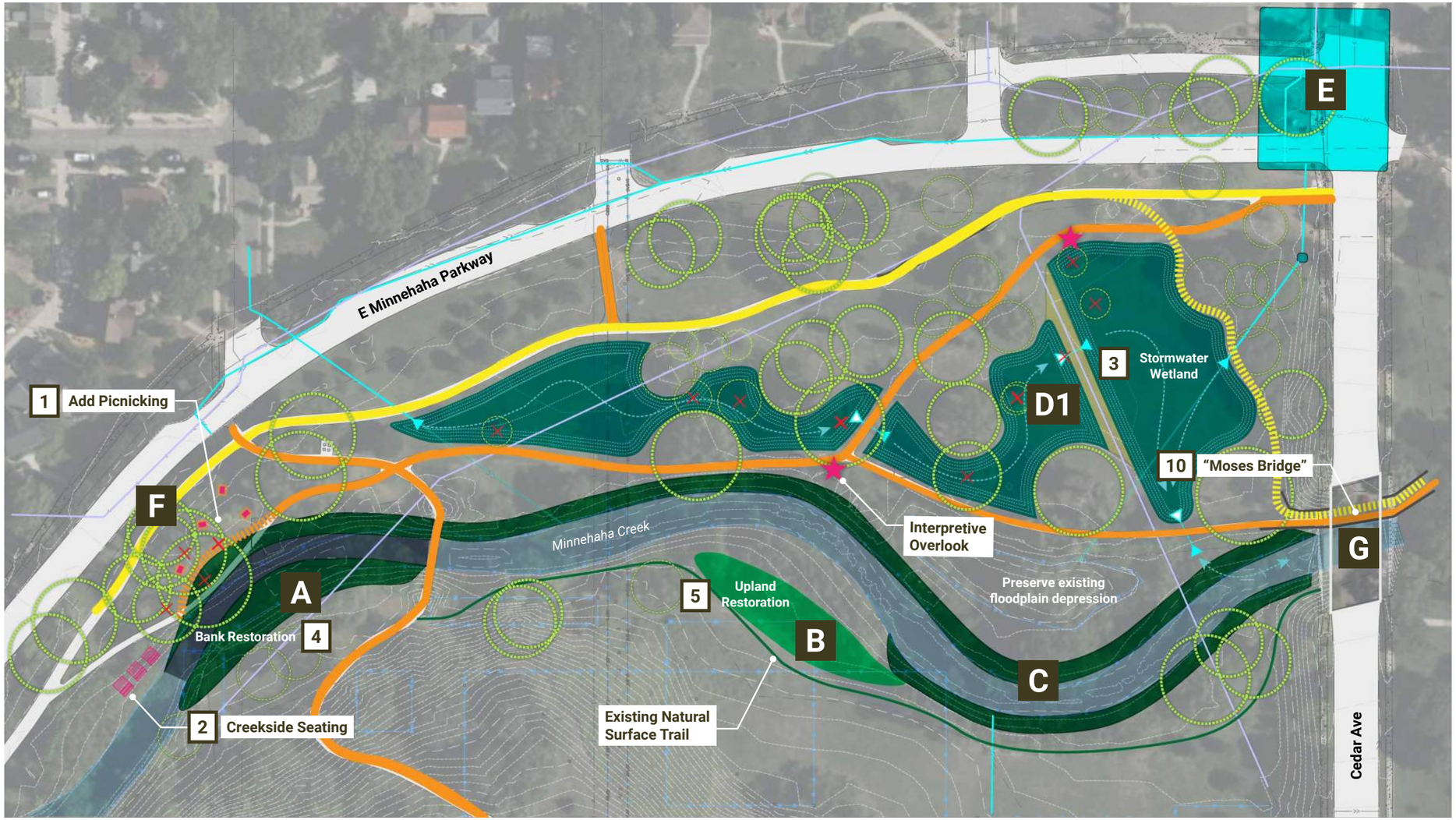
- Separate sanitary and storm sewer systems

F) À LA CARTE RECREATION IMPROVEMENTS

- Add picnicking
- Add creekside seating

G) À LA CARTE CIRCULATION IMPROVEMENTS

- "Moses Bridge" beneath Cedar Ave with associated bike trail connection



0 20 40 80'

N

LEGEND

Path Network

- Existing/Proposed Bike Trail
- Existing/Proposed Ped Trail: Paved
- Existing Ped Trail: Natural Surface

Landscape Elements

- Stormwater Feature
- Bank Restoration
- Upland Restoration
- # Precedent Imagery Reference
- Recreation Features
- Significant Tree
- Removed Tree

Utilities

- Sanitary Sewer
- Stormwater
- Culvert

CEDAR AVENUE: OPTION 1 CONCEPT DIAGRAM

PROJECTS

A) CREEK REMEANDER

- Realign creek to add meander bend along its current trajectory
- Stabilize banks and restore floodplain bench
- Relocate path and bench away from top of slope

B) RIPARIAN HABITAT RESTORATION

- Convert mowed lawn to native tallgrass prairie, oak savanna, and/or riparian forest

C) BANK RENATURALIZATION

- Remove plastic mesh, remove/reset existing boulders, and reconstruct top of bank with bioengineering treatments

D1) MULTI-BASIN STORMWATER WETLAND

- Preserve some trees in this area vs. option D2. Incorporates native and wetland vegetation

E) CSO SEPARATION

- Separate sanitary and storm sewer systems

F) À LA CARTE RECREATION IMPROVEMENTS

- Add picnicking
- Add creekside seating

G) À LA CARTE CIRCULATION IMPROVEMENTS

- "Moses Bridge" beneath Cedar Ave with associated bike trail connection

LEGEND

Path Network

- Existing/Proposed Bike Trail
- Existing/Proposed Ped Trail: Paved
- Existing Ped Trail: Natural Surface

Stormwater Wetland

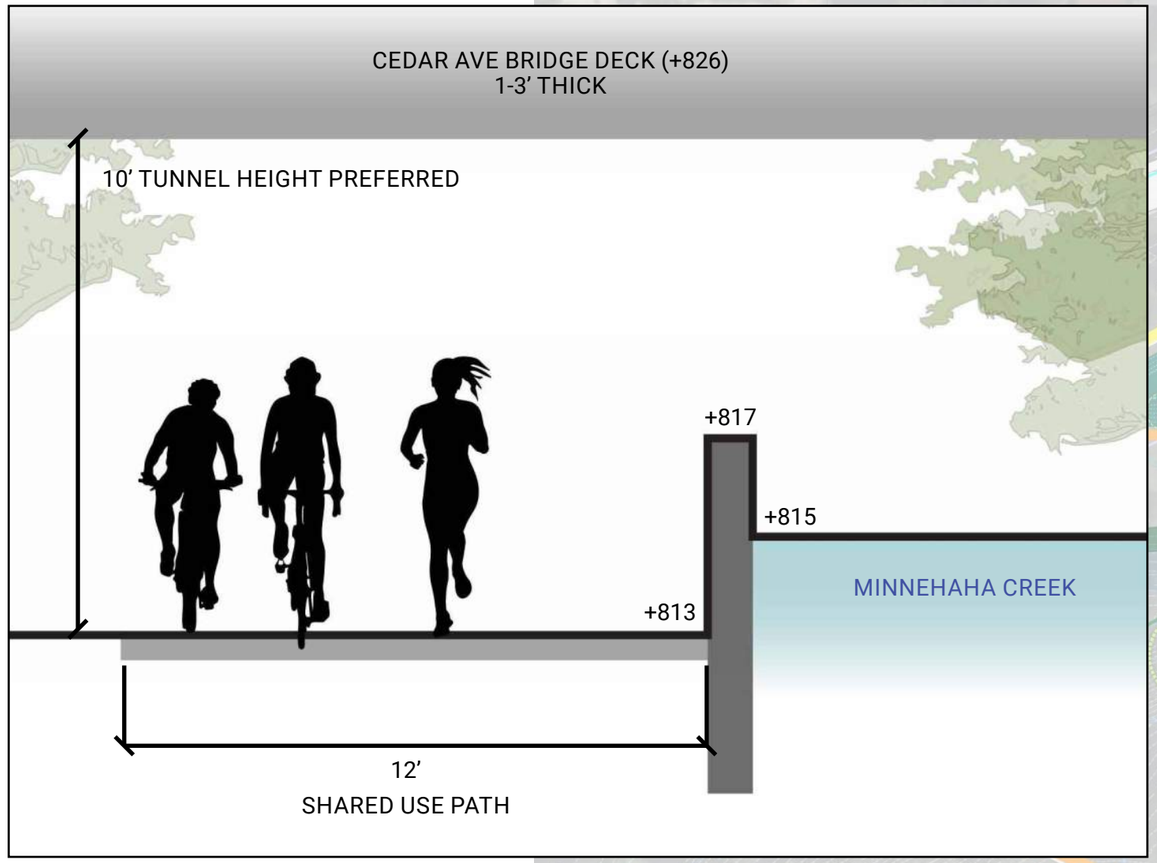
- Emergent
- Transitional
- Wetland
- Restoration

- Precedent Imagery Reference
- Sanitary Sewer
- Stormwater
- Culvert

0 20 40 80'

N

CEDAR AVENUE: OPTION 1 ILLUSTRATIVE PLAN



LEGEND

Path Network
- Existing/Proposed Bike Trail
- Existing/Proposed Ped Trail: Paved
- Existing Ped Trail: Natural Surface

Landscape Elements
- Stormwater Feature
- Bank Restoration
- Upland Restoration
- # Precedent Imagery Reference
- Recreation Features
- Significant Tree
- Removed Tree

Utilities
- Sanitary Sewer
- Stormwater
- Culvert

0 20 40 80’

N

CEDAR AVENUE: OPTION 1
“MOSES BRIDGE” STUDY

PROJECTS

A) CREEK REMEANDER

- Realign creek to add meander bend along its current trajectory
- Stabilize banks and restore floodplain bench
- Relocate path and bench away from top of slope

B) RIPARIAN HABITAT RESTORATION

- Convert mowed lawn to native tallgrass prairie, oak savanna, and/or riparian forest

C) BANK RENATURALIZATION

- Remove plastic mesh, remove/reset existing boulders, and reconstruct top of bank with bioengingeering treatments

D2) MULTI-BASIN STORMWATER WETLAND

- Maximize flood storage. More tree removals than in option D1. Incorporate native and wetland vegetation
- Make circulation adjustments: move bike path north and allow pedestrian path to utilize existing bike path for a stretch to move trails out of the floodplain
- Add a boardwalk with overlook and interpretive elements across the stormwater wetland to connect to grade-separated access beneath Cedar

E) CSO SEPARATION

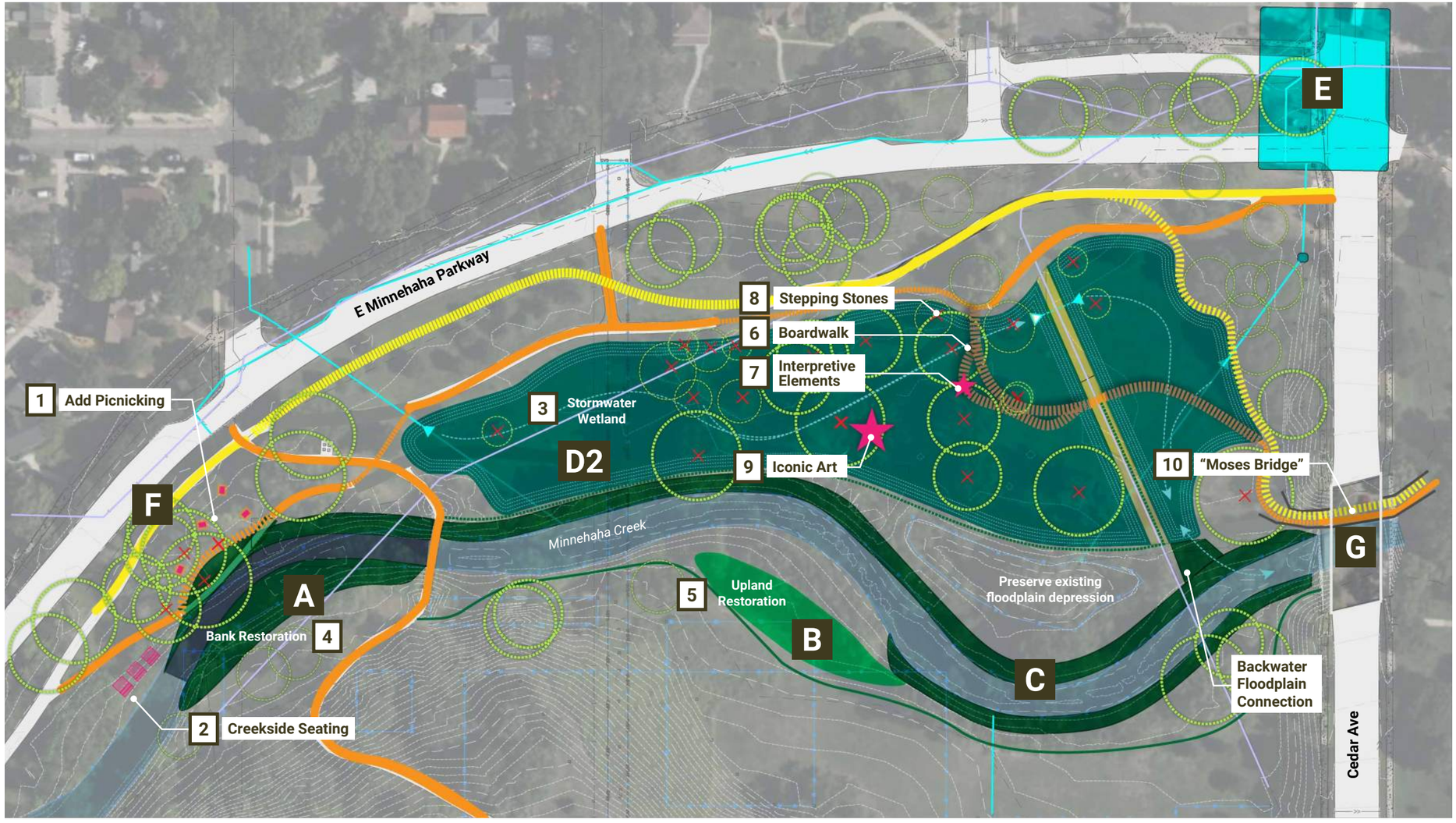
- Separate sanitary and storm sewer systems

F) À LA CARTE RECREATION IMPROVEMENTS

- Add picnicking
- Add creekside seating

G) À LA CARTE CIRCULATION IMPROVEMENTS

- “Moses Bridge” beneath Cedar Ave



0 20 40 80’

N

LEGEND

Path Network

- Existing/Proposed Bike Trail
- Existing/Proposed Ped Trail: Paved
- Existing Ped Trail: Natural Surface

Landscape Elements

- Stormwater Feature
- Bank Restoration
- Upland Restoration
- # Precedent Imagery Reference
- Recreation Features
- Significant Tree
- Removed Tree

Utilities

- Sanitary Sewer
- Stormwater
- Culvert

CEDAR AVENUE: OPTION 2 CONCEPT DIAGRAM

PROJECTS

A) CREEK REMEANDER

- Realign creek to add meander bend along its current trajectory
- Stabilize banks and restore floodplain bench
- Relocate path and bench away from top of slope

B) RIPARIAN HABITAT RESTORATION

- Convert mowed lawn to native tallgrass prairie, oak savanna, and/or riparian forest

C) BANK RENATURALIZATION

- Remove plastic mesh, remove/reset existing boulders, and reconstruct top of bank with bioengingeering treatments

D2) MULTI-BASIN STORMWATER WETLAND

- Maximize flood storage. More tree removals than in option D1. Incorporate native and wetland vegetation
- Make circulation adjustments: move bike path north and allow pedestrian path to utilize existing bike path for a stretch to move trails out of the floodplain
- Add a boardwalk with overlook and interpretive elements across the stormwater wetland to connect to grade-separated access beneath Cedar

E) CSO SEPARATION

- Separate sanitary and storm sewer systems

F) À LA CARTE RECREATION IMPROVEMENTS

- Add picnicking
- Add creekside seating

G) À LA CARTE CIRCULATION IMPROVEMENTS

- “Moses Bridge” beneath Cedar Ave

LEGEND

Path Network

- Existing/Proposed Bike Trail
- Existing/Proposed Ped Trail: Paved
- Proposed Ped Trail: Boardwalk
- Existing/Proposed Ped Trail: Natural Surface

Stormwater Wetland

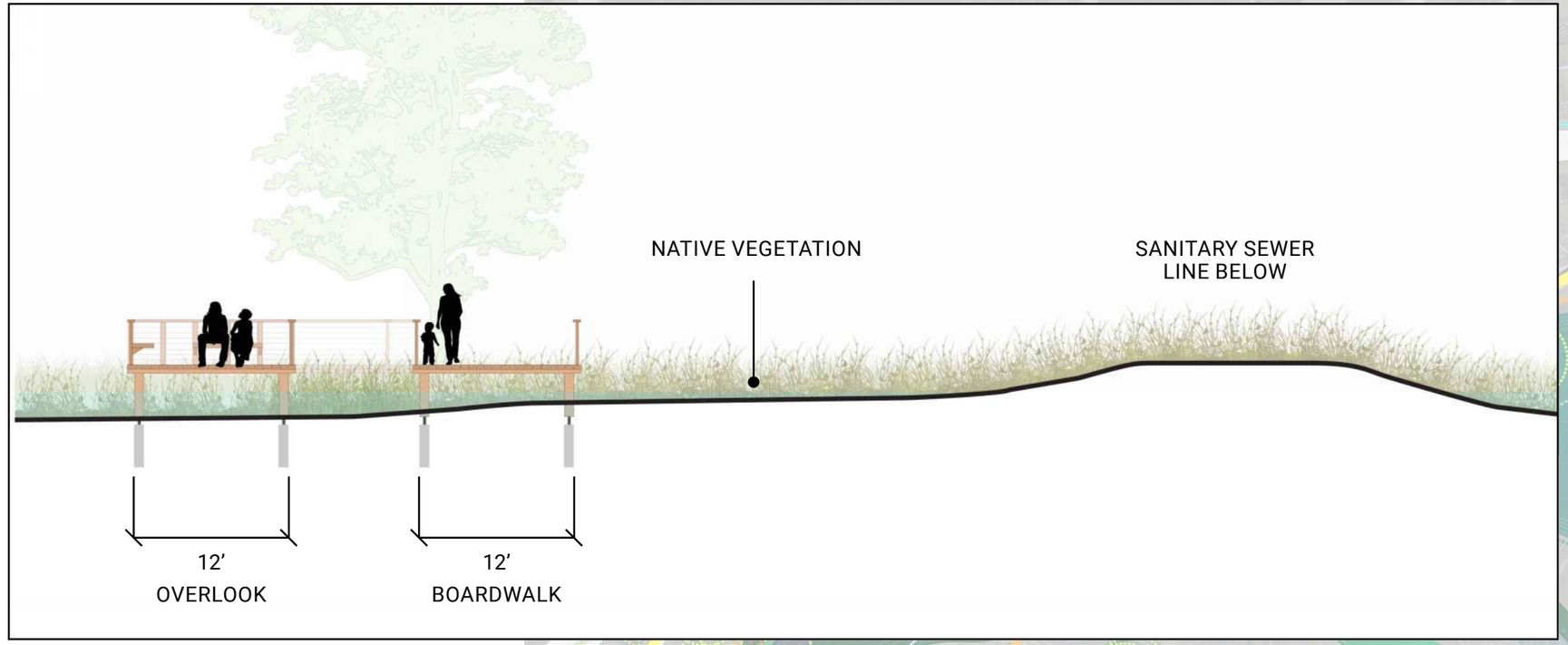
- Emergent
- Transitional
- Wetland
- Restoration
- [#] Precedent Imagery Reference

- Sanitary Sewer
- Stormwater
- Culvert

0 20 40 80’

N

CEDAR AVENUE: OPTION 2 ILLUSTRATIVE PLAN



LEGEND

Path Network
- Existing/Proposed Bike Trail
- Existing/Proposed Ped Trail: Paved
- Existing Ped Trail: Natural Surface

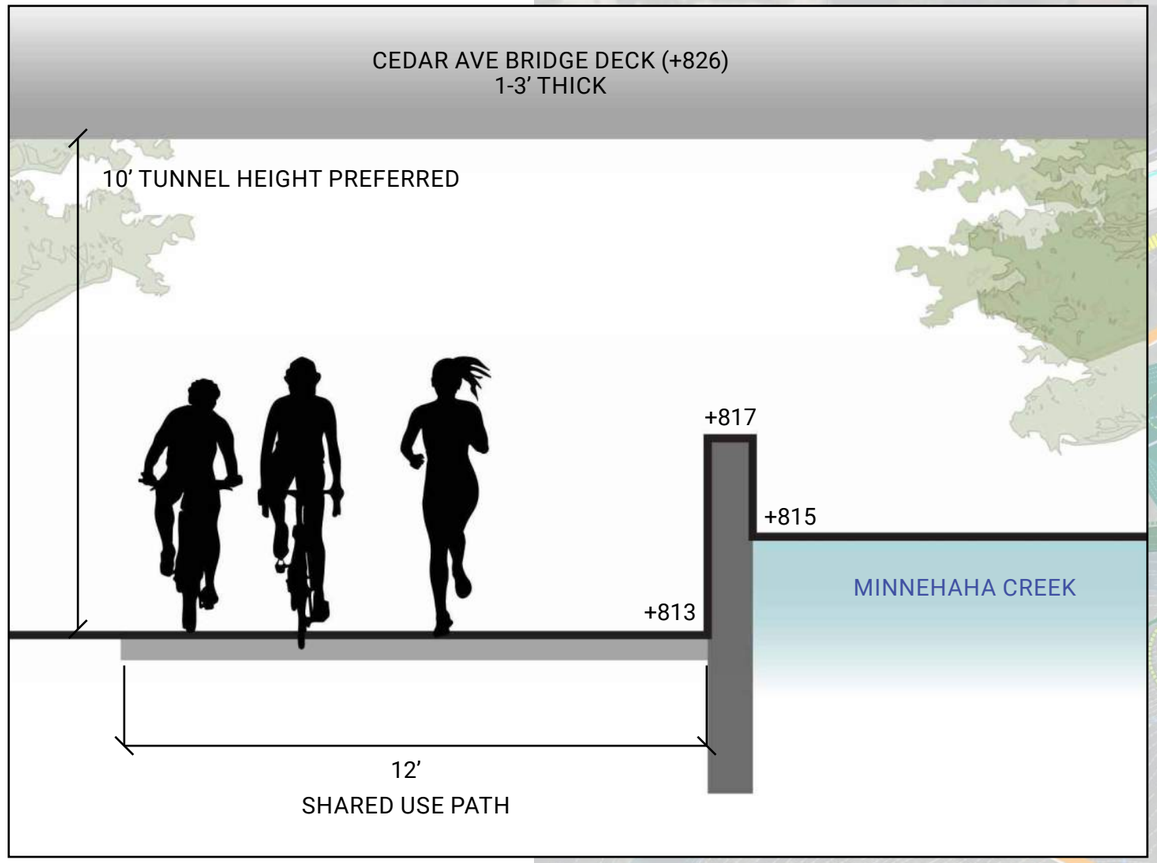
Landscape Elements
- Stormwater Feature
- Bank Restoration
- Upland Restoration
- Recreation Features
- Significant Tree
- Removed Tree

Utilities
- Sanitary Sewer
- Stormwater
- Culvert

0 20 40 80’

N

CEDAR AVENUE: OPTION 2 BOARDWALK STUDY



LEGEND

Path Network
- Existing/Proposed Bike Trail
- Existing/Proposed Ped Trail: Paved
- Existing Ped Trail: Natural Surface

Landscape Elements
- Stormwater Feature
- Bank Restoration
- Upland Restoration
- Recreation Features
- Significant Tree
- Removed Tree

Utilities
- Sanitary Sewer
- Stormwater
- Culvert

0 20 40 80’

N

CEDAR AVENUE: OPTION 2
“MOSES BRIDGE” STUDY

CEDAR AVENUE PRECEDENT IMAGERY

Picnicking and Seating

1 Picnic tables

2 Creekside Seating

Shared-use Path Tunnel

10 “Moses Bridge”

Stormwater Wetland

3 Stormwater Wetland

4 Bank Restoration

5 Upland Restoration

6 Boardwalk

Seating

Dynamic Shape

Cutout for Habitat

Shelter

7 Interpretive Elements

Railing Panels

Playful Interactive Features

8 Stepping Stones

9 Iconic Art

PROJECTS

A) BANK RESTORATION

- Remove concrete pipes from bank and stabilize bank with bioengineering

B) CIRCULATION ADJUSTMENTS

- Improve ADA-accessibility of pedestrian access from north. Move pedestrian trails out of the floodplain where possible. Add interpretive overlook across the creek from new stormwater wetland

C1) STORMWATER / FLOOD STORAGE WETLAND & REMEANDER

- Remove former roadway embankment to improve floodplain storage and connectivity
- Remeander creek between wetlands and preserved trees
- Add interpretive overlook

D) IN-STREAM HABITAT IMPROVEMENTS

- Add in-stream habitat features to force micro pools and provide complexity

E1) CIRCULATION ADJUSTMENTS

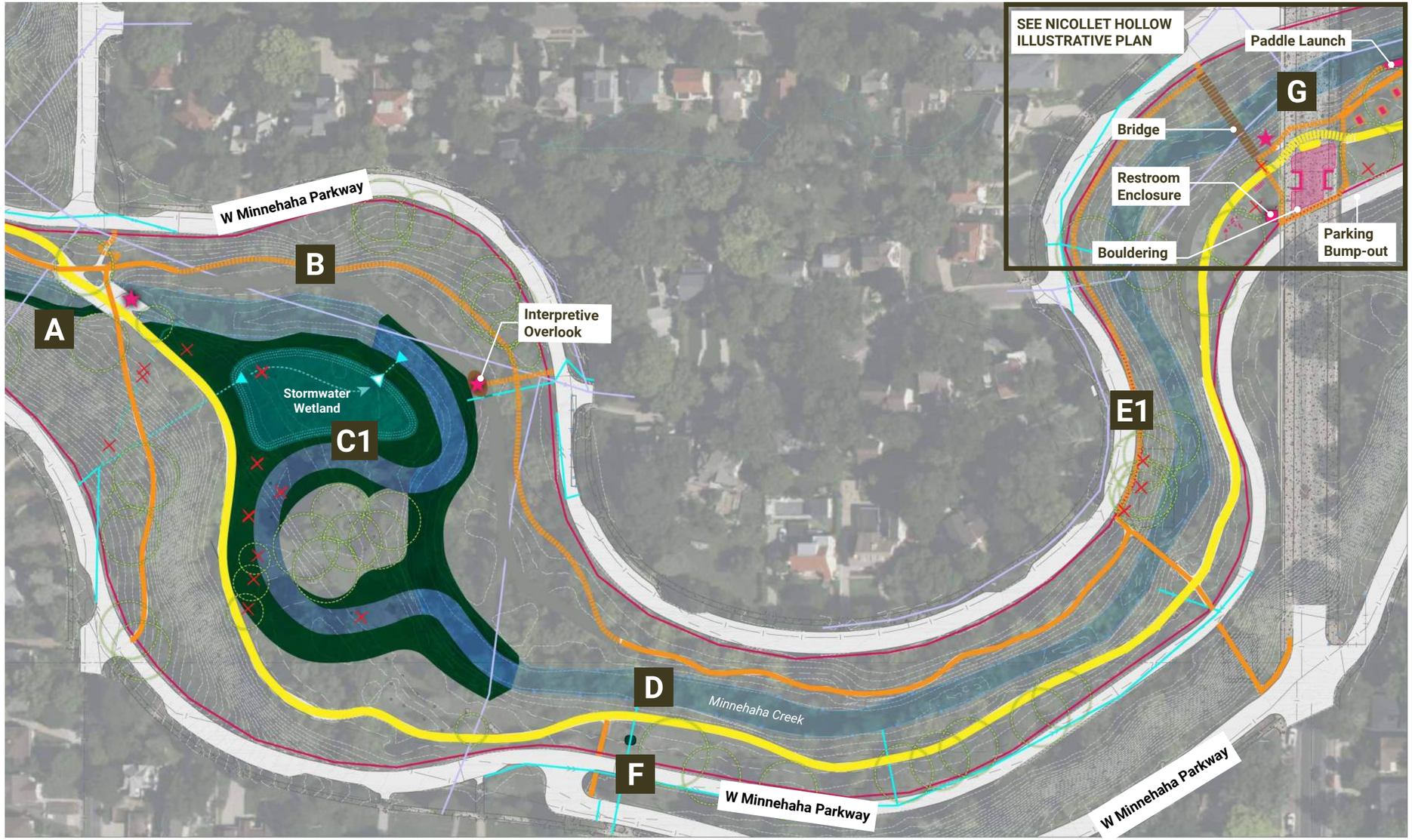
- Extend pedestrian path on north side of the creek to separate modes currently in conflict along the curve. Requires new pedestrian bridge

F) GRIT CHAMBER

- Construct grit chamber in line with existing storm infrastructure

G) À LA CARTE RECREATION IMPROVEMENTS

- Add improvements at Nicollet Hollow:
  - Bouldering with resilient surfacing and viewing/gathering space
  - Bike parking
  - Restroom enclosure
  - ADA-accessible paddle launch with parallel parking bump-out
  - Picnicking
  - Artful play elements
  - Public art



LEGEND

Path Network
- Existing/Proposed Bike Trail
- Existing/Proposed Ped Trail: Paved
- Proposed Pedestrian Bridge

Landscape Elements
- Stormwater Feature
- Bank Restoration
- Recreation Features
- Significant Tree
- Removed Tree

Utilities
- Sanitary Sewer
- Stormwater
- Electric
- Culvert

0 25 50 100’

N

NICOLLET: OPTION 1 CONCEPT DIAGRAM

PROJECTS

A) BANK RESTORATION

- Remove concrete pipes from bank and stabilize bank with bioengineering

B) CIRCULATION ADJUSTMENTS

- Improve ADA-accessibility of pedestrian access from north. Move pedestrian trails out of the floodplain where possible. Add interpretive overlook across the creek from new stormwater wetland

C2) STORMWATER & FLOOD STORAGE WETLANDS

- Excavate and create a single wetland basin, preserving large cottonwoods in center
- Bank stabilization adjacent to proposed stormwater outfall

E2) CIRCULATION ADJUSTMENTS

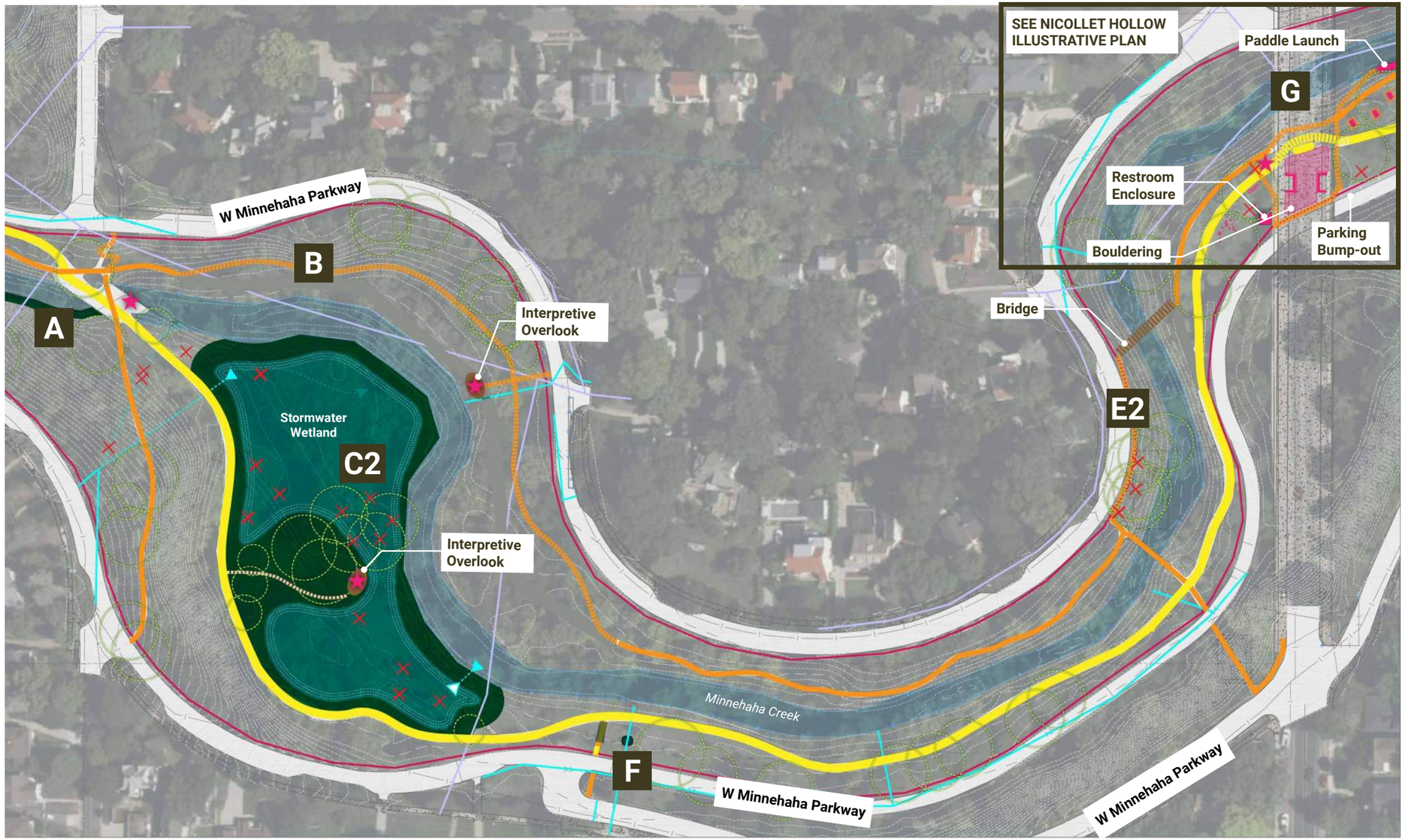
- Extend pedestrian path on north side of the creek to separate modes currently in conflict along the curve. Requires new pedestrian bridge

F) GRIT CHAMBER

- Construct grit chamber in line with existing storm infrastructure

G) À LA CARTE RECREATION IMPROVEMENTS

- Add interpretive overlook at stormwater wetland
- Add improvements at Nicollet Hollow:
  - Bouldering with resilient surfacing and viewing/gathering space
  - Bike parking
  - Restroom enclosure
  - ADA-accessible paddle launch with parallel parking bump-out
  - Picnicking
  - Artful play elements
  - Public art



LEGEND

Path Network
- Existing/Proposed Bike Trail
- Existing/Proposed Ped Trail: Paved
- Proposed Ped Trail: Natural Surface
- Proposed Pedestrian Bridge

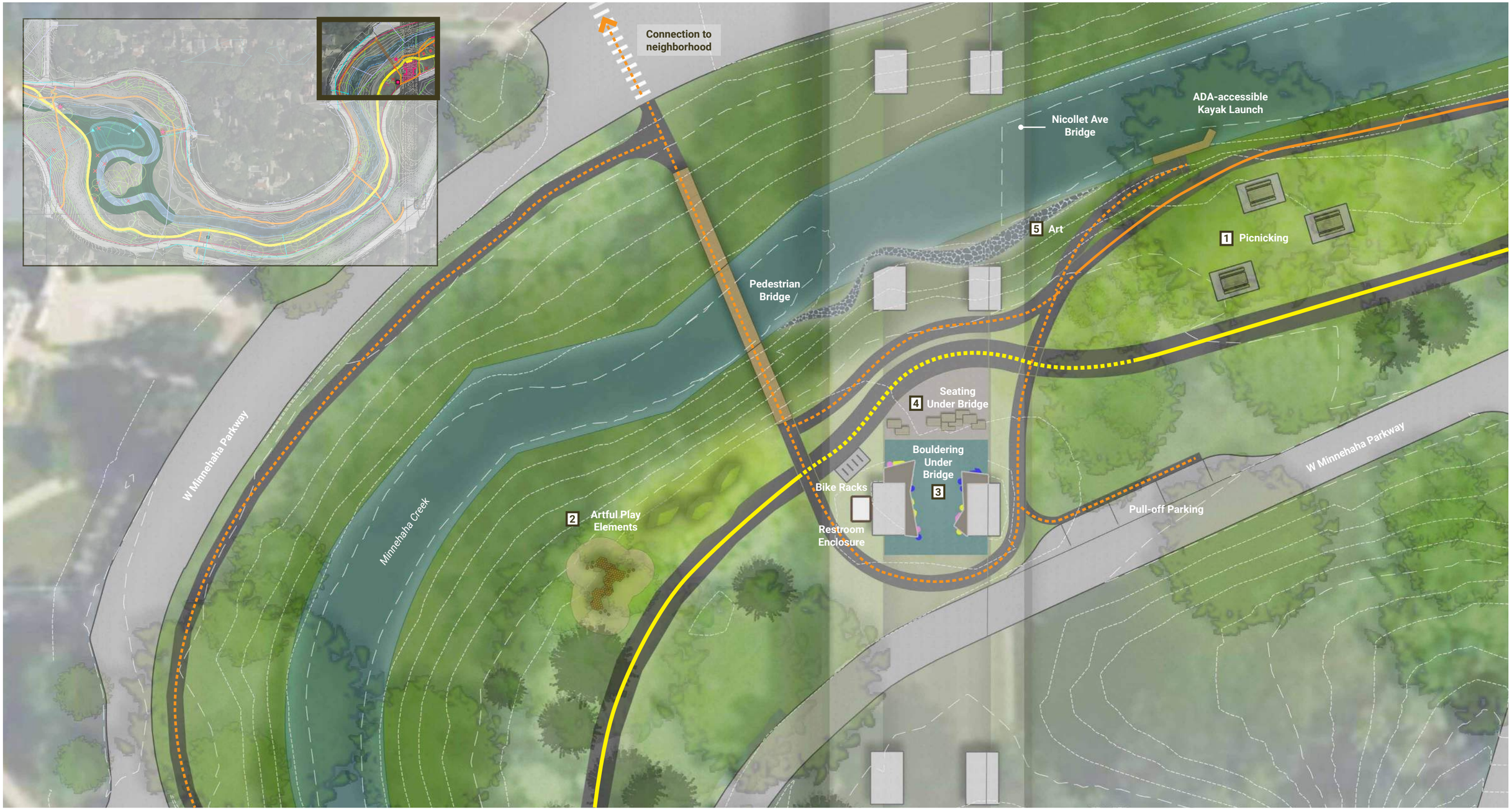
Landscape Elements
- Stormwater Feature
- Bank Restoration
- Recreation Features
- Significant Tree
- Removed Tree

Utilities
- Sanitary Sewer
- Stormwater
- Electric
- Culvert

0 25 50 100’

N

NICOLLET: OPTION 2 CONCEPT DIAGRAM



NICOLLET BRIDGE: ILLUSTRATIVE PLAN

LEGEND

Path Network

- Existing/Proposed Bike Trail
- Existing/Proposed Ped Trail: Paved
- Proposed Ped Trail: Bridge

[#] Reference to Precedent Imagery

0 25 50 100’

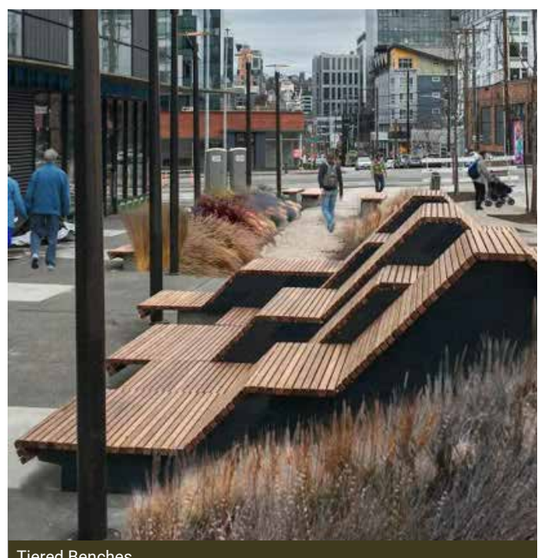
N

Bouldering Under Bridge

3 Bouldering Wall

Geometric and Colorful

4 Seating



Tiered Benches

Dynamic and Playful

Picnicking

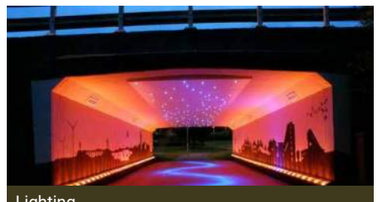
1 Picnic Tables

Art

At Bridge

Ceiling Treatment

Paint



Lighting

Column Treatment

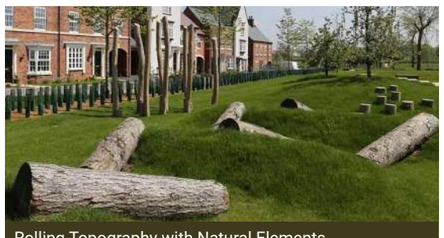
5 At Creek

Rising Stones

Play

2 Play Features

Log Climbing



Rolling Topography with Natural Elements

NICOLLET:
PRECEDENT IMAGERY

PROJECTS

A1) STORMWATER TREATMENT TRAIN

- Remove flume, add catch basin and new curb at road to capture stormwater from road
- Add grit chamber
- Add three basins to replace the open stormwater flume
- Add natural surface path to traverse the basins (option for small bridge or path)
- Stabilize bank adjacent to proposed stormwater outfall

B) BANK RESTORATION

- Stabilize and revegetate slope, relocate natural surface trail away from top of slope

C) OAK SAVANNA RESTORATION

- Add native interseeding beneath oaks with natural surface path maintained through the grove

D) WATER ACCESS POINT

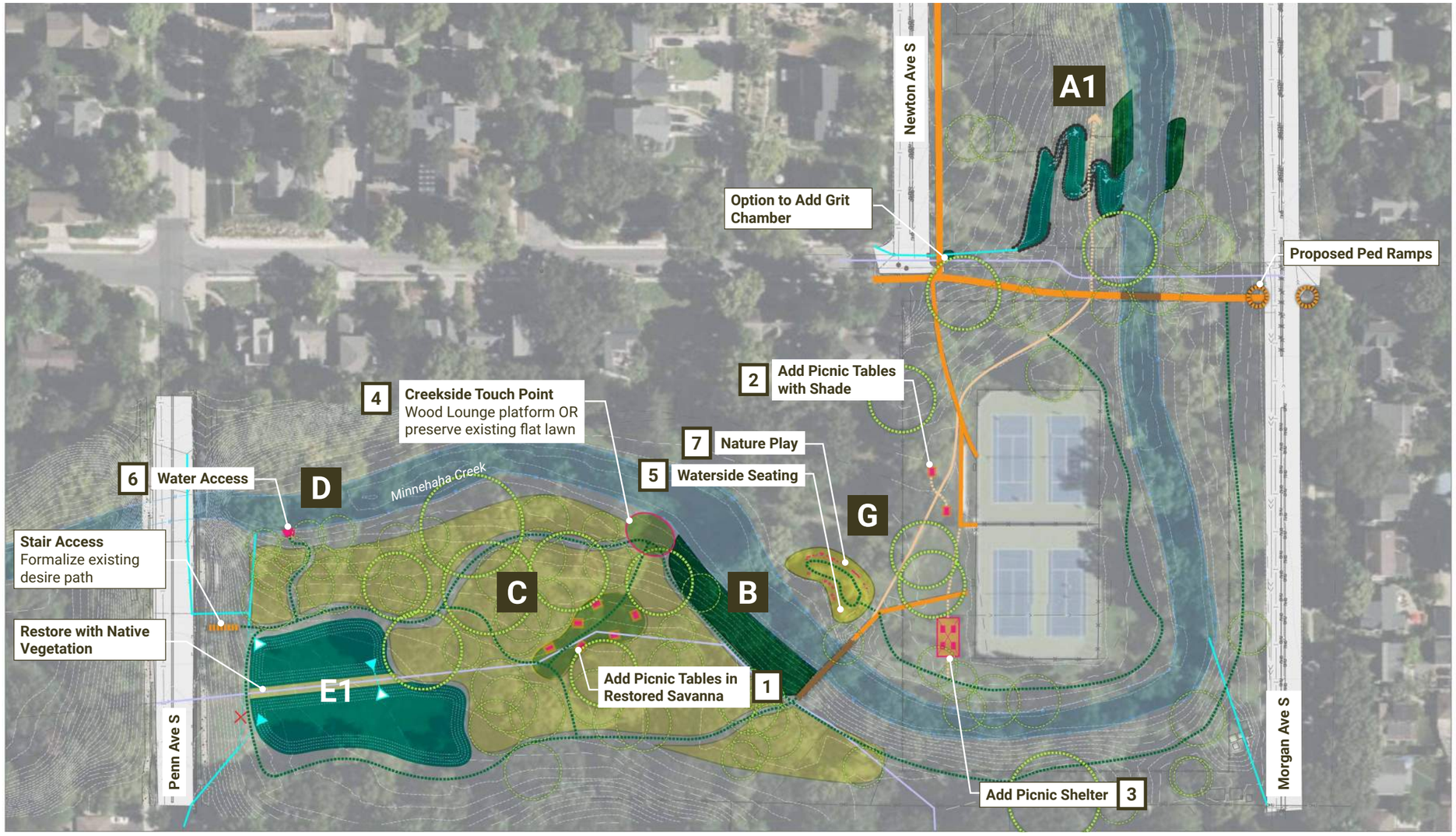
- Install stepped limestone water access point near Penn

E1) PENN AVENUE STORMWATER TREATMENT BASIN

- Add flat-bottomed turf basins to maintain playable recreation surface

G) À LA CARTE RECREATION IMPROVEMENTS

- Add picnicking: tables within restored savanna; picnic tables with umbrellas and picnic shelter near tennis
- Add nature play features and waterside seating along Minnehaha Creek
- Add wood lounge platform at creekside touch point
- Add stair access



LEGEND

Path Network

- Existing/Proposed Ped Trail: Paved
- Existing/Proposed Ped Trail: Natural Surface
  **Mown trails until packed earth*

Landscape Elements

- Stormwater Feature
- Bank Restoration
- Open Area
- # Precedent Imagery Reference
- Savanna
- Recreation Features
- Significant Tree
- X Removed Tree

Utilities

- Sanitary Sewer
- Stormwater
- Culvert

0 20 40 80’

N

PENN–NEWTON: OPTION 1 CONCEPT DIAGRAM

PROJECTS

A2) CHECK DAMS

- Remove flume, add catch basin and new curb at road to capture stormwater from road
- Add grit chamber
- Add meandering check dams to reduce flow velocities, reduce erosion risks, and trap sediment (replace the open stormwater flume)
- Add natural surface path to traverse check dams (option for small bridge or path as part of the dam)
- Stabilize bank adjacent to proposed stormwater outfall

B) BANK RESTORATION

- Stabilize and revegetate slope, relocate natural surface trail away from top of slope

C) OAK SAVANNA RESTORATION

- Add native interseeding beneath oaks with natural surface path maintained through the grove

D) WATER ACCESS POINT

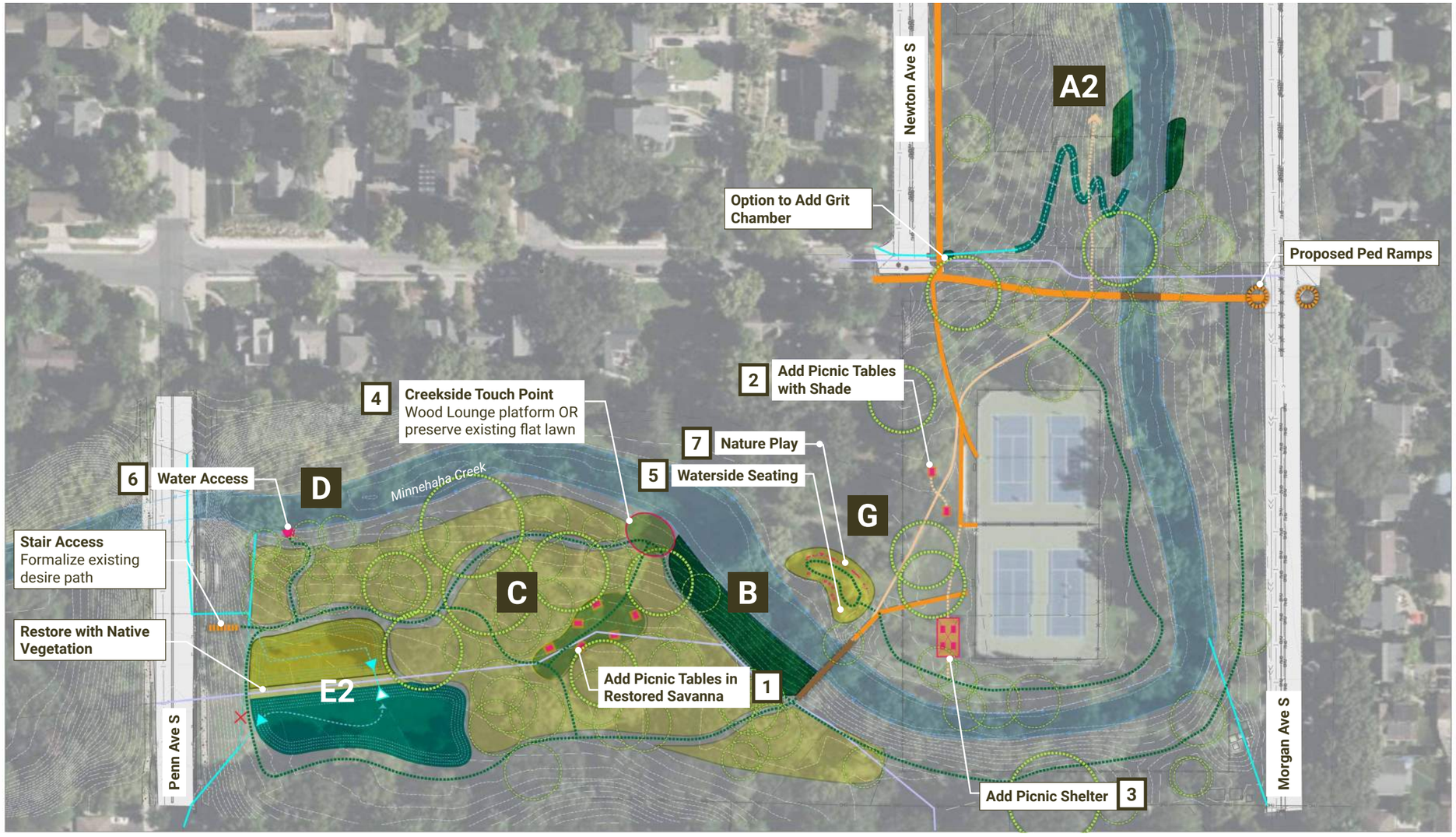
- Install stepped limestone water access point near Penn

E2) PENN AVENUE STORMWATER FILTRATION BASIN

- Construct northern basin with sand filter and draintile. Southern basin would be a treatment basin as in option E1

G) À LA CARTE RECREATION IMPROVEMENTS

- Add picnicking: tables within restored savanna; picnic tables with umbrellas and picnic shelter near tennis
- Add nature play features and Adirondack chairs along Minnehaha Creek
- Add wood lounge platform at creekside touch point
- Add stair access



LEGEND

Path Network

- Existing/Proposed Ped Trail: Paved
- Existing/Proposed Ped Trail: Natural Surface
  **Mown trails until packed earth*

Landscape Elements

- Stormwater Feature
- Bank Restoration
- Open Area
- # Precedent Imagery Reference
- Savanna
- Recreation Features
- Significant Tree
- Removed Tree

Utilities

- Sanitary Sewer
- Stormwater
- Culvert

0 20 40 80’

N

PENN-NEWTON: OPTION 2 CONCEPT DIAGRAM

PROJECTS

F) BANK RESTORATION

- Stabilize bank and reset existing boulder armor
- Relocate natural surface trail away from top of slope

LEGEND

Path Network

- Existing/Proposed Ped Trail: Paved
- Existing/Proposed Ped Trail: Natural Surface
  **Mown trails until packed earth*

Landscape Elements

- Stormwater Feature
- Bank Restoration
- Significant Tree

Utilities

- Sanitary Sewer
- Stormwater
- Culvert

0 35 70 140’

N

PENN-NEWTON: NORTH CONCEPT DIAGRAM

Picnicking

1 Picnic tables in restored savanna

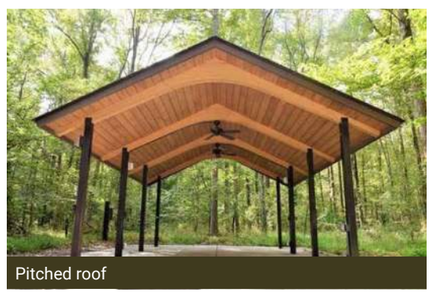
2 Picnic tables with shade

Small structure

Umbrella

Shade sail

3 Picnic shelter

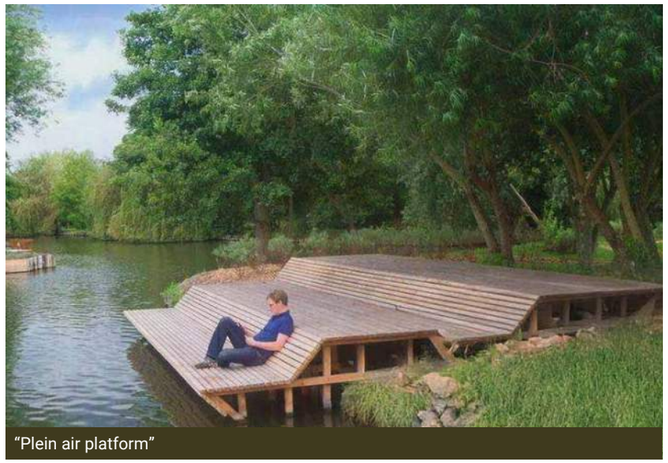


Pitched roof

Flat roof

Waterside

4 Creekside Touch Point



"Plein air platform"

5 Waterside Seating

Fixed, heavy duty

Movable chairs

6 Water Access

Nature Play

7 Nature Play

PENN-NEWTON: PRECEDENT IMAGERY

Appendix B

Cost Estimate

Cost Summary

Location/Alternate	Project		Capital Costs	Capital Cost for Full Alternative
Penn Newton Option 1	Project A1	Stormwater treatment train	$ 610,000	
	Project B	Bank Restoration	$ 160,000	
	Project C	Oak Savanna Restoration	$ 20,000	
	Project D	Water Access point	$ 60,000	$ 1,440,000
	Project E1	Stormwater Treatment Basin	$ 260,000	
	Project F	Bank Restoration	$ 330,000	
	Project G	A La Carte Recreation Projects	(1)	
Penn Newton Option 2	Project A2	Check Dams	$ 500,000	
	Project B	Bank Restoration	See Option 1	
	Project C	Oak Savanna Restoration	See Option 1	
	Project D	Water Access point	See Option 1	$ 1,410,000
	Project E2	Filtration Basin	$ 340,000	
	Project F	Bank Restoration	See Option 1	
	Project G	A La Carte Recreation Projects	(1)	
Cedar Avenue Option 1	Project A	Creek remeander	$ 350,000	
	Project B	Riparian Habitat Restoration	$ 20,000	
	Project C	Bank Renaturalization	$ 160,000	$ 1,020,000
	Project D1	Multi-basin stormwater wetland	$ 490,000	
	Project E	CSO Separation	(2)	
	Project F/G	A La Carte Recreation and Circulation Projects	(1)	
Cedar Avenue Option 2	Project A	Bank Restoration and shaping	$ 300,000	
	Project B	Riparian Habitat Restoration	See Option 1	
	Project C	Bank Renaturalization	See Option 1	$ 3,080,000
	Project D2	Multi-basin stormwater wetland (3)	$ 2,600,000	
	Project E	CSO Separation	(2)	
	Project F/G	A La Carte Recreation and Circulation Projects	(1)	
Nicollet Option 1	Project A	Bank Restoration	$ 120,000	
	Project B	Circulation Adjustments	$ 260,000	
	Project C1	Stormwater wetlands & remeander	$ 1,050,000	
	Project D	In-Stream Habitat Improvements	$ 40,000	$ 2,290,000
	Project E1	Circulation Adjustments	$ 660,000	
	Project F	Grit Chamber	$ 160,000	
	Project G	A La Carte Recreation Projects	(1)	
Nicollet Option 2	Project A	Bank Restoration	See Option 1	
	Project B	Circulation Adjustments	See Option 1	
	Project C2	Stormwater & flood storage wetlands	$ 770,000	$ 2,370,000
	Project E2	Circulation adjustments	$ 1,060,000	
	Project F	Grit Chamber	See Option 1	
	Project G	A La Carte Recreation Projects	(1)	

(1) A La Carte costs are included in the detail budget tables

(2) CSO separation costs have too many unknowns for costs to be included at this time

(3) Price includes $800,000 in boardwalk improvements

Cost Estimates for Cedar

NO.	ITEM DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	TOTAL PRICE
Option 1 - Creek Remeander (Project A)					
1	Mobilization/Demobilization	LS	1	$ 19,000.00	$ 19,000.00
2	Traffic Control	LS	1	$ 6,000.00	$ 6,000.00
3	Dewatering & Erosion/Sediment Control	LS	1	$ 14,000.00	$ 14,000.00
4	Site Access	LS	1	$ 5,000.00	$ 5,000.00
5	New 8' Bituminous Trail	LF	140	$ 115.00	$ 16,100.00
6	Remove Bituminous Trail	SY	780	$ 10.00	$ 7,800.00
7	Control of Water	LS	1	$35,000	$ 35,000.00
8	Earthwork	CY	610	$18	$ 10,980.00
9	FES Lifts	FACE-F	840	$50	$ 42,000.00
10	Topsoil	CY	70	$30	$ 2,100.00
11	Stone Toe	CY	80	$140	$ 11,200.00
12	Riffle Stone	CY	30	$140	$ 4,200.00
13	Surface Fabric	SY	1,500	$18	$ 27,000.00
14	Seeding	AC	0.4	$12,000	$ 4,800.00
				SUBTOTAL	$ 205,180.00
				[30%] CONTINGENCY	$ 61,554.00
				TOTAL CONSTRUCTION COST	$ 266,734.00
				30% LEGAL, ENGINEERING, ADMIN, FINANCE	$ 80,020.20
				TOTAL PROJECT COSTS	$ 346,754.20

NO.	ITEM DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	TOTAL PRICE
Riparian Habitat Restoration (Project B)					
1	Mobilization/Demobilization	LS	1	$ 2,000.00	$ 2,000.00
2	Traffic Control	LS	1	$ 1,000.00	$ 1,000.00
3	Dewatering & Erosion/Sediment Control	LS	1	$ 1,000.00	$ 1,000.00
4	Site Access	LS	1	$ 1,000.00	$ 1,000.00
5	Revegetation	AC	0.5	$ 17,000.00	$ 8,500.00
				SUBTOTAL	$ 13,500.00
				[30%] CONTINGENCY	$ 4,050.00
				TOTAL CONSTRUCTION COST	$ 17,550.00
				30% LEGAL, ENGINEERING, ADMIN, FINANCE	$ 5,265.00
				TOTAL PROJECT COSTS	$ 22,815.00

NO.	ITEM DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	TOTAL PRICE
Bank Renaturalization (Project C)					
1	Mobilization/Demobilization	LS	1	$ 9,000.00	$ 9,000.00
2	Traffic Control	LS	1	$ 3,000.00	$ 3,000.00
3	Dewatering & Erosion/Sediment Control	LS	1	$ 7,000.00	$ 7,000.00
4	Site Access	LS	1	$ 3,000.00	$ 3,000.00
5	Remove Plastic Mesh and Reset Boulders	DAYS	3	$3,000	$ 9,000.00
6	FES Lifts	FACE-F	1,250	$50	$ 62,500.00
7	Backfill	CY	50	$18	$ 900.00
8	Topsoil	CY	50	$30	$ 1,500.00
9	Seeding	AC	0.2	$5,000	$ 1,000.00
				SUBTOTAL	$ 96,900.00
				[30%] CONTINGENCY	$ 29,070.00
				TOTAL CONSTRUCTION COST	$ 125,970.00
				30% LEGAL, ENGINEERING, ADMIN, FINANCE	$ 37,791.00
				TOTAL PROJECT COSTS	$ 163,761.00

NO.	ITEM DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	TOTAL PRICE
Option 2 - Bank Restoration and Shaping (Project A)					
1	Mobilization/Demobilization	LS	1	$ 16,000.00	$ 16,000.00
2	Traffic Control	LS	1	$ 5,000.00	$ 5,000.00
3	Dewatering & Erosion/Sediment Control	LS	1	$ 12,000.00	$ 12,000.00
4	Site Access	LS	1	$ 5,000.00	$ 5,000.00
5	Control of Water	LS	1	$35,000	$ 35,000.00
6	Earthwork	CY	610	$18	$ 10,980.00
7	FES Lifts	FACE-F	840	$50	$ 42,000.00
8	Topsoil	CY	70	$30	$ 2,100.00
9	Stone Toe	CY	80	$140	$ 11,200.00
10	Riffle Stone	CY	30	$140	$ 4,200.00
11	Surface Fabric	SY	1,500	$18	$ 27,000.00
12	Seeding	AC	0.4	$12,000	$ 4,800.00
				SUBTOTAL	$ 175,280.00
				[30%] CONTINGENCY	$ 52,584.00
				TOTAL CONSTRUCTION COST	$ 227,864.00
				30% LEGAL, ENGINEERING, ADMIN, FINANCE	$ 68,359.20
				TOTAL PROJECT COSTS	$ 296,223.20

Cost Estimates for Cedar

NO.	ITEM DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	TOTAL PRICE
Option 1 - Multi-Basin Stormwater Wetland - Smaller Footprint (Project D1)					
1	Mobilization/Demobilization	LS	1	$ 27,000.00	$ 27,000.00
2	Traffic Control	LS	1	$ 13,000.00	$ 13,000.00
3	Dewatering & Erosion/Sediment Control	LS	1	$ 19,000.00	$ 19,000.00
4	Site Access	LS	1	$ 7,000.00	$ 7,000.00
5	Tree Clearing	EA	7	$ 750.00	$ 5,250.00
6	Common Excavation Export EV	CY	6120	$ 25.00	$ 153,000.00
7	Remove Existing RCP	LIN FT	355	$ 20.00	$ 7,100.00
8	Remove Existing Storm Structure	EA	1	$ 2,500.00	$ 2,500.00
9	Pretreatment	EA	1	$ 15,000.00	$ 15,000.00
10	Install New RCP	LIN FT	120	$ 100.00	$ 12,000.00
11	Storm Structures	LS	1	$ 15,000.00	$ 15,000.00
12	Revegetation and Restoration	AC	1.4	$ 10,000.00	$ 14,000.00
				SUBTOTAL	$ 289,850.00
				[30%] CONTINGENCY	$ 86,955.00
				TOTAL CONSTRUCTION COST	$ 376,805.00
				30% LEGAL, ENGINEERING, ADMIN, FINANCE	$ 113,041.50
				TOTAL PROJECT COSTS	$ 489,846.50

NO.	ITEM DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	TOTAL PRICE
CSO Separation (Project E)					
				SUBTOTAL	$ -
				[30%] CONTINGENCY	$ -
				TOTAL CONSTRUCTION COST	$ -
				30% LEGAL, ENGINEERING, ADMIN, FINANCE	$ -
				TOTAL PROJECT COSTS	$ -

NO.	ITEM DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	TOTAL PRICE
A La Carte Recreation Improvements - Picnicking (Project F)					
Cost for a la carte recreation projects are based on the master plan's implementation chapter and adjusted 5% per year for inflation to					
1	Mobilization/Demobilization	LS	1	$ 29,000.00	$ 29,000.00
2	Traffic Control	LS	1	$ 9,000.00	$ 9,000.00
3	Dewatering & Erosion/Sediment Control	LS	1	$ 21,000.00	$ 21,000.00
4	Site Access	LS	1	$ 20,000.00	$ 20,000.00
5	Picnic Tables and Concrete Pads at 16th Ave	EA	6	$ 9,800.00	$ 58,800.00
6	Interpretive Overlooks	EA	2	$ 80,000.00	$ 160,000.00
7	Creekside Seating	SF	250	$ 80.00	$ 20,000.00
				SUBTOTAL	$ 317,800.00
				[30%] CONTINGENCY	$ 95,340.00
				TOTAL CONSTRUCTION COST	$ 413,140.00
				30% LEGAL, ENGINEERING, ADMIN, FINANCE	$ 123,942.00
				TOTAL PROJECT COSTS	$ 537,082.00

NO.	ITEM DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	TOTAL PRICE
A La Carte Circulation Improvements - "Moses Bridge" (Project G)					
1	Mobilization/Demobilization	LS	1	$ 227,000.00	$ 227,000.00
2	Traffic Control	LS	1	$ 66,000.00	$ 66,000.00
3	Dewatering & Erosion/Sediment Control	LS	1	$ 163,000.00	$ 163,000.00
4	Site Access	LS	1	$ 60,000.00	$ 60,000.00
5	Tunnel at Cedar Ave	LS	1	$ 1,914,500.00	$ 1,914,500.00
6	Bike Path Connection to Tunnel	LF	505	$ 115.00	$ 58,075.00
				SUBTOTAL	$ 2,488,575.00
				[30%] CONTINGENCY	$ 746,572.50
				TOTAL CONSTRUCTION COST	$ 3,235,147.50
				30% LEGAL, ENGINEERING, ADMIN, FINANCE	$ 970,544.25
				TOTAL PROJECT COSTS	$ 4,205,691.75

NO.	ITEM DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	TOTAL PRICE
Option 2 - Multi-Basin Stormwater Wetland - Larger Footprint (Project D2)					
1	Mobilization/Demobilization	LS	1	$ 46,000.00	$ 46,000.00
2	Traffic Control	LS	1	$ 22,000.00	$ 22,000.00
3	Dewatering & Erosion/Sediment Control	LS	1	$ 33,000.00	$ 33,000.00
4	Site Access	LS	1	$ 12,000.00	$ 12,000.00
5	Tree Clearing	EA	25	$ 750.00	$ 18,750.00
6	Common Excavation Export EV	CY	12010	$ 25.00	$ 300,250.00
7	Remove Existing RCP	LIN FT	355	$ 20.00	$ 7,100.00
8	Remove Existing Storm Structure	EA	1	$ 2,500.00	$ 2,500.00
9	Pretreatment	EA	1	$ 15,000.00	$ 15,000.00
10	Install New RCP	LIN FT	60	$ 100.00	$ 6,000.00
11	Storm Structures	LS	1	$ 15,000.00	$ 15,000.00
12	Revegetation and Restoration	AC	2.5	$ 10,000.00	$ 25,000.00
13	Overlook	EA	1	$ 80,000.00	$ 80,000.00
14	Interpretive Sign	EA	1	$ 8,000.00	$ 8,000.00
15	12' Timber Boardwalk with railings (vehicle-rated)	LF	530	$ 1,500.00	$ 795,000.00
16	New 8' Bituminous Trail	LF	1112	$ 115.00	$ 127,880.00
17	Remove Bituminous Trail	SY	2660	$ 10.00	$ 26,600.00
				SUBTOTAL	$ 1,540,080.00
				[30%] CONTINGENCY	$ 462,024.00
				TOTAL CONSTRUCTION COST	$ 2,002,104.00
				30% LEGAL, ENGINEERING, ADMIN, FINANCE	$ 600,631.20
				TOTAL PROJECT COSTS	$ 2,602,735.20

Cost Estimates for Nicollet

NO.	ITEM DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	TOTAL PRICE
Bank Restoration (Project A)					
1	Mobilization/Demobilization	LS	1	$ 7,000.00	$ 7,000.00
2	Traffic Control	LS	1	$ 2,000.00	$ 2,000.00
3	Dewatering & Erosion/Sediment Control	LS	1	$ 5,000.00	$ 5,000.00
4	Site Access	LS	1	$ 2,000.00	$ 2,000.00
5	Control of Water	LS	1	$20,000	$ 20,000.00
6	Remove Concrete Culvert Bank Stabilization	LS	1	$2,000	$ 2,000.00
7	Address WPA Wall	LS	1	$10,000	$ 10,000.00
8	FES Lifts	FACE-FT	300	$50	$ 15,000.00
9	Backfill	CY	50	$18	$ 900.00
10	Stone Toe	CY	30	$140	$ 4,200.00
11	Bank Revegetation	AC	0.1	$12,000	$ 1,200.00
				SUBTOTAL	$ 69,300.00
				[30%] CONTINGENCY	$ 20,790.00
				TOTAL CONSTRUCTION COST	$ 90,090.00
				30% LEGAL, ENGINEERING, ADMIN, FINANCE	$ 27,027.00
				TOTAL PROJECT COSTS	$ 117,117.00

NO.	ITEM DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	TOTAL PRICE
Circulation Adjustments (Project B)					
1	Mobilization/Demobilization	LS	1	$ 14,000.00	$ 14,000.00
2	Traffic Control	LS	1	$ 4,000.00	$ 4,000.00
3	Dewatering & Erosion/Sediment Control	LS	1	$ 10,000.00	$ 10,000.00
4	Site Access	LS	1	$ 4,000.00	$ 4,000.00
5	New 8' Bituminous Trail	LF	870	$ 115.00	$ 100,050.00
6	Remove Bituminous Trail	SY	700	$ 10.00	$ 7,000.00
7	Seating	EA	2	$ 6,000.00	$ 12,000.00
				SUBTOTAL	$ 151,050.00
				[30%] CONTINGENCY	$ 45,315.00
				TOTAL CONSTRUCTION COST	$ 196,365.00
				30% LEGAL, ENGINEERING, ADMIN, FINANCE	$ 58,909.50
				TOTAL PROJECT COSTS	$ 255,274.50

NO.	ITEM DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	TOTAL PRICE
Option 1 - Stormwater/Flood Storage Wetland and Remeander (Project C1)					
1	Mobilization/Demobilization	LS	1	$ 56,000.00	$ 56,000.00
2	Traffic Control	LS	1	$ 17,000.00	$ 17,000.00
3	Dewatering & Erosion/Sediment Control	LS	1	$ 40,000.00	$ 40,000.00
4	Site Access	LS	1	$ 15,000.00	$ 15,000.00
5	Tree Clearing	EA	10	$ 750.00	$ 7,500.00
6	Common Excavation Export EV	CY	1250	$ 25.00	$ 31,250.00
7	Remove Existing RCP	LIN FT	185	$ 20.00	$ 3,700.00
8	Remove Existing Storm Structure	EA	3	$ 2,500.00	$ 7,500.00
9	Pretreatment	EA	1	$ 15,000.00	$ 15,000.00
10	Install New RCP	LIN FT	195	$ 100.00	$ 19,500.00
11	Storm Structures	LS	1	$ 20,000.00	$ 20,000.00
12	Control of Water	LS	1	$75,000	$ 75,000.00
13	Earthwork	CY	1,000	$18	$ 18,000.00
14	Offsite Disposal	CY	800	$20	$ 16,000.00
15	FES Lifts	FACE-FT	1,960	$50	$ 98,000.00
16	Salvaged Topsoil	CY	140	$17	$ 2,380.00
17	Backfill	CY	140	$18	$ 2,520.00
18	Stone Toe	CY	170	$140	$ 23,800.00
19	Riffle Stone	CY	120	$140	$ 16,800.00
20	Habitat Boulders	EACH	8	$300	$ 2,400.00
21	Surface Fabric	SY	5900	$18	$ 106,200.00
22	Bank Revegetation	AC	1.4	$12,000	$ 16,800.00
23	Revegetation and Restoration	AC	1	$ 10,000.00	$ 10,000.00
				SUBTOTAL	$ 620,350.00
				[30%] CONTINGENCY	$ 186,105.00
				TOTAL CONSTRUCTION COST	$ 806,455.00
				30% LEGAL, ENGINEERING, ADMIN, FINANCE	$ 241,936.50
				TOTAL PROJECT COSTS	$ 1,048,391.50

NO.	ITEM DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	TOTAL PRICE
Option 2 - Stormwater and Flood Storage Wetlands (Project C2)					
1	Mobilization/Demobilization	LS	1	$ 42,000.00	$ 42,000.00
2	Traffic Control	LS	1	$ 13,000.00	$ 13,000.00
3	Dewatering & Erosion/Sediment Control	LS	1	$ 30,000.00	$ 30,000.00
4	Site Access	LS	1	$ 11,000.00	$ 11,000.00
5	Tree Clearing	EA	11	$ 750.00	$ 8,250.00
6	Common Excavation Export EV	CY	5920	$ 25.00	$ 148,000.00
7	Remove Existing RCP	LIN FT	185	$ 20.00	$ 3,700.00
8	Remove Existing Storm Structure	EA	3	$ 2,500.00	$ 7,500.00
9	Pretreatment	EA	1	$ 15,000.00	$ 15,000.00
10	Install New RCP	LIN FT	195	$ 100.00	$ 19,500.00
11	Storm Structures	LS	1	$ 20,000.00	$ 20,000.00
12	Control of Water	LS	1	$30,000	$ 30,000.00
13	FES Lifts	FACE-FT	1,180	$50	$ 59,000.00
14	Backfill	CY	170	$18	$ 3,060.00
15	Stone Toe	CY	100	$140	$ 14,000.00
16	Surface Fabric	SY	460	$18	$ 8,280.00
17	Bank Revegetation	AC	0.3	$12,000	$ 3,600.00
18	Revegetation and Restoration	AC	2	$ 10,000.00	$ 20,000.00
				SUBTOTAL	$ 455,890.00
				[30%] CONTINGENCY	$ 136,767.00
				TOTAL CONSTRUCTION COST	$ 592,657.00
				30% LEGAL, ENGINEERING, ADMIN, FINANCE	$ 177,797.10
				TOTAL PROJECT COSTS	$ 770,454.10

Cost Estimates for Nicollet

NO.	ITEM DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	TOTAL PRICE
Option 1 - Instream Habitat Improvements (Project D)					
1	Mobilization/Demobilization	LS	1	$ 1,000.00	$ 1,000.00
2	Traffic Control	LS	1	$ 1,000.00	$ 1,000.00
3	Dewatering & Erosion/Sediment Control	LS	1	$ 1,000.00	$ 1,000.00
4	Site Access	LS	1	$ 1,000.00	$ 1,000.00
5	Habitat Boulders	EACH	12	$300	$ 3,600.00
6	Large Wood	EACH	8	$1,500	$ 12,000.00
7	Riffle Stone	CY	30	$140	$ 4,200.00
				SUBTOTAL	$ 23,800.00
				[30%] CONTINGENCY	$ 7,140.00
				TOTAL CONSTRUCTION COST	$ 30,940.00
				30% LEGAL, ENGINEERING, ADMIN, FINANCE	$ 9,282.00
				TOTAL PROJECT COSTS	$ 40,222.00

NO.	ITEM DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	TOTAL PRICE
Option 1 - Circulation Adjustments - Extension of Path and New Bridge (Project E1)					
1	Mobilization/Demobilization	LS	1	$ 36,000.00	$ 36,000.00
2	Traffic Control	LS	1	$ 11,000.00	$ 11,000.00
3	Dewatering & Erosion/Sediment Control	LS	1	$ 26,000.00	$ 26,000.00
4	Site Access	LS	1	$ 10,000.00	$ 10,000.00
5	New 8' Bituminous Trail	LF	190	$ 115.00	$ 21,850.00
6	Tree Clearing	EA	3	$ 750.00	$ 2,250.00
7	Remove Bituminous Trail	SY	950	$ 10.00	$ 9,500.00
8	New Pedestrian Bridge	EA	1	$ 275,000.00	$ 275,000.00
				SUBTOTAL	$ 391,600.00
				[30%] CONTINGENCY	$ 117,480.00
				TOTAL CONSTRUCTION COST	$ 509,080.00
				30% LEGAL, ENGINEERING, ADMIN, FINANCE	$ 152,724.00
				TOTAL PROJECT COSTS	$ 661,804.00

NO.	ITEM DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	TOTAL PRICE
Option 2 - Circulation Adjustments - Extension of Path and New Bridge (Project E2)					
1	Mobilization/Demobilization	LS	1	$ 57,000.00	$ 57,000.00
2	Traffic Control	LS	1	$ 17,000.00	$ 17,000.00
3	Dewatering & Erosion/Sediment Control	LS	1	$ 41,000.00	$ 41,000.00
4	Site Access	LS	1	$ 15,000.00	$ 15,000.00
5	New 8' Bituminous Trail	LF	550	$ 115.00	$ 63,250.00
6	Tree Clearing	EA	3	$ 750.00	$ 2,250.00
7	Remove Bituminous Trail	SY	2900	$ 10.00	$ 29,000.00
8	New Pedestrian Bridge	EA	1	$ 400,000.00	$ 400,000.00
				SUBTOTAL	$ 624,500.00
				[30%] CONTINGENCY	$ 187,350.00
				TOTAL CONSTRUCTION COST	$ 811,850.00
				30% LEGAL, ENGINEERING, ADMIN, FINANCE	$ 243,555.00
				TOTAL PROJECT COSTS	$ 1,055,405.00

NO.	ITEM DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	TOTAL PRICE
Grit Chamber (Project F)					
1	Mobilization/Demobilization	LS	1	$ 9,000.00	$ 9,000.00
2	Traffic Control	LS	1	$ 3,000.00	$ 3,000.00
3	Dewatering & Erosion/Sediment Control	LS	1	$ 7,000.00	$ 7,000.00
4	Site Access	LS	1	$ 3,000.00	$ 3,000.00
5	Grit Chamber	LS	1	$ 75,000.00	$ 75,000.00
				SUBTOTAL	$ 97,000.00
				[30%] CONTINGENCY	$ 29,100.00
				TOTAL CONSTRUCTION COST	$ 126,100.00
				30% LEGAL, ENGINEERING, ADMIN, FINANCE	$ 37,830.00
				TOTAL PROJECT COSTS	$ 163,930.00

NO.	ITEM DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	TOTAL PRICE
Option 1 - A La Cart Recreation Improvements - Bridge and Interpretive Overlook (Project G)					
Cost for a la carte recreation projects are based on the master plan's implementation chapter and adjusted 5% per year for inflation to 2025 dollars:					
1	Mobilization/Demobilization	LS	1	$ 141,000.00	$ 141,000.00
2	Traffic Control	LS	1	$ 43,000.00	$ 43,000.00
3	Dewatering & Erosion/Sediment Control	LS	1	$ 113,000.00	$ 113,000.00
4	Site Access	LS	1	$ 43,000.00	$ 43,000.00
5	Picnic Area at Lower Parkway Road (includes picnic tables, drinking fountain, pollinator lawn, and playful public art features)	LS	1	$ 250,000.00	$ 250,000.00
6	Activity Area (includes ADA accessible creek access, restroom enclosure, bouldering wall, natural-themed play features, public art, and associated trail connections under Nicollet Ave Bridge)	LS	1	$ 1,000,000.00	$ 1,000,000.00
7	Interpretive Overlooks	EA	2	$ 80,000.00	$ 160,000.00
				SUBTOTAL	$ 1,750,000.00
				[30%] CONTINGENCY	$ 525,000.00
				TOTAL CONSTRUCTION COST	$ 2,275,000.00
				30% LEGAL, ENGINEERING, ADMIN, FINANCE	$ 682,500.00
				TOTAL PROJECT COSTS	$ 2,957,500.00

NO.	ITEM DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	TOTAL PRICE
Option 2 - A La Cart Recreation Improvements - Bridge and Interpretive Overlooks (Project G)					
Cost for a la carte recreation projects are based on the master plan's implementation chapter and adjusted 5% per year for inflation to 2025 dollars:					
1	Mobilization/Demobilization	LS	1	$ 143,000.00	$ 143,000.00
2	Traffic Control	LS	1	$ 43,000.00	$ 43,000.00
3	Dewatering & Erosion/Sediment Control	LS	1	$ 107,000.00	$ 107,000.00
4	Site Access	LS	1	$ 43,000.00	$ 43,000.00
5	Picnic Area at Lower Parkway Road (includes picnic tables, drinking fountain, pollinator lawn, and playful public art features)	LS	1	$ 250,000.00	$ 250,000.00
6	Activity Area (includes ADA accessible creek access, restroom enclosure, bouldering wall, natural-themed play features, public art, and associated trail connections under Nicollet Ave Bridge)	LS	1	$ 1,000,000.00	$ 1,000,000.00
7	Interpretive Overlook	EA	1	$ 80,000.00	$ 80,000.00
8	Interpretive Overlook at Stormwater Wetland	EA	1	$ 100,000.00	$ 100,000.00
				SUBTOTAL	$ 1,766,000.00
				[30%] CONTINGENCY	$ 529,800.00
				TOTAL CONSTRUCTION COST	$ 2,295,800.00
				30% LEGAL, ENGINEERING, ADMIN, FINANCE	$ 688,740.00
				TOTAL PROJECT COSTS	$ 2,984,540.00

Cost Estimates for Penn-Newton

NO.	ITEM DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	TOTAL PRICE
Option 1 - Remove riprap, construct tiered ponds (Project A1)					
1	Mobilization/Demobilization	LS	1	$ 33,000.00	$ 33,000.00
2	Traffic Control	LS	1	$ 16,000.00	$ 16,000.00
3	Dewatering & Erosion/Sediment Control	LS	1	$ 23,000.00	$ 23,000.00
4	Site Access	LS	1	$ 9,000.00	$ 9,000.00
5	Tree Clearing	EA	5	$ 750.00	$ 3,750.00
6	Remove Existing Concrete Spillway	SY	900	$ 30.00	$ 27,000.00
7	Remove and Replace Pavement	SY	40	$ 150.00	$ 6,000.00
8	Concrete Curb	LIN FT	15	$ 50.00	$ 750.00
9	Install New RCP	LIN FT	100	$ 100.00	$ 10,000.00
10	Storm Structures	LS	1	$ 15,000.00	$ 15,000.00
11	Grit Chamber	LS	1	$ 75,000.00	$ 75,000.00
12	Install Geotextile Fabric	SY	160	$ 7.00	$ 1,120.00
13	Install Class III Riprap	TON	170	$ 120.00	$ 20,400.00
14	Common Excavation Export EV	CY	330	$ 25.00	$ 8,250.00
15	Retaining Walls	LF	190	$ 210.00	$ 39,900.00
16	Install Plants	LS	1	$ 15,000.00	$ 15,000.00
17	Revegetation and Restoration	AC	0.25	$ 10,000.00	$ 2,500.00
18	Control of Water	LS	1	$ 25,000.00	$ 25,000.00
19	Bank Tree Clearing	LS	1	$ 5,000.00	$ 5,000.00
20	FES Lifts	FACE-FT	320	$50	$ 16,000.00
21	Backfill	CY	30	$18	$ 540.00
22	Topsoil	CY	30	$30	$ 900.00
23	Stone Toe	CY	30	$140	$ 4,200.00
24	Bank Revegetation	AC	0.1	$12,000	$ 1,200.00
				SUBTOTAL	$ 358,510.00
				[30%] CONTINGENCY	$ 107,553.00
				TOTAL CONSTRUCTION COST	$ 466,063.00
				30% LEGAL, ENGINEERING, ADMIN, FINANCE	$ 139,818.90
				TOTAL PROJECT COSTS	$ 605,881.90

NO.	ITEM DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	TOTAL PRICE
Option 2 - Remove riprap, construct check dams (Project A2)					
1	Mobilization/Demobilization	LS	1	$ 27,000.00	$ 27,000.00
2	Traffic Control	LS	1	$ 13,000.00	$ 13,000.00
3	Dewatering & Erosion/Sediment Control	LS	1	$ 19,000.00	$ 19,000.00
4	Site Access	LS	1	$ 7,000.00	$ 7,000.00
5	Tree Clearing	EA	5	$ 750.00	$ 3,750.00
6	Remove Existing Concrete Spillway	SY	900	$ 30.00	$ 27,000.00
7	Remove and Replace Pavement	SY	40	$ 150.00	$ 6,000.00
8	Concrete Curb	LIN FT	15	$ 50.00	$ 750.00
9	Install New RCP	LIN FT	100	$ 100.00	$ 10,000.00
10	Storm Structures	LS	1	$ 15,000.00	$ 15,000.00
11	Grit Chamber	LS	1	$ 75,000.00	$ 75,000.00
12	Install Geotextile Fabric	SY	50	$ 7.00	$ 350.00
13	Install Class III Riprap	TON	140	$ 120.00	$ 16,800.00
14	Common Excavation Export EV	CY	210	$ 25.00	$ 5,250.00
15	Retaining Walls	LF	0	$ 210.00	$ -
16	Install Plants	LS	1	$ 15,000.00	$ 15,000.00
17	Revegetation and Restoration	AC	0.25	$ 10,000.00	$ 2,500.00
18	Control of Water	LS	1	$ 25,000.00	$ 25,000.00
19	Bank Tree Clearing	LS	1	$ 5,000.00	$ 5,000.00
20	FES Lifts	FACE-FT	320	$50	$ 16,000.00
21	Backfill	CY	30	$18	$ 540.00
22	Topsoil	CY	30	$30	$ 900.00
23	Stone Toe	CY	30	$140	$ 4,200.00
24	Bank Revegetation	AC	0.1	$12,000	$ 1,200.00
				SUBTOTAL	$ 296,240.00
				[30%] CONTINGENCY	$ 88,872.00
				TOTAL CONSTRUCTION COST	$ 385,112.00
				30% LEGAL, ENGINEERING, ADMIN, FINANCE	$ 115,533.60
				TOTAL PROJECT COSTS	$ 500,645.60

NO.	ITEM DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	TOTAL PRICE
Bank Restoration (Project B)					
1	Mobilization/Demobilization	LS	1	$ 9,000.00	$ 9,000.00
2	Traffic Control	LS	1	$ 5,000.00	$ 5,000.00
3	Dewatering & Erosion/Sediment Control	LS	1	$ 7,000.00	$ 7,000.00
4	Site Access	LS	1	$ 3,000.00	$ 3,000.00
5	Control of Water	LS	1	$ 25,000.00	$ 25,000.00
6	Bank Tree Clearing	LS	1	$5,000	$ 5,000.00
7	FES Lifts	FACE-FT	700	$50	$ 35,000.00
8	Backfill	CY	50	$18	$ 900.00
9	Topsoil	CY	50	$30	$ 1,500.00
10	Stone Toe	CY	30	$140	$ 4,200.00
11	Bank Revegetation	AC	0.1	$12,000	$ 1,200.00
				SUBTOTAL	$ 96,800.00
				[30%] CONTINGENCY	$ 29,040.00
				TOTAL CONSTRUCTION COST	$ 125,840.00
				30% LEGAL, ENGINEERING, ADMIN, FINANCE	$ 37,752.00
				TOTAL PROJECT COSTS	$ 163,592.00

NO.	ITEM DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	TOTAL PRICE
Oak Savanna Restoration (Project C)					
1	Mobilization/Demobilization	LS	1	$ 2,000.00	$ 2,000.00
2	Traffic Control	LS	1	$ 1,000.00	$ 1,000.00
3	Oak Savanna Restoration	AC	1.4	$ 6,500.00	$ 9,100.00
				SUBTOTAL	$ 12,100.00
				[30%] CONTINGENCY	$ 3,630.00
				TOTAL CONSTRUCTION COST	$ 15,730.00
				30% LEGAL, ENGINEERING, ADMIN, FINANCE	$ 4,719.00
				TOTAL PROJECT COSTS	$ 20,449.00

Cost Estimates for Penn-Newton

NO.	ITEM DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	TOTAL PRICE
Water Access Point (Project D)					
1	Mobilization/Demobilization	LS	1	$ 4,000.00	$ 4,000.00
2	Traffic Control	LS	1	$ 2,000.00	$ 2,000.00
3	Dewatering & Erosion/Sediment Control	LS	1	$ 3,000.00	$ 3,000.00
4	Site Access	LS	1	$ 1,000.00	$ 1,000.00
5	Limestone Water Access	LS	1	$ 25,000.00	$ 25,000.00
6	Revegetation and Restoration	LS	1	$ 1,500.00	$ 1,500.00
				SUBTOTAL	$ 36,500.00
				[30%] CONTINGENCY	$ 10,950.00
				TOTAL CONSTRUCTION COST	$ 47,450.00
				30% LEGAL, ENGINEERING, ADMIN, FINANCE	$ 14,235.00
				TOTAL PROJECT COSTS	$ 61,685.00

NO.	ITEM DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	TOTAL PRICE
Option 1 - Stormwater Treatment Basin (Project E1)					
1	Mobilization/Demobilization	LS	1	$ 14,000.00	$ 14,000.00
2	Traffic Control	LS	1	$ 7,000.00	$ 7,000.00
3	Dewatering & Erosion/Sediment Control	LS	1	$ 10,000.00	$ 10,000.00
4	Site Access	LS	1	$ 4,000.00	$ 4,000.00
5	Common Excavation Export EV	CY	2120	$ 30.00	$ 63,600.00
6	Remove Existing RCP	LIN FT	125	$ 20.00	$ 2,500.00
7	Pretreatment	EA	1	$ 15,000.00	$ 15,000.00
8	Install New RCP	LIN FT	100	$ 100.00	$ 10,000.00
9	Storm Structures	LS	1	$ 15,000.00	$ 15,000.00
10	Revegetation and Restoration	AC	1	$ 10,000.00	$ 10,000.00
				SUBTOTAL	$ 151,100.00
				[30%] CONTINGENCY	$ 45,330.00
				TOTAL CONSTRUCTION COST	$ 196,430.00
				30% LEGAL, ENGINEERING, ADMIN, FINANCE	$ 58,929.00
				TOTAL PROJECT COSTS	$ 255,359.00

NO.	ITEM DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	TOTAL PRICE
Option 2 - Stormwater Filtration Basin (Project E2)					
1	Mobilization/Demobilization	LS	1	$ 19,000.00	$ 19,000.00
2	Traffic Control	LS	1	$ 6,000.00	$ 6,000.00
3	Dewatering & Erosion/Sediment Control	LS	1	$ 13,000.00	$ 13,000.00
4	Site Access	LS	1	$ 5,000.00	$ 5,000.00
5	Common Excavation Export EV	CY	2120	$ 25.00	$ 53,000.00
6	Remove Existing RCP	LIN FT	125	$ 20.00	$ 2,500.00
7	Pretreatment	EA	1	$ 15,000.00	$ 15,000.00
8	Install New RCP	LIN FT	100	$ 150.00	$ 15,000.00
9	Storm Structures	LS	1	$ 15,000.00	$ 15,000.00
10	Filtration Basin	SF	3275	$ 12.00	$ 39,300.00
11	4" PVC Draintile	Lin FT	250	$ 30.00	$ 7,500.00
12	Revegetation and Restoration	AC	1	$ 10,000.00	$ 10,000.00
				SUBTOTAL	$ 200,300.00
				[30%] CONTINGENCY	$ 60,090.00
				TOTAL CONSTRUCTION COST	$ 260,390.00
				30% LEGAL, ENGINEERING, ADMIN, FINANCE	$ 78,117.00
				TOTAL PROJECT COSTS	$ 338,507.00

NO.	ITEM DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	TOTAL PRICE
Bank Restoration (Project F)					
1	Mobilization/Demobilization	LS	1	$ 18,000.00	$ 18,000.00
2	Traffic Control	LS	1	$ 9,000.00	$ 9,000.00
3	Dewatering & Erosion/Sediment Control	LS	1	$ 13,000.00	$ 13,000.00
4	Site Access	LS	1	$ 5,000.00	$ 5,000.00
5	Control of Water	LS	1	$ 35,000.00	$ 35,000.00
6	Bank Tree Clearing	LS	1	$10,000	$ 10,000.00
7	Removal of Existing Riprap	LS	1	$2,000	$ 2,000.00
8	FES Lifts	FACE-FT	1800	$50	$ 90,000.00
9	Backfill	CY	120	$18	$ 2,160.00
10	Topsoil	CY	120	$30	$ 3,600.00
11	Stone Toe	CY	40	$140	$ 5,600.00
12	Bank Revegetation	AC	0.2	$12,000	$ 2,400.00
				SUBTOTAL	$ 195,760.00
				[30%] CONTINGENCY	$ 58,728.00
				TOTAL CONSTRUCTION COST	$ 254,488.00
				30% LEGAL, ENGINEERING, ADMIN, FINANCE	$ 76,346.40
				TOTAL PROJECT COSTS	$ 330,834.40

Cost Estimates for Penn-Newton

NO.	ITEM DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	TOTAL PRICE
A La Carte Recreation Improvements - Picnicking, Nature Play, etc. (Project G)					
Cost for a la carte recreation projects are based on the master plan's implementation chapter and adjusted 5% per year for inflation to 2025 dollars:					
1	Mobilization/Demobilization	LS	1	$ 170,000.00	$ 170,000.00
2	Traffic Control	LS	1	$ 81,000.00	$ 81,000.00
3	Dewatering & Erosion/Sediment Control	LS	1	$ 120,000.00	$ 120,000.00
4	Site Access	LS	1	$ 44,000.00	$ 44,000.00
5	Picnic Tables with Concrete Pads at Oak Savanna Restoration	EA	6	$ 9,800.00	$ 58,800.00
6	Picnic Tables with Concrete Pads and Shade at Tennis Courts	EA	2	$ 20,000.00	$ 40,000.00
7	Picnic Shelter at Tennis Court	LS	1	$200,000	$ 200,000.00
8	Natural Surface Path to Picnicking at Tennis Courts	LF	100	$9	$ 900.00
9	Nature-based Play Area	LS	1	$1,021,000	$ 1,021,000.00
10	Waterside Seating Area	EA	1	$78,500	$ 78,500.00
11	Stair Access	SF	54	$250	$ 13,500.00
12	Wood Platform at Creek Access	LS	500	$80	$ 40,000.00
				SUBTOTAL	$ 1,867,700.00
				[30%] CONTINGENCY	$ 560,310.00
				TOTAL CONSTRUCTION COST	$ 2,428,010.00
				30% LEGAL, ENGINEERING, ADMIN, FINANCE	$ 728,403.00
				TOTAL PROJECT COSTS	$ 3,156,413.00

Appendix C

Prioritization Matrix

Prioritization Matrix

		Primary Drivers									Secondary Drivers									
Site	**Concept Name**	**Capital Cost**	**Cost Score**	**Water Quality Benefit (lb TP/yr)**	**Water Quality Score**	**O&M Notes**	**O&M Effort Score**	**Potential Net Gain in Floodplain Storage Volume (CY)**	**Flood Resiliency Notes**	**Flood Resiliency Score**	**Ecosystem / Habitat Services Lift Notes**	**Ecosystem / Habitat Services Lift Score**	**Permitting Notes**	**Pathway to Permitting Score**	**Infrastructure and Adjacent Project Considerations and Notes**	**Adjacent Projects Score**	**Land Footprint Notes**	**Land Footprint Efficiency Score**	**Community Amenities Lift Notes**	**Community Amenities Lift Score**	**TOTAL**
Cedar	**Option 1** - Smaller Stormwater Pond Footprint	$ 1,020,000	3	26	2	Stormwater Pond maintenance	2	2,000	Flood Storage capacity could be increased within the footprint of the proposed stormwater pond (both for overland flow and backwater from the creek)	2	Riparian habitat would benefit from bank renaturalization, maintaining existing "oxbow" floodplain, and added floodplain forest area. Conversion of turf grass to wetland habitat provides net added habitat services. More large trees are preserved under this alternative than Option 2. Backwater connection from proposed stormwater pond to Creek could provide spawning habitat for fishes and expanded habitat availability for many species.	2	Wetland may exist on east portion of proposed ponding area. The wetland function would be maintained via pond design.	3	CSO Separation. Creek remeander and bank stabilization will relocate and protect trail and bench that are currently in the path of eroding bank.	3	Smaller stormwater footprint	2	Reduced size of basin means more recreation space, however poor drainage and seasonal inundation currently affect the use of this area for recreation. Minor circulation adjustments at creek remeander would protect path from continued erosion threat. No adjustments would mean continued flooding. Addition of picnicking can occur at any time. Interpretive features should be added with stormwater improvements.	2	**21**
Cedar	**Option 2** - Larger Stormwater Pond Footprint with Major Circulation Adjustments	$ 3,080,000	1	37	3	Stormwater Pond maintenance; Boardwalk adds some complexity	1	4,000	Flood Storage capacity could be increased within the footprint of the proposed stormwater pond (both for overland flow and backwater from the creek)	3	Riparian habitat would benefit from bank renaturalization, maintaining existing "oxbow" floodplain, and added floodplain forest area. Conversion of turf grass to wetland habitat provides net added habitat services. Less large trees are preserved under this alternative than Option 1. Backwater connection from proposed stormwater pond to Creek could provide spawning habitat for fishes and expanded habitat availability for many species.	2	Wetland may exist on east portion of proposed ponding area. The wetland function would be maintained via pond design.	3	CSO Separation. Creek remeander and bank stabilization will relocate and protect trail and bench that are currently in the path of eroding bank.	3	Larger stormwater footprint, but addition of boardwalk	2	Larger pond results in least recreation space, however addition of boardwalk and wetland habitat provides a new recreation amenity not found nearby. Circulation adjustments would move the trail out of the floodplain resulting in more reliable use. Circulation adjustments and interpretive elements must occur with stormwater improvements. Picnicking can be added at any time.	3	**21**
Penn-Newton	**Option 1** - Stormwater Treatment Basin (Penn) and Tiered Pools (Newton)	$ 1,440,000	2	7	1	Stormwater Pond Maintenance	2	-	Minimal change/impact	1	Conversion of turf grass to wetland habitat provides added habitat services for aquatic and riparian species, but may modify habitat for pollinators and is disconnected from riparian area. Proposed savanna restoration is a habitat improvement.	2	No hurdles with Threatened & Endangered species, wetlands, or water levels.	3	Addresses deteriorating concrete flume (Newton). Bank stabilization upstream of pedestrian bridge arrests erosion and re-routes existing natural surface walking trail (Penn).	3	-	2	Loss of usable open space for flexible recreation (Penn). Option to add stairway between Penn Ave and the proposed water access, along with picnicking. Also option to add a pedestrian path between 52nd and 53rd. Recreational elements can be phased with stormwater improvements or happen separately.	2	**18**
Penn-Newton	**Option 2** - Stormwater Filtration Basin (Penn) and Check Dams (Newton)	$ 1,410,000	2	4	1	Stormwater Pond Maintenance	2	-	Minimal change/impact	1		2	No hurdles with Threatened & Endangered species, wetlands, or water levels.	3	Addresses deteriorating concrete flume (Newton). Bank stabilization upstream of pedestrian bridge arrests erosion and re-routes existing natural surface walking trail (Penn).	3	-	2		2	**18**
Nicollet	**Option 1** - Creek Remeander with Smaller Stormwater / Flood Storage Wetlands	$ 2,270,000	1	17	2	Stormwater Wetland Maintenance, ADA dock, restroom	2	1,000	Floodplain reconnection and floodplain storage added by removing former roadway prism	2	Requires removal of several mature trees but creek remeander and added stream length would provide in-stream habitat and riparian benefits. Floodplain reconnection adds to riparian habitat area and value.	3	Would likely require a CLOMR/LOMR (~$70k and 12+ months). EAW needed for Remeander. May require accommodations for pugnose shiner.	1	-	1	Smaller stormwater wetland footprint	2	Recreational amenities have a large impact as they address a major gap in amenities along the regional trail and neighborhood park. Circulation will be improved by the trail adjustments and should occur simultaneously with the proposed stormwater improvements. Trails would be moved out of the floodplain where able. Recreational amenities could happen separately but should occur simultaneously with the bridge work. Interpretive elements should happen simultaneously with stormwater improvements.	3	**17**
Nicollet	**Option 2** - Larger Stormwater and Flood Storage Wetlands	$ 2,370,000	1	30	3	Stormwater Wetland Maintenance, ADA dock, restroom	2	4,000	Floodplain reconnection and floodplain storage added by removing former roadway prism	3	Floodplain reconnection adds to riparian habitat area and value.	2	Would likely require a CLOMR/LOMR (~$70k and 12+ months).	2	-	1	Larger stormwater wetland footprint	1		3	**18**

Appendix D

Water Quality P8 Modeling

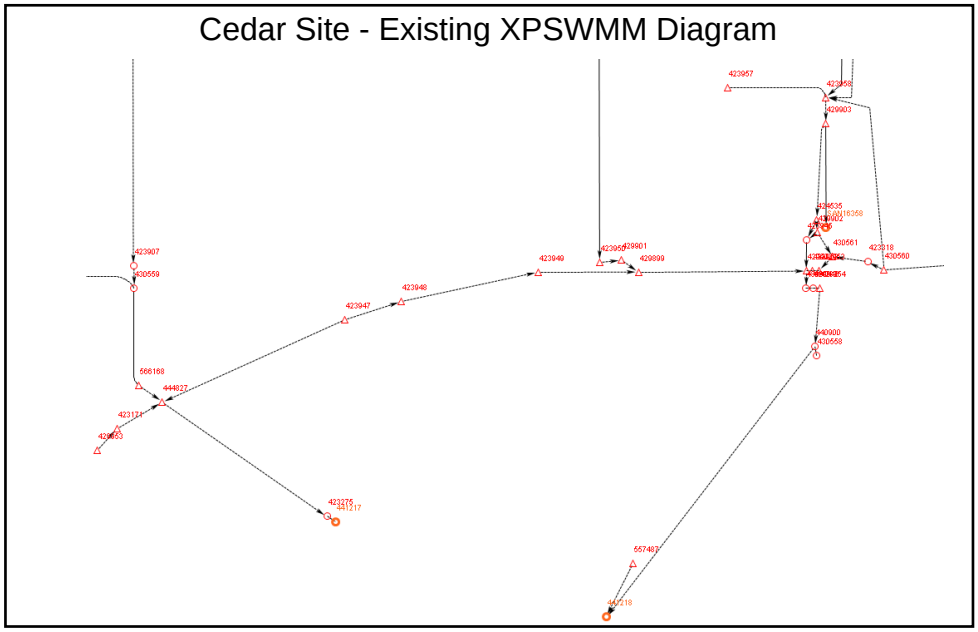
Water Quality (P8) Modeling

Variable	Overall	Cedar E	Cedar W	Cedar Combined	Newton Cell 1	Newton Cell 2	Newton Cell 3	Penn UG Filter	Penn Pond - South	Penn Pond - North	Penn Pond - South Opt 2	Penn North Sand Filter Opt2	Nicollet North Option 1 - Small Pond	Nicollet North Option 2 - Large Pond
P10%	7823.5	682.3	922.2	2770.3	73	49.6	44.6	162.3	187.9	44.1	187.9	66.1	757.3	1873.4
P30%	10937.8	757.2	1510.2	3261.7	144	76.6	57.5	349.3	248.6	43.4	248.6	94.8	1435.2	2687.1
P50%	13582.3	797.1	2136.3	3568.7	245.8	89.9	50.8	351.4	297.9	34	297.9	52.6	2250.8	3300.5
P80%	34205	1676.5	5826.6	7782.1	843.3	104.2	28.1	707.6	694	15.1	694	16.1	7439.6	6898.3
TSS (lbs./yr.)	66548.6	3913	10395.2	17382.8	1306.1	320.3	181	1570.6	1428.5	136.7	1428.5	229.5	11883	14759.4
TP (lbs./yr.)	108.5	8.6	17.6	37	1.8	0.8	0.6	3.3	2.8	0.5	2.8	0.8	17.1	30.3
TKN (lbs./yr.)	485.2	33.5	68.5	144	6.9	3.2	2.3	12.9	11	1.8	11	3.2	66.7	117.9
CU (lbs./yr.)	22.6	1.3	3.5	5.9	0.4	0.1	0.1	0.5	0.5	0	0.5	0.1	4	5
PB (lbs./yr.)	12	0.7	1.9	3.1	0.2	0.1	0	0.3	0.3	0	0.3	0	2.1	2.7
ZN (lbs./yr.)	51.7	3.6	7.3	15.4	0.7	0.3	0.2	1.4	1.2	0.2	1.2	0.3	7.1	12.6
HC (lbs./yr.)	1497.3	88	233.9	391.1	29.4	7.2	4.1	35.3	32.1	3.1	32.1	5.2	267.4	332.1

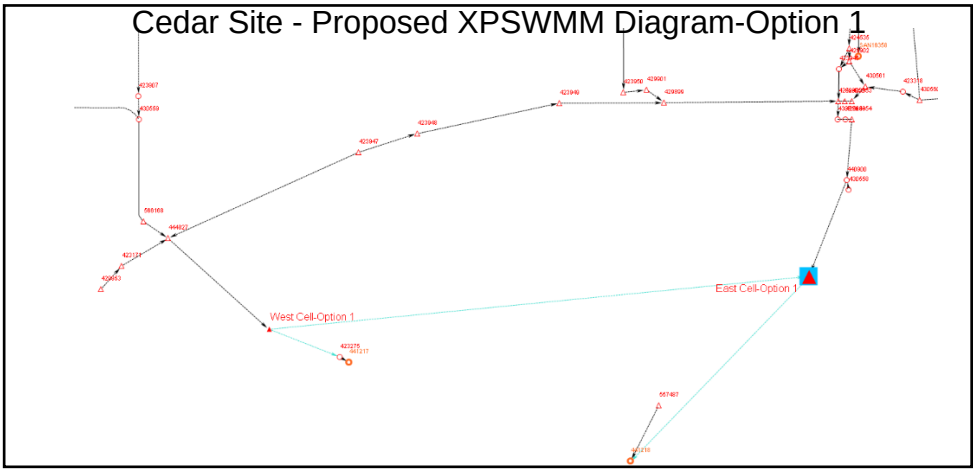
Appendix E

H&H SWMM Modeling

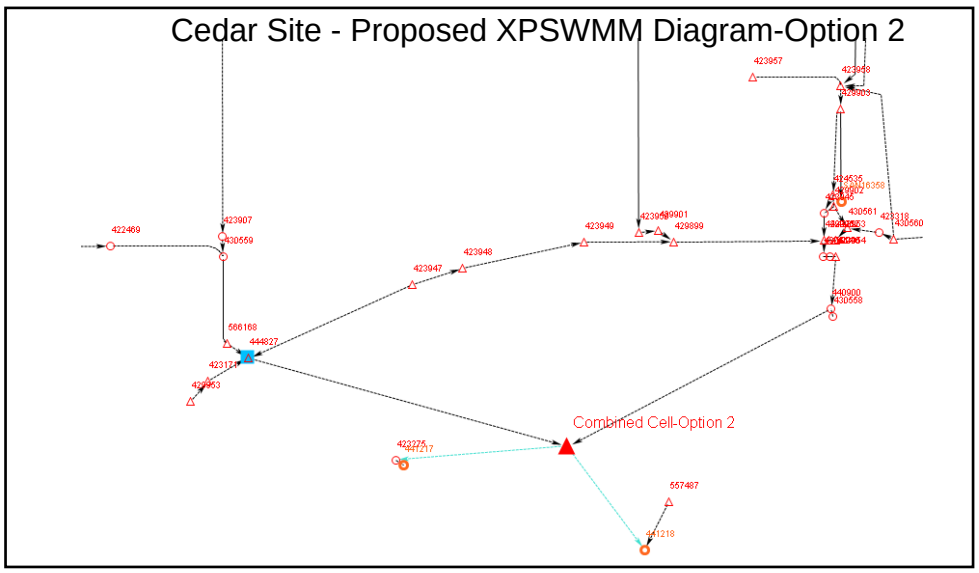
Cedar Site - Existing XPSWMM Diagram



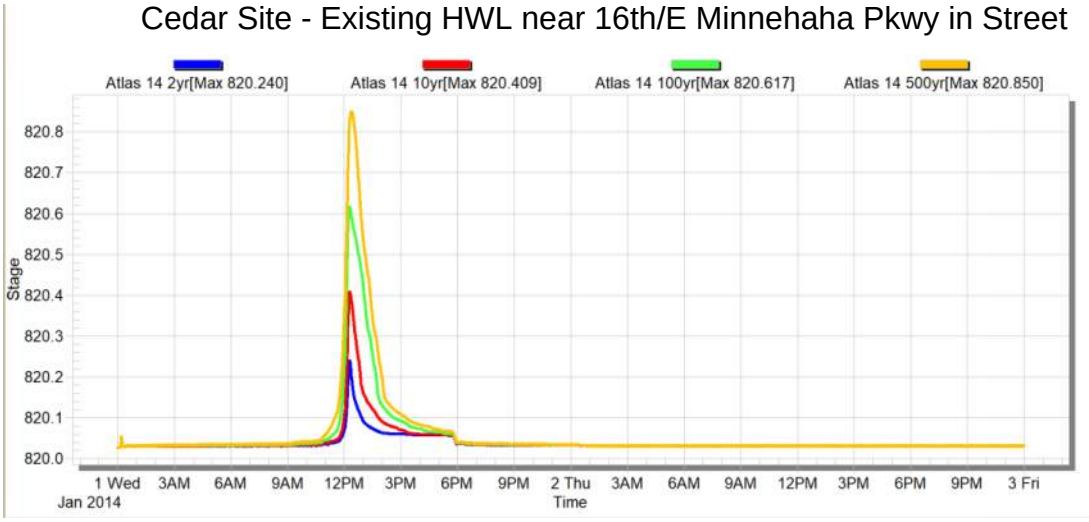
Cedar Site - Proposed XPSWMM Diagram-Option 1



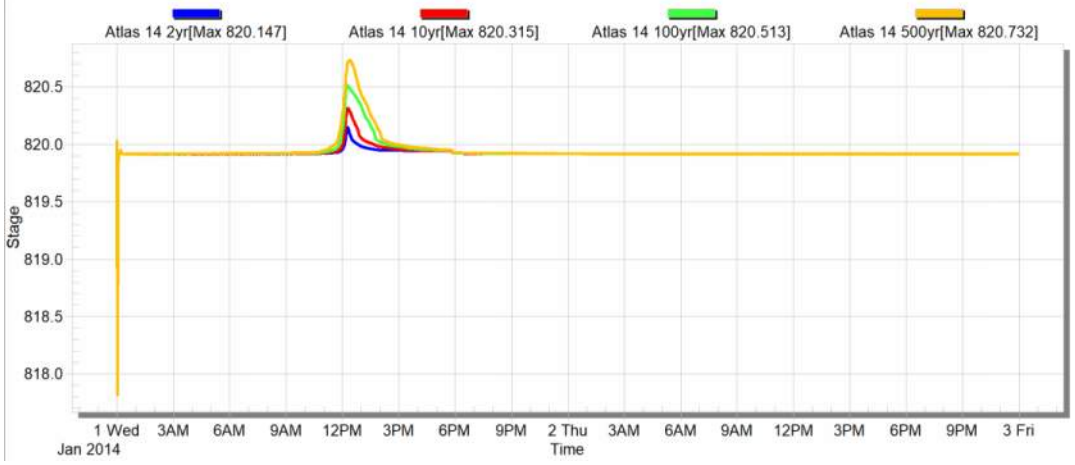
Cedar Site - Proposed XPSWMM Diagram-Option 2



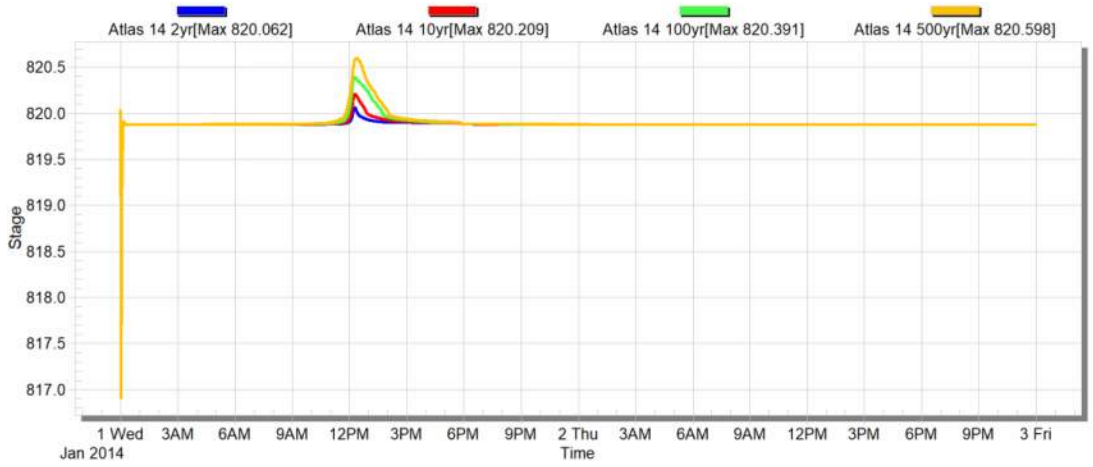
Cedar Site - Existing HWL near 16th/E Minnehaha Pkwy in Street



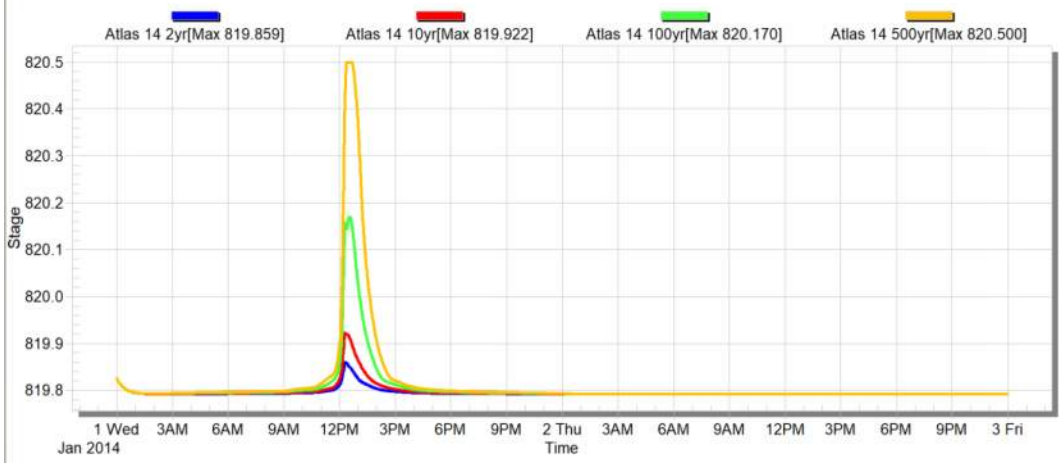
Cedar Site - Proposed HWL near 16th/E Minnehaha Pkwy in Street-Option 1



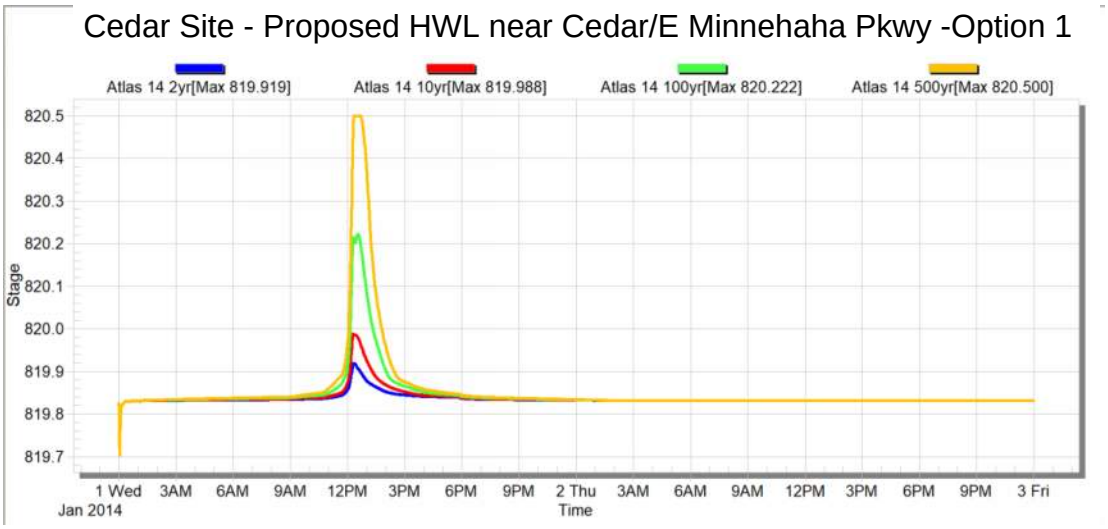
Cedar Site - Proposed HWL near 16th/E Minnehaha Pkwy in Street-Option 2



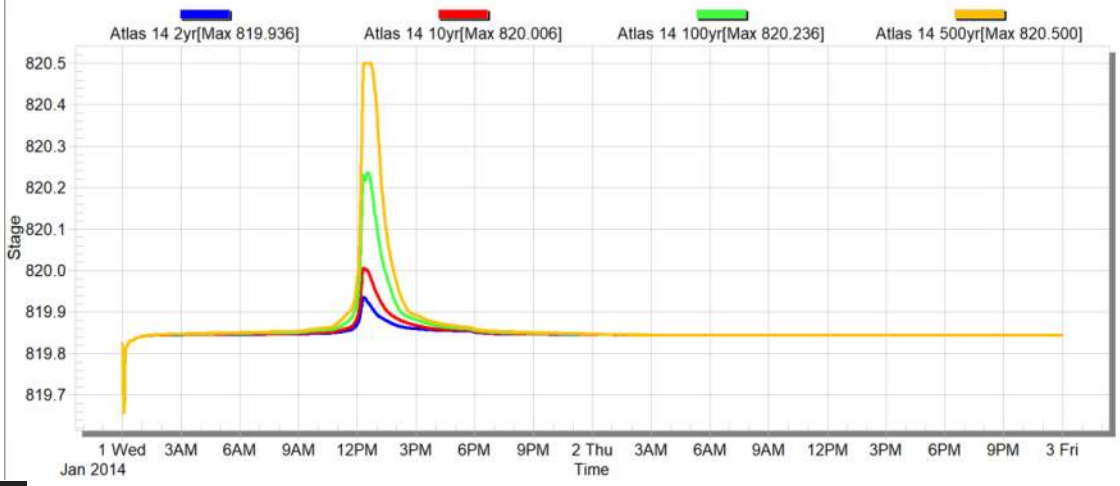
Cedar Site - Existing HWL near Cedar/E Minnehaha Pkwy



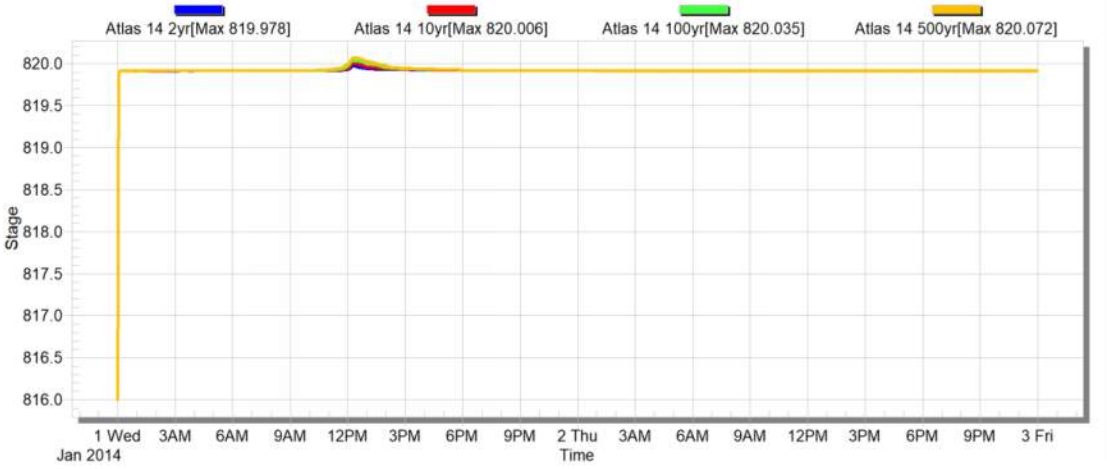
Cedar Site - Proposed HWL near Cedar/E Minnehaha Pkwy -Option 1



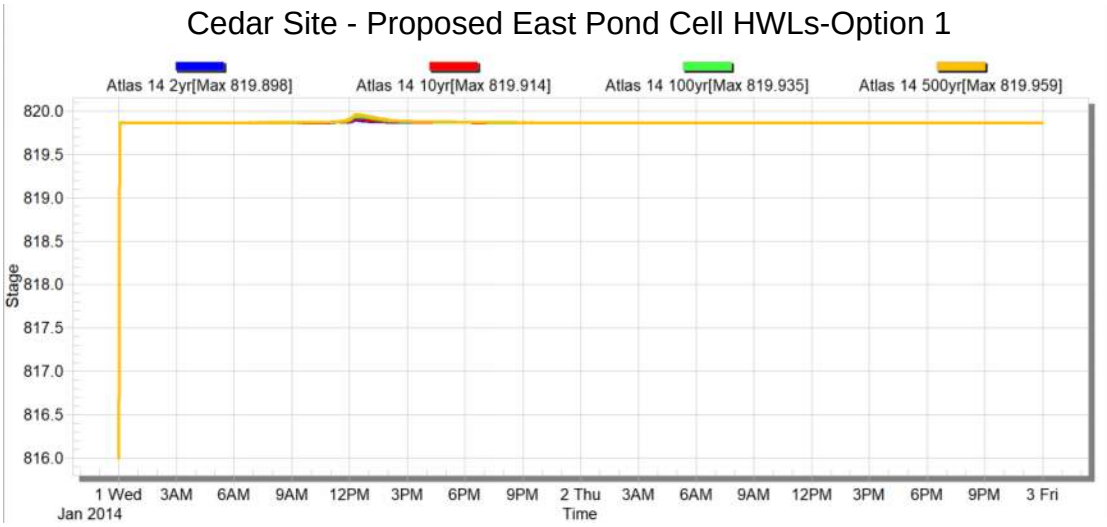
Cedar Site - Proposed HWL near Cedar/E Minnehaha Pkwy -Option 2



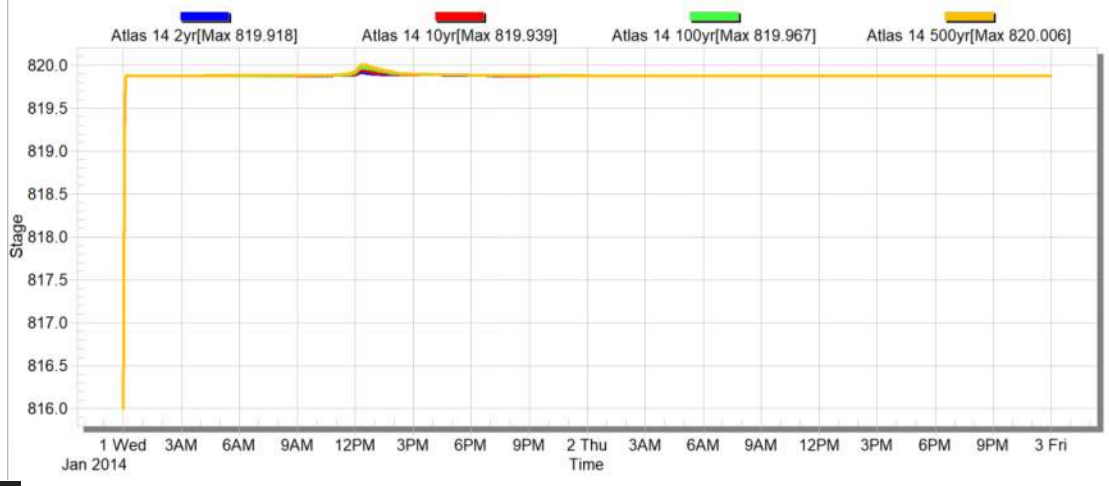
Cedar Site - Proposed West Pond Cell HWLs-Option 1

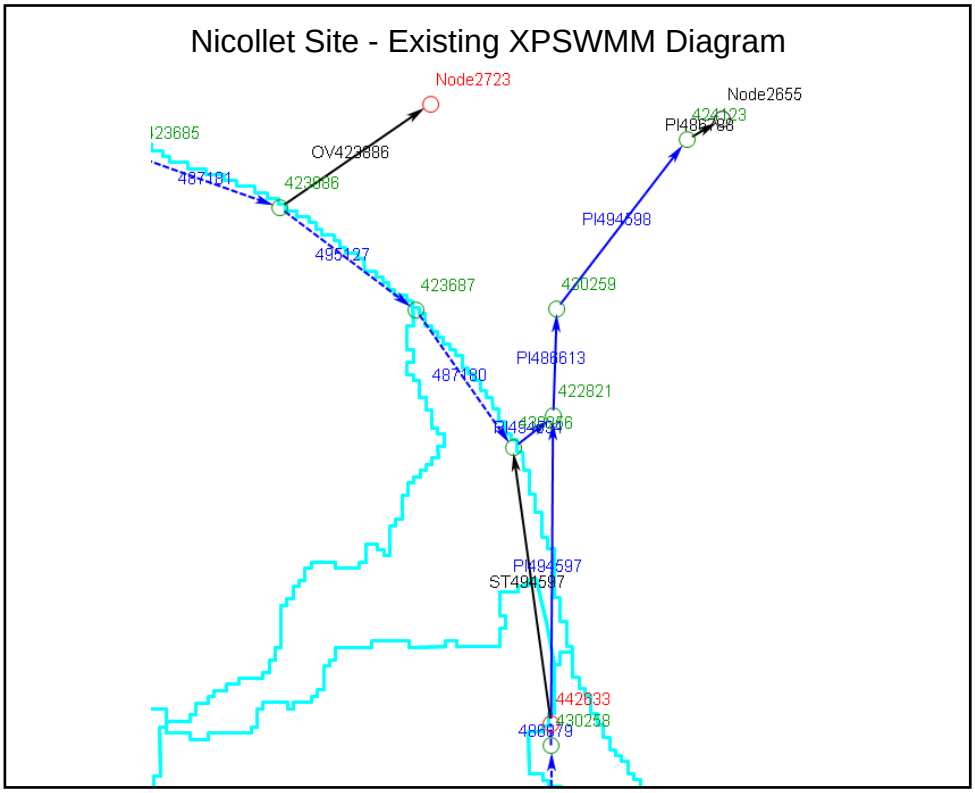


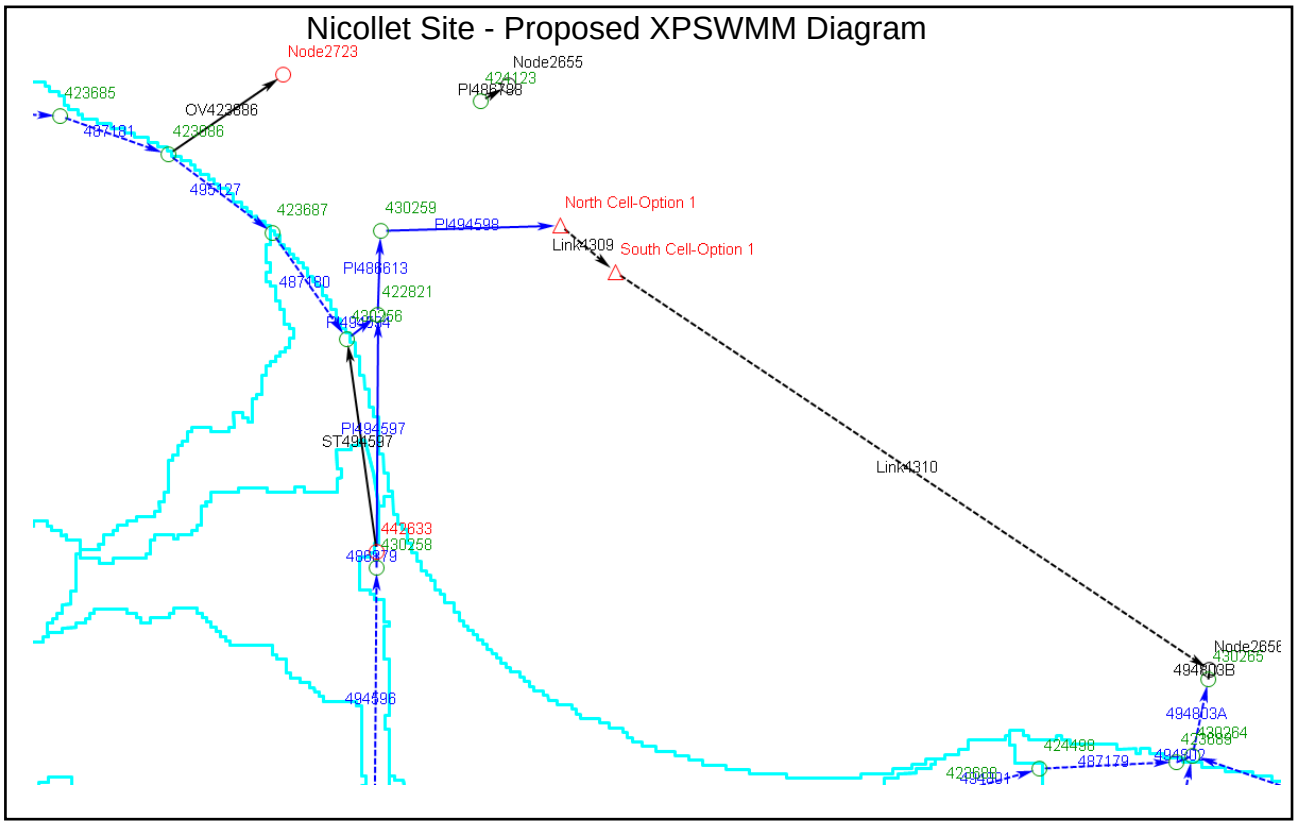
Cedar Site - Proposed East Pond Cell HWLs-Option 1



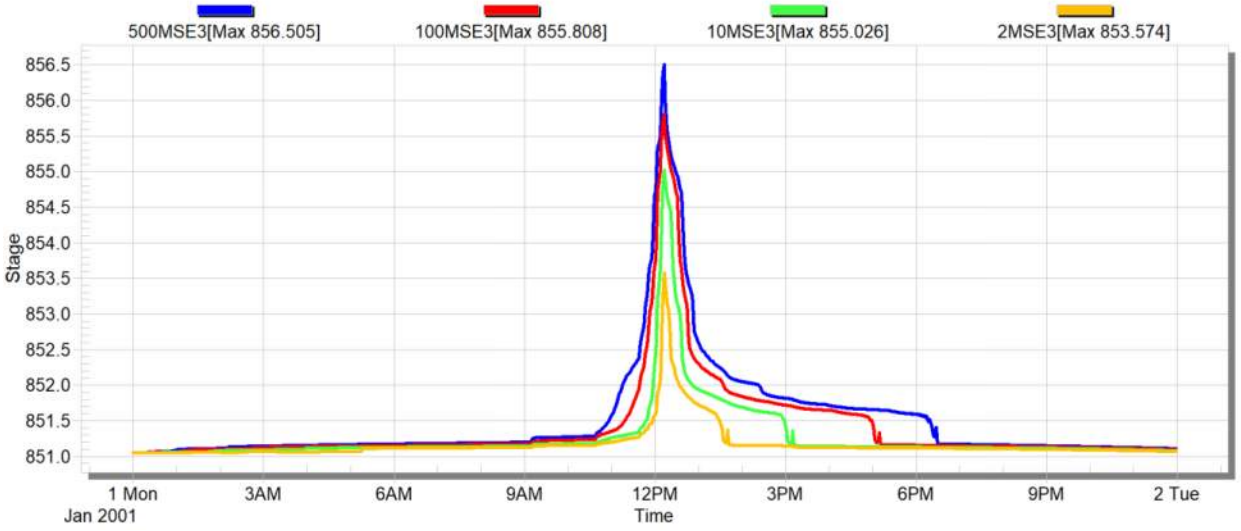
Cedar Site - Proposed Combined Pond HWLs-Option 2



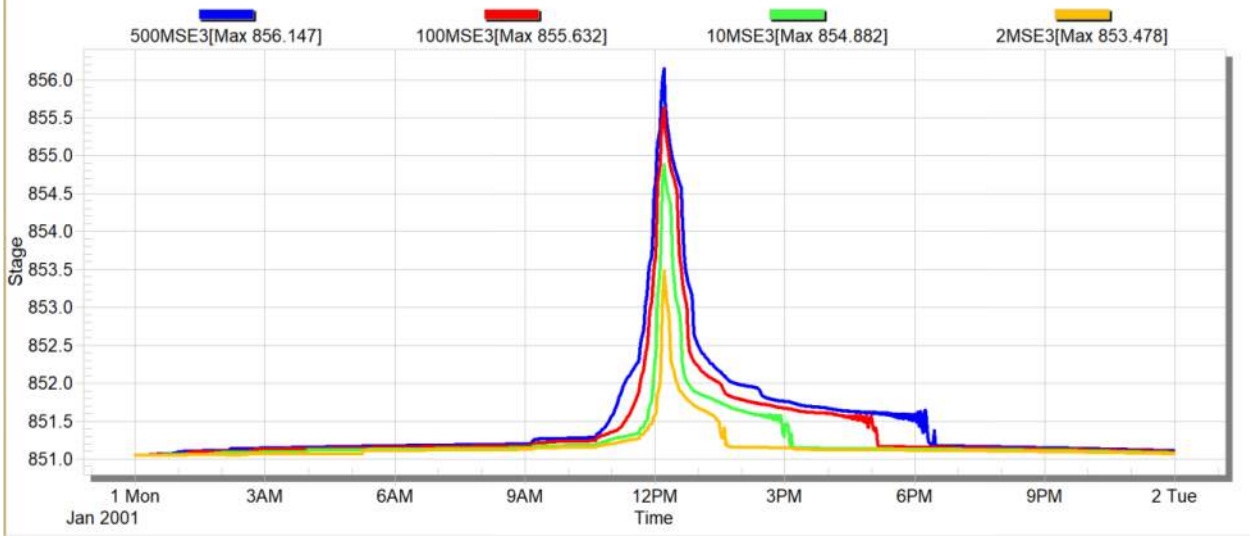

Nicollet Site - Existing XPSWMM Diagram
Node2723
Node2655
OV423686
PI494598
423687
430259
PI486613
422821
PI494597
ST494597
442633
430258


Nicollet Site - Proposed XPSWMM Diagram
Node2723
Node2655
OV423686
423687
430259
PI494598
North Cell-Option 1
Link4309
South Cell-Option 1
PI486613
422821
PI494597
ST494597
Link4310
442633
430258
494596

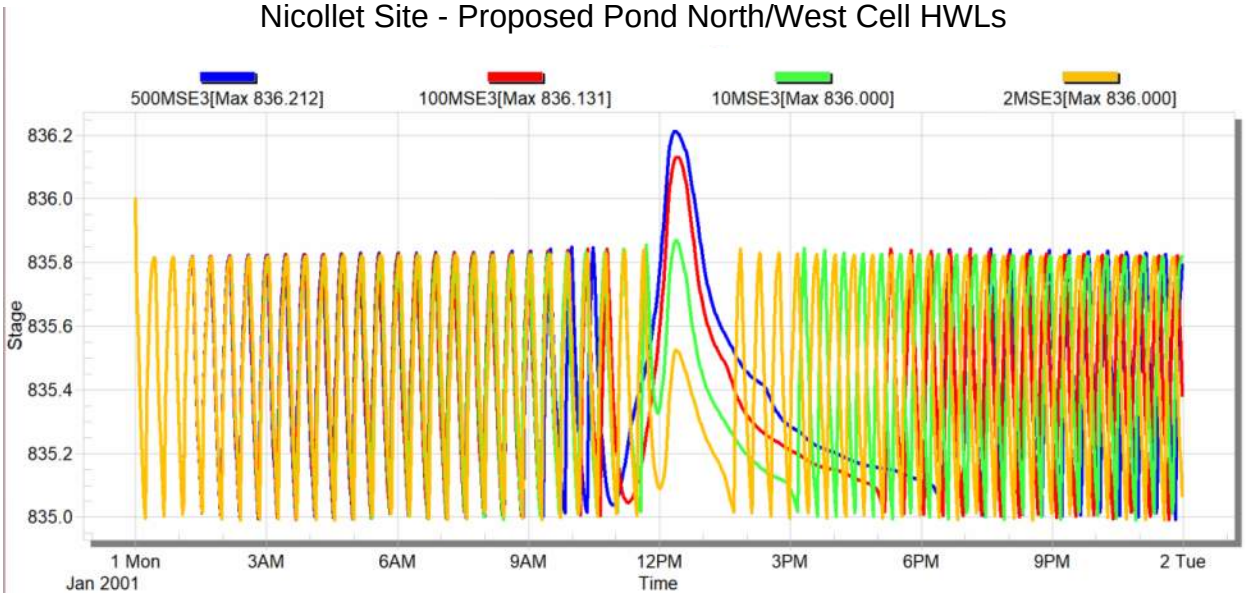
Nicollet Site - Existing HWL Manhole in W Minnehaha Pkwy



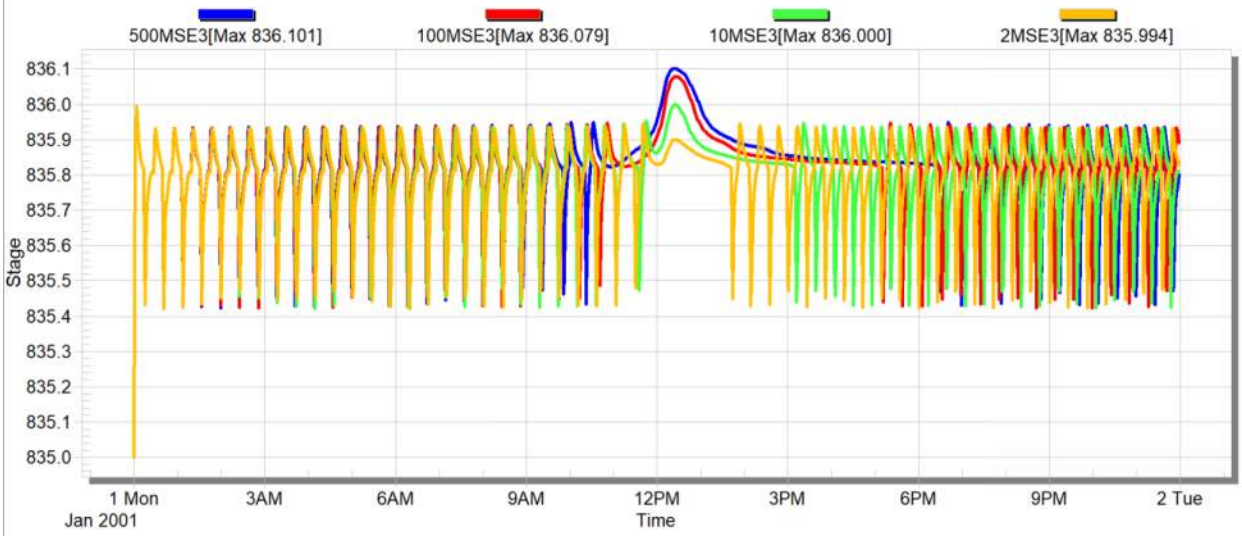
Nicollet Site - Proposed HWL Manhole in W Minnehaha Pkwy

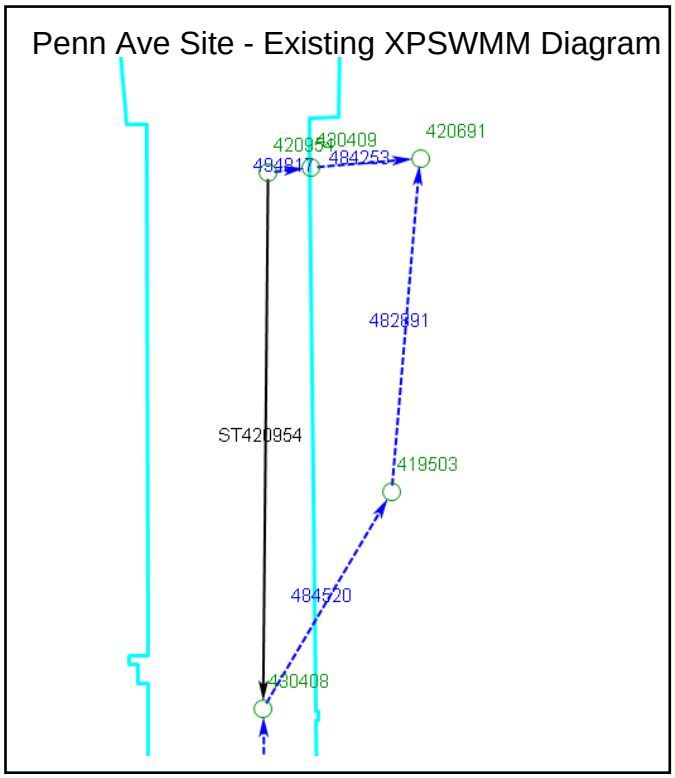


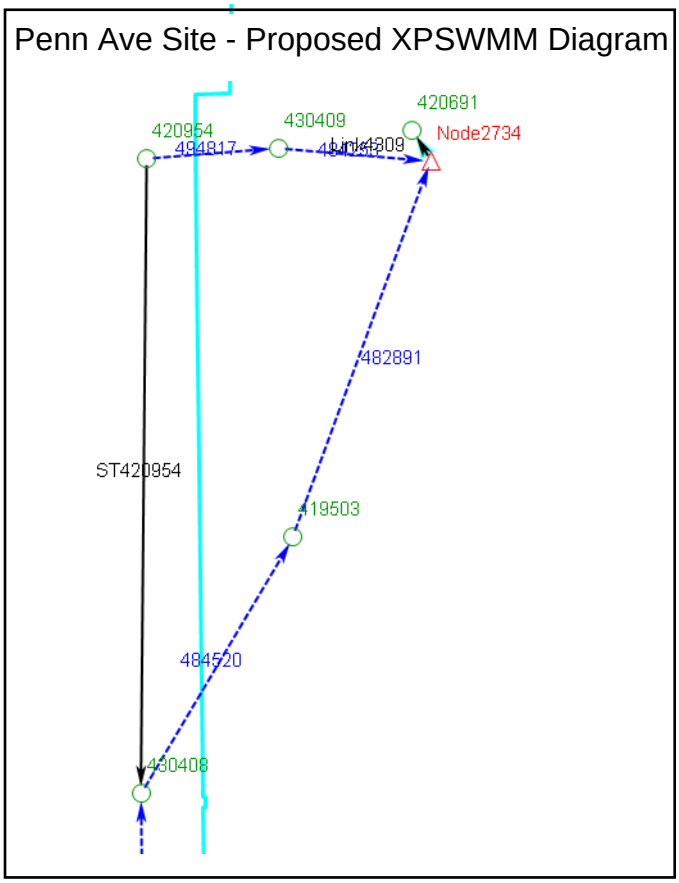
Nicollet Site - Proposed Pond North/West Cell HWLs



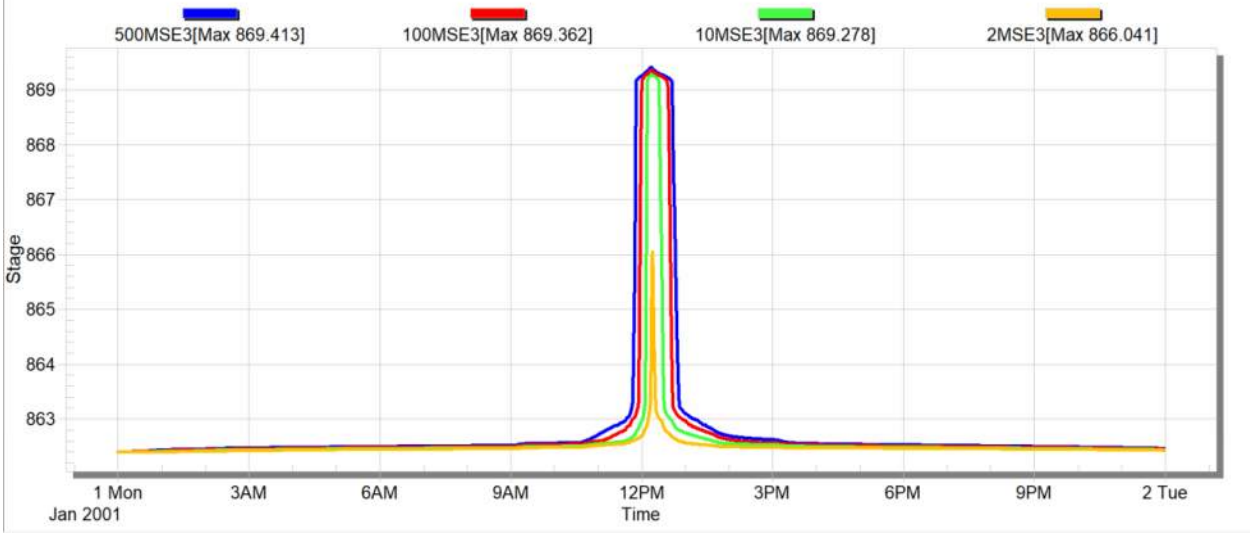
Nicollet Site - Proposed Pond South/East Cell HWLs



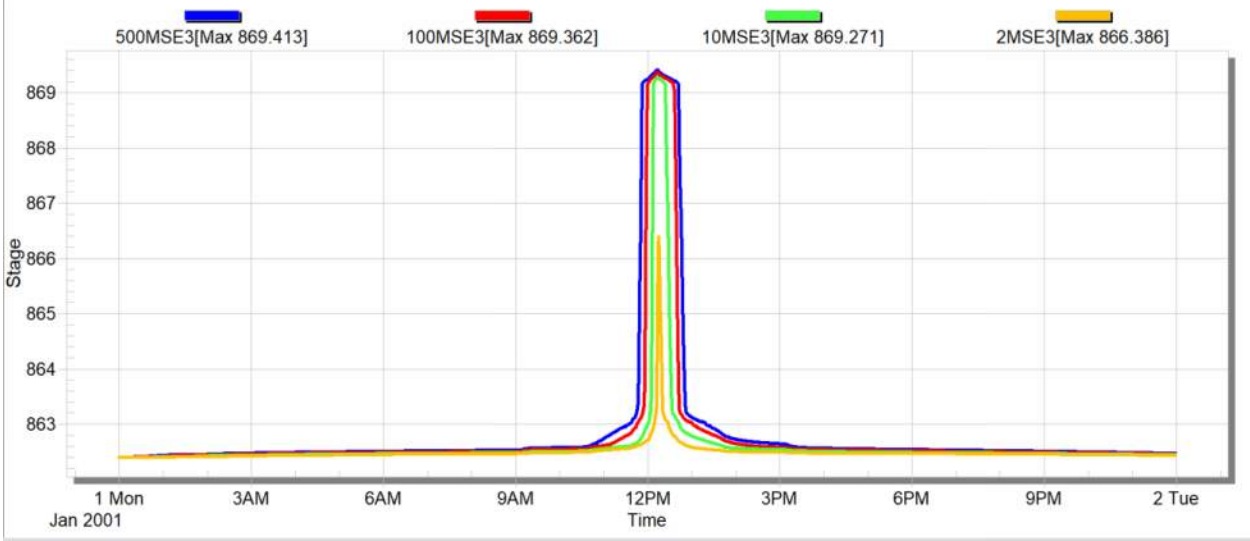

Penn Ave Site - Existing XPSWMM Diagram
420954
430409
420691
494817
484253
482691
ST420954
419503
484520
430408


Penn Ave Site - Proposed XPSWMM Diagram
420954
430409
420691
Node2734
494817
Link4309
482891
ST420954
419503
484520
430408

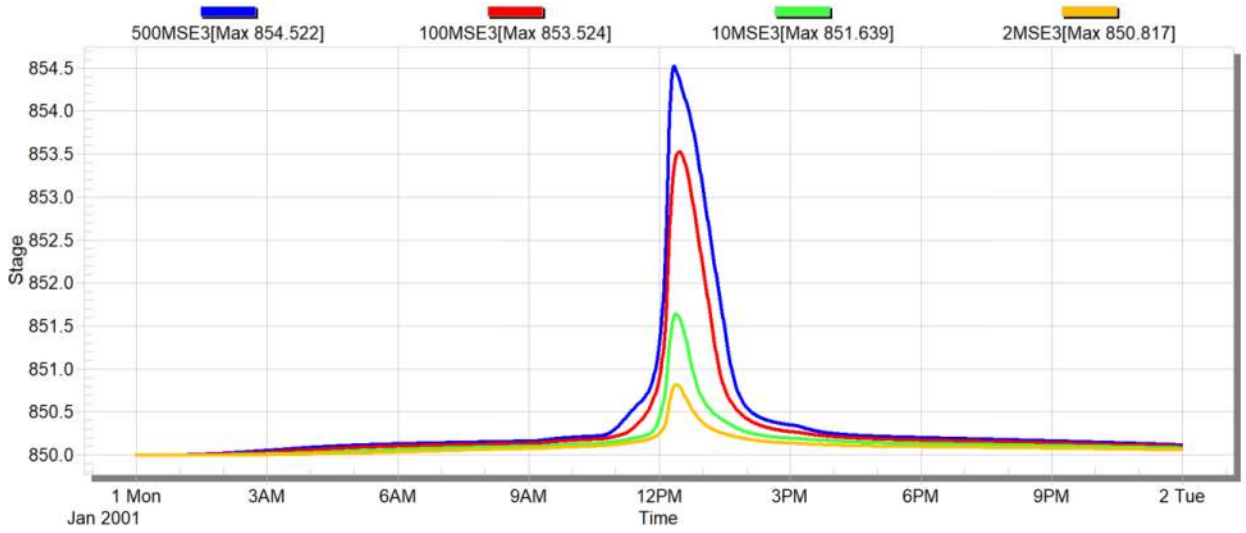
Penn Ave Site - Existing HWL Manhole in Penn Ave



Penn Ave Site - Proposed HWL Manhole in Penn Ave



Penn Ave Site - Proposed Pond HWLs



Appendix F

Meeting Minutes and Workshops

Meeting Notes

Minneapolis Kickoff Meeting

Project/File:	227707285
Date/Time:	September 23, 2024
Attendees:	MCWD: James Wisker, Michael Hayman, Gabe Sherman City: Angie Craft, Lisa Goddard, Kelly Moriarity MPRB: Michael Schroeder, Deb Pilger Stantec: Chris Meehan, Rena Weis Inter-Fluve: Jonathon Kusa, Maren Hansell HKGi: Bryan Harjes, Sarah Evenson

---

SUMMARY

The following are the minutes of the walk through the group completed on September 23rd. If there are any edits or adjustments needed, please let me know.

OVERALL

Should be thinking across project sites about different tiers of visitor interaction with the projects

PENN/NEWTON

General Notes:

- Stormwater from Morgan Ave. was not going to be evaluated as there would be too much disturbance to move the water over to the BMP on the west side of the site.
- There should be discussion around likely private property encroachment on MPRB land
- There should be discussion around looking into acquiring the currently vacant residential parcel – any project benefit?

Newton Ave Stormwater:

- Remove concrete flume and create multi-cell stormwater BMP which intercepts overland road runoff along with piped outlet
- May need to look at vertical overflows from pond cells
- Look to maintain trees on upper portion of the slope
- Maintain ability to have footpath adjacent to the creek

Penn Ave Stormwater:

- Stormwater footprint should look to fit in the existing open area
- Need to address sanitary manhole in the middle of the open space
- Preservation of trees is critical
- Routing of stormwater down to the creek could be by pipe or overland flow, but should limit tree impacts
- Should ensure there is room for the creek access next to east side of Penn

- Re-meander will be reviewed and potentially replaced with floodplain connection/enhancement
- North bank residents are very close and there are concerns about encroachment to their properties
- May want to look at bank enhancements adjacent to the western ped bridge

Alternatives:

- Penn Ave. Stormwater – evaluate underground vs. above ground stormwater treatment approaches.
- Cell sizing and placement for stormwater off Newton Ave.

NICOLLET

General Notes:

- Stream restoration will occur to from western pedestrian bridge downstream to next downstream pedestrian bridge. A preliminary review will be conducted from the eastern pedestrian bridge down to Nicollet Ave.
- Stormwater treatment will look to have two primary cells adjacent to outfalls to treat stormwater from the storm sewer draining the to area and then have them overflow into an open wetland restoration area
- Accentuating the re-meander of the creek will be investigated adjacent to the proposed stormwater facilities
- It was recognized there were significant trees (Cottonwoods) where the proposed basins were slated to go that may need to be protected
- Need to have desktop ESA completed for the road/rail grade that goes through the site
- There may be a desire to have a footpath through the stormwater features, to reflect current traffic patterns on the site
- MPRB is going to investigate the presence of U of M forest restoration signs on the site to confirm implications to the design.
- Minneapolis staff will confirm timing of Nicollet Ave. bridge repair
- Replacing the paved trail on the north side of the creek will be costed out to help understand costs for the partners
- We will consider removing the “planter” bank restoration just upstream of the former parkway bridge on the west bank

Alternatives:

- Extent to accentuate the stream re-meander
- Size of stormwater cells and breakdown of cells

CEDAR

General Notes:

- Look to have multi-cell facility that can weave in trails for visitor interaction
- Focus on placemaking at this site as it has high visibility
- Identify location of bike path underpass based on road grade to help relieve incident potential at Cedar Avenue.
- Pull trail away from the creek and open up view to creek from south and allow greater backwater interaction with the site and protected habitat
- Limit tree removal – can move some of the small trees, but limit loss of the larger trees on site.
- Need to have rough ESA given Speedway is adjacent to site
- Should think about garbage collection from Cedar drainage
- Evaluate open channel or pipe, when directing flow from 16th
- Removal of the throughput road may be a good place for a BMP which collects trash from the Cedar Ave. drainage area
- Everyone acknowledged that the site will interact with groundwater

- Access points to stormwater management BMPs should be clearly identified
- City of Minneapolis Staff – were going to check on the status of the through road removal

Alternatives:

- Open Channel vs. Pipe for 16th Drainage
- Combined vs. separated Ped and Bike paths adjacent to the north side of pond
- Pre-treatment in throughput road vs south of Parkway
- Look at Boardwalk through cells

If any discrepancies or inconsistencies are noted, please contact me.

Respectfully,

STANTEC CONSULTING SERVICES INC.

Chris Meehan
US Water Sector Lead, Senior Principal
Phone: (763) 252-6844
Chris.meehan@stantec.com

Attachment: [Attachment]

Stantec

Agenda

Parkway Feasibility Study Phase 1 | Goal Alignment & Alternatives Workshop

Location: **MPRB Office**
Date: **November 13, 2024**
Attendees: **MCWD (Gabe Sherman, Michael Hayman)**
City of Minneapolis (Lisa Goddard, Angie Craft)
MPRB (Rachael Crabb, Michael Schroeder)
Stantec (Chris Meehan, Rena Weis)
Inter-Fluve (Maren Hansell)
HKGI (Sarah Evenson)

1:30 – 1:35 | Introductions (if needed)

1:35 – 1:40 | Review Project Objectives

Assess feasibility of project implementation suites at Penn-Newton, Cedar-Bloomington, and Nicollet Hollow, which are areas of the Minnehaha Parkway Master Plan that will benefit from close coordination between the City of Minneapolis, Minneapolis Park and Recreation Board, and Minnehaha Creek Watershed District. Project goal of identifying phasing of key beneficial projects which integrate goals of partners with improvement of water quality and flood storage in Minnehaha Creek.

1:40 – 1:45 pm | Decision Matrix

Project alternatives will be evaluated based on quantitative primary drivers and qualitative secondary drivers, which will be weighed against each other to formulate recommendations.

- **Primary Drivers**
  - Capital Cost
  - Water Quality Impact
    - MPRB would like to explore metrics for considering what achieving comparable pollutant removals through conventional means would look like from a cost and footprint standpoint (e.g., in-pipe, home buyouts) to support using parkland for this purpose, and consider what the impacts to the creek and Lake Hiawatha would be if these removals are not achieved.
  - O&M Burden
  - Flood Resiliency / Capacity
- **Secondary Drivers**
  - Ecosystem / Habitat Services Lift
    - MPRB notes that metrics will be useful to explain the benefits of the projects.

- Funding Pathways
- Pathway to Permitting
- Addresses Adjacent Projects
- Land Footprint Efficiency
- Community Amenities Lift
    - Michael Schroeder expressed the need to accommodate people and their recreational use on parkland;
    - Michael Schroeder also noted incorporating placemaking with each of the sites to create a sense of connection with the neighborhood and resources similar to Arden Park. He noted that this sentiment is shared by MCWD Manager Miller.

1:45 – 2:45 pm | Review Alternatives & Criteria (20 mins/site)

Penn & Newton

- Need to modify basin footprints to accommodate required access over sanitary sewer lines
- Document at a high level what would be required (i.e. additional tree removals, lift station) to capture drainage from the 60-inch storm outfall that runs north along Morgan Ave (Rachael Crabb expressed interest).
    - If this project component does not move forward, document that it could be considered as part of a future road project with a new stormwater system running in the ROW.
    - Need to reach consensus regarding the value of treating only the Penn drainage area.
    - Document that the basin was not sized to treat Morgan drainage area
    - Document that the basin could accommodate a degree of filtration
- Document decision to only recommend bank restoration on south side of creek at Project B, to avoid encroaching toward homes on north side of bank.
- If Oak Savanna is implemented, it would have special maintenance requirements such as periodic controlled burns. MPRB and City communicated that there are other areas in Minneapolis that are managed via controlled burn so this is not a barrier. Oak Savanna maintenance needs will be added to O&M tables.
- Agency Partners expressed some interest in including additional meander bend stabilization north of the formal project area. Desire to take advantage of the opportunity to stabilize now and minimize future erosion risk / risks to the sledding hill while work focused in this area.
- In lieu of large, formal tiered pools to replace the flume, consider smaller pools / check dams down the slope in combination with a grit chamber/hydrodynamic separator
- MPRB expressed concern around maintenance burden for tiered pools compared to the TP removal benefit.

Cedar

- No decisions made yet on grit chamber relocation / replacement. If relocated, the drainage area treated by it would be reduced and it would likely still be subject to periodic high water. Need additional information on costs, assumptions, and water quality benefits. Need additional information on maintenance requirements and who would pay for and perform O&M. Some level of pretreatment will need to be provided upstream of basin(s) at all inlets.
    - Need to understand level of priority of separating the sanitary and storm sewer in this area – this would be a big lift.

- Group was supportive of implementing Projects A (Creek Remeander and Shoreline Restoration), B (Riparian habitat Restoration) and C (Creek Stabilization) as shown on the figures.
    - Preference for the "greener" version of project A, which is shown on Option 1 figure and includes the remeander and shoreline restoration.
    - If pursuing remeanders, consider an EAW that covers more than the narrow project area.
    - Project C is bank renaturalization which includes removing plastic netting and resetting some bank boulders and cobbles that were implemented as part of a 2007 project.
- Option 2 includes an overland connection to creek, so the wetland area could also act as a backflow for the creek.
- MCWD noted trash removal for the residential drainage should be considered as well from the outfall draining *storm main on 16th Ave S*.
- Revise figures to include an alternative that provides land access over MCES and City of Minneapolis sanitary lines. Incorporate this land access into park user experience as appropriate.
- City and MPRB noted that it doesn't take much for the intersection of Cedar Ave & Minnehaha Parkway to flood. Need to really understand what the XP-SWMM model shows for how this project improves flooding in this area.
- Group was interested in boardwalk options
    - MPRB stated they are not opposed to boardwalks, and sees value in them if they enhance the user experience.
    - Questions about who would maintain boardwalks
    - Ideas about integrating micro-biomes for users to experience different habitats from the boardwalk; would require robust access and maintenance plan to maintain desired vegetation community; consider carp barriers; consider enhancement of habitat for NHIS species as there many T&E species in the area.
- MPRB noted that this area is primarily used as pass-through for bike and pedestrian users, with some minor picnicking by smaller groups, overlook(s), and some unique "discovered" spots.
- MPRB would like space for the bike tunnel trail beneath Cedar Ave to continue to be considered in the concepts. Design of the tunnel is not included in the feasibility study, but stormwater layout and circulation of trails should accommodate future tie-in for passage.

Nicollet Hollow

- Group is comfortable with the added pedestrian bridge associated with Project E "Circulation Adjustments"
- Consider how proposed basins would be accessed for dredging maintenance. Steep slopes and distance from roads make this tricky.
- Review plan for repair or removal of City outlet identified in City priority document. Clarify for team.
- Anticipate significant public engagement if this site is pursued given the tree removal.
- Consider timing work at this site to coincide with Nicollet Ave bridge repairs.
- Both options were acceptable to the team.
- Need to understand implications of WPA wall restoration for future restoration efforts and if it can be removed and replaced with something more current in design standards.

2:45 – 2:50 pm | Operation & Maintenance

- Add boardwalks, oak savanna, grit chambers

- Incorporate O&M frequencies (ongoing, periodic, infrequent replacement) and costs
- Need to identify ownership of O&M between partners.

2:50 – 2:55 pm | Permitting Considerations

- No-rise
- DNR – Public Water
- WCA
- Cultural Resources
- MCWD
    - Floodplain Alteration
    - Erosion Control
    - Stormwater Management
    - Streambank Stabilization
    - Wetland Protection
- MPRB
- City of Minneapolis
    - Streets
    - Stormwater Ordinance, potentially
- MCES (Penn-Newton, Cedar)
- DNR & USFWS - T&E
    - Rusty Patched Bumble Bee (all)
    - Pugnose Shiner (all)
    - Lake Sturgeon (Penn-Newton)
    - Least Darter (Penn Newton, Cedar-Bloomington)
    - Forster’s Tern (all)
    - Blanding’s Turtle (Nicollet)
    - Tricolored Bat (Nicollet)

- Need to overlay solutions with these species to understand how projects impact or integrate each species and influence construction schedule.

2:55 – 3:00 pm | Next Steps

- MPRB Forester to visit sites and collect data on tree species and health at each site; share with team to inform tree removal decisions
- MCWD to review whether the Kestrel stabilization project at Cedar can be modified to reflect current best practices (reposition some riprap and remove plastic), or whether there are funding implications.
- Minneapolis to advise on timing of Nicollet Ave bridge project.
- Consultant team to summarize feedback and seek confirmation.
- Consultant team to finalize decision matrix.
- Consultant team and Minneapolis to complete transfer of water quality model
- Consultant team to refine preferred solutions and incorporate any new project components
    - Infrastructure analysis
    - Modeling
    - Cost estimates
- Phasing Plan

Other questions to be addressed:

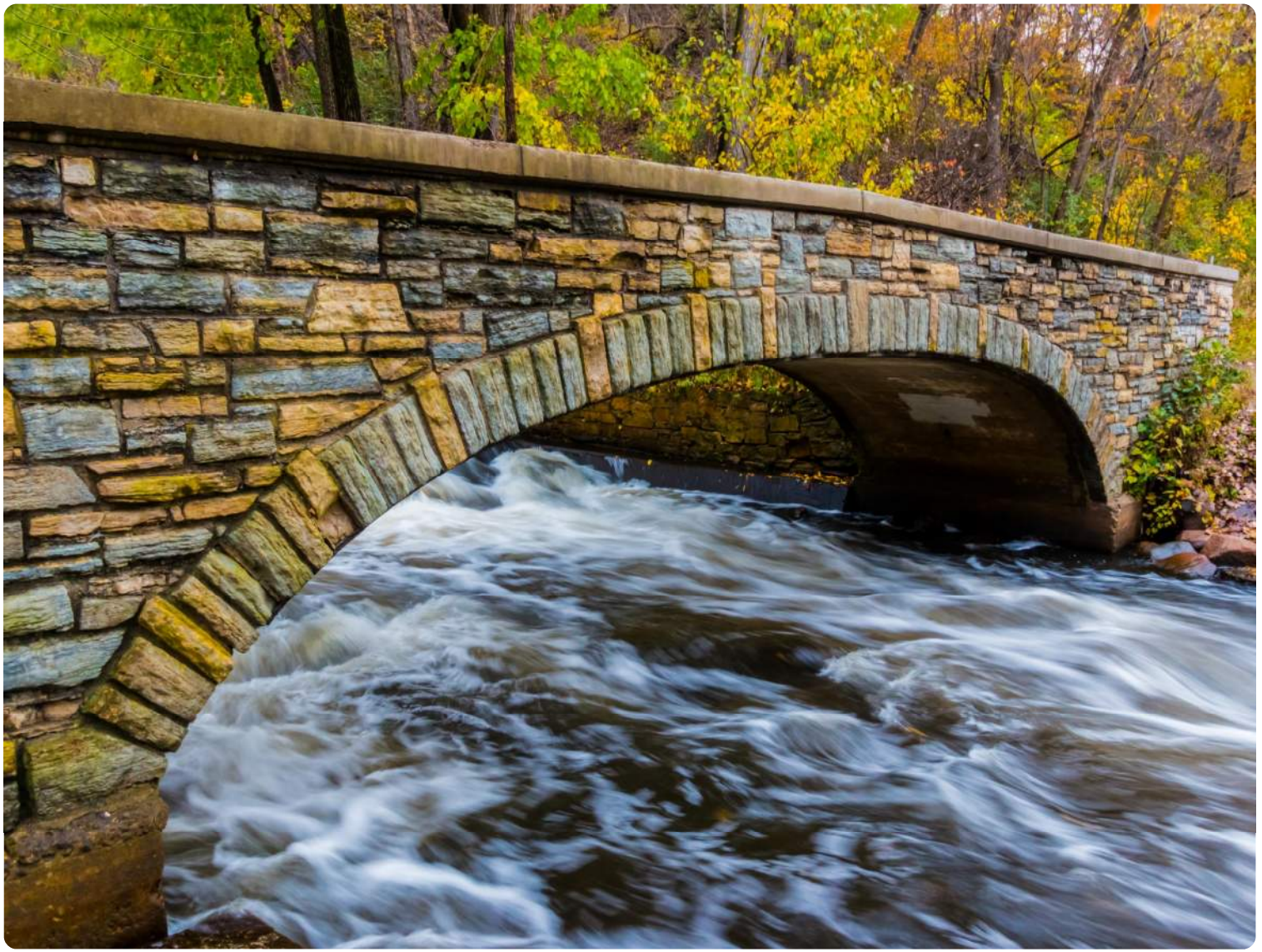
- For MPRB: Develop a high-level assessment of what would be required to achieve the proposed level of water quality benefit elsewhere in the City of Minneapolis (i.e. how many homes / how much of a city block would need to be acquired and impacted, explain why not feasible to achieve this scale under roads or in right of way). Help to make the case for using parkland. Discuss the longterm impacts to the Creek and Lake Hiawatha (TMDL and Fishable & Swimmable goals) that will result based on project implementation (or no project implementation).

Stantec

Parkway Feasibility Phase 1:
Goal Alignment and Alternatives Workshop

Agenda

1. Intros
2. Project Objectives
3. Decision Matrix
    1. Primary & Secondary drivers
4. Review Alternatives
    1. Penn & Newton
    2. Cedar
    3. Nicollet Hollow
5. Operation & Maintenance
6. Permitting Considerations
7. Conclusion

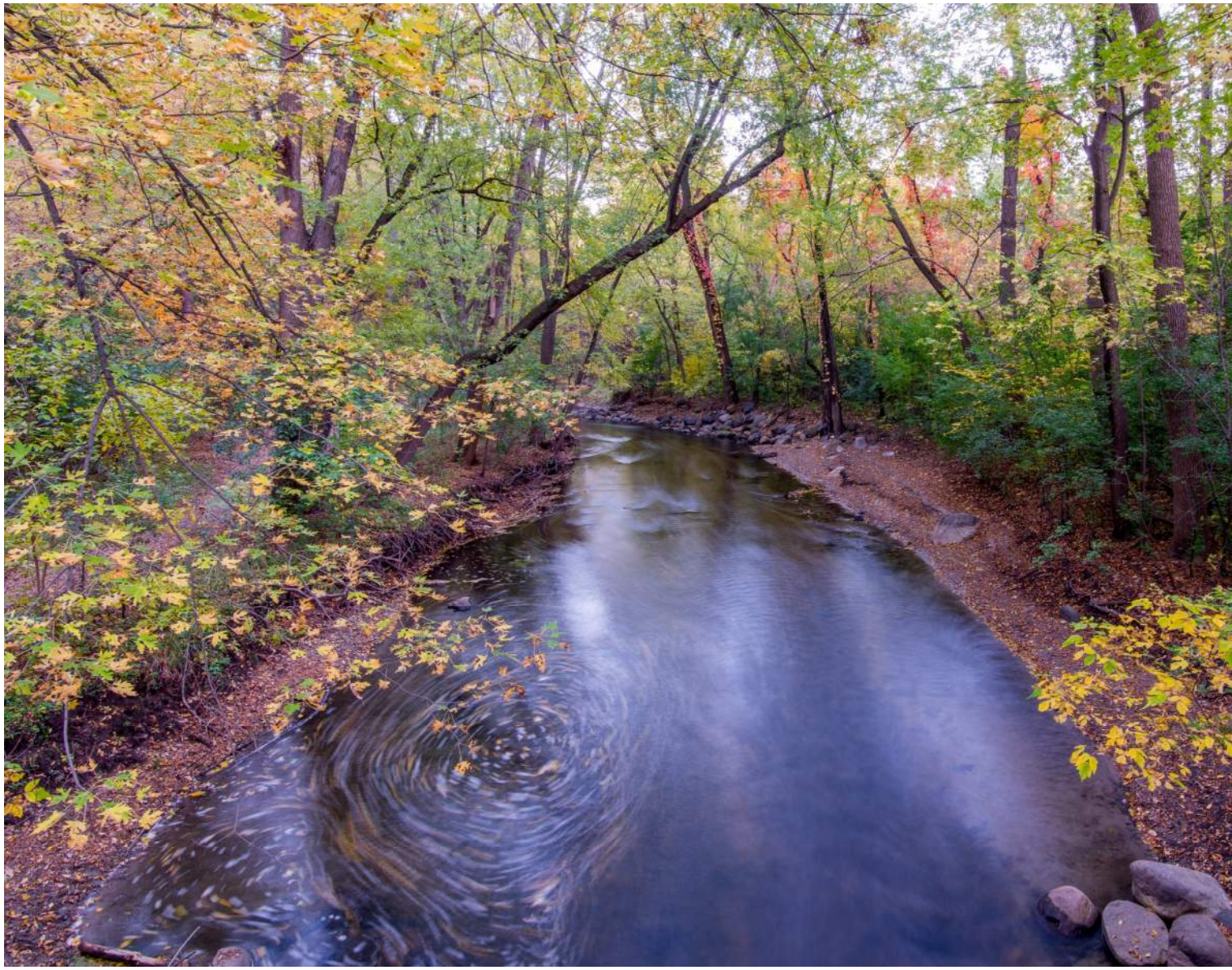


Project Objectives

Minneapolis Park & Recreation Board

Minneapolis City of Lakes

MINNEHAHA CREEK WATERSHED DISTRICT
QUALITY OF WATER, QUALITY OF LIFE



Decision Matrix

Primary Criteria

- Capital Cost
- Water Quality Impact
- O&M Burden
- Flood Resiliency / Capacity

Secondary Criteria

- Ecosystem / Habitat Services Lift
- Funding Pathways
- Pathway to Permitting
- Addresses Adjacent Projects
- Land Footprint Efficiency
- Community Amenities Lift

Key Areas

1. Penn & Newton
2. Cedar
3. Nicollet Hollow

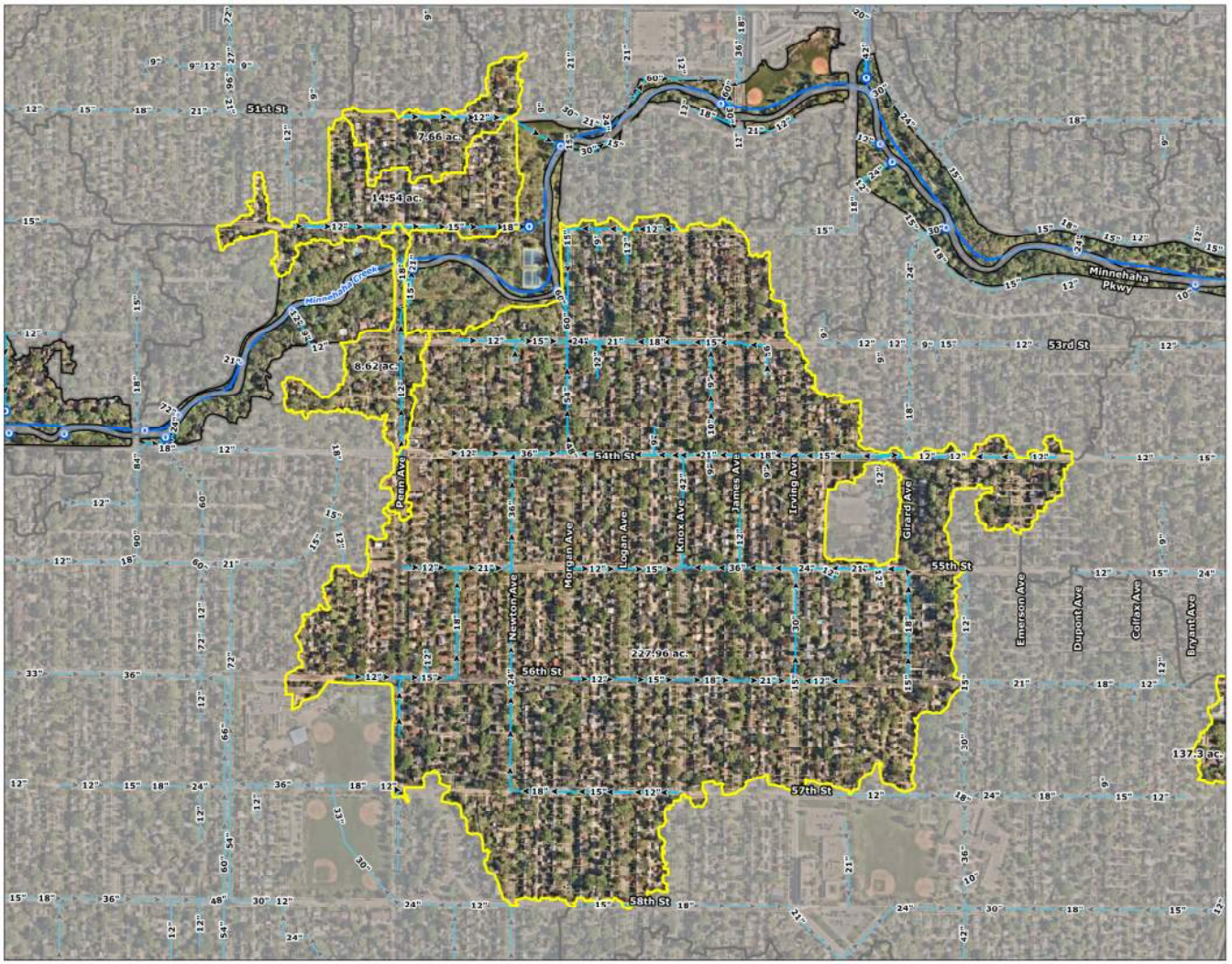


Figure No.
1

Title
Penn-Newton: Pipeshed

Client/Project
MCWD
Parkway Feasibility Phase 1

227707285

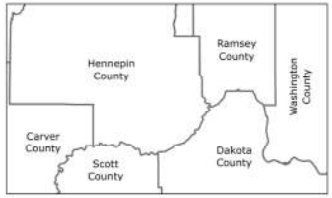
Project Location
Minneapolis, Hennepin Co., MN

Prepared by BS on 11/12/2024

N

0 200 400 Feet
(At original document size of 11x17)
1:7,000

Legend
- Pipesheds
- Public Waters
- Storm Main
- Storm Open Channel
- Storm Outfall



Notes
1. Coordinate System: NAD 1983 UTM Zone 15N
2. Data Sources: MnDOT, Hennepin County
3. Background: Hennepin County 2024 Imagery

Stantec

Page 1 of 3

POTENTIAL PROJECTS

A) STORMWATER TREATMENT TRAIN
- Three cells replace the open stormwater flume
- Natural surface path traverses between two of the basins (option for small bridge, or over a culvert)

B) BANK RESTORATION
- Revegetate and stabilize slopes, moving existing natural surface trail along creek to top of slope

C) OAK SAVANNA RESTORATION
- Native interseeding beneath oaks with natural surface path maintained through the grove

D) WATER ACCESS POINT
- Stepped limestone water access point to be installed near Penn.

E1) PENN AVENUE STORMWATER TREATMENT OPTION 1: BASIN
- Basin could be flat-bottomed turf to maintain playable surface for recreation

E2) PENN AVENUE STORMWATER TREATMENT OPTION 2: UNDERGROUND STORAGE

QUESTIONS: *Trails desired to be packed earth, crushed agg, mown, or a mixture? Access up/down hill to Penn desired at this phase? Picnicking desired in clearing or elsewhere? Extent of savanna too much? Should turf slopes be converted to shortgrass meadow or pollinator lawn?*

PENN-NEWTON-MORGAN

Existing/Proposed Ped Trail (paved)
Existing/Proposed Ped Trail (natural surface)
Existing/Proposed Bike Trail
Significant Tree
Bank Restoration
Stormwater Feature
Savanna
Recreation Features
Sanitary Sewer
Stormwater

DRAFT
NOVEMBER 2024

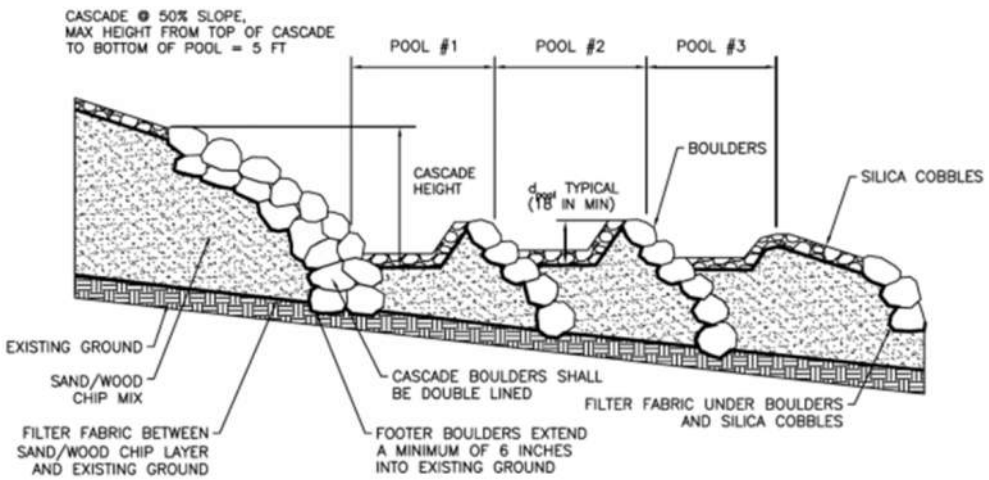


Figure 2: Cascade Profile- Three Pools Following Cascade

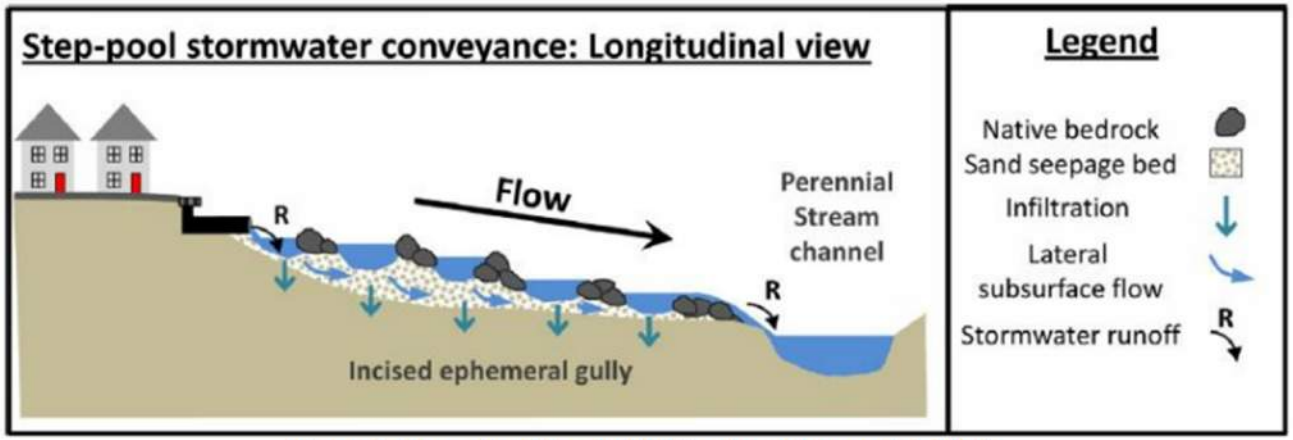
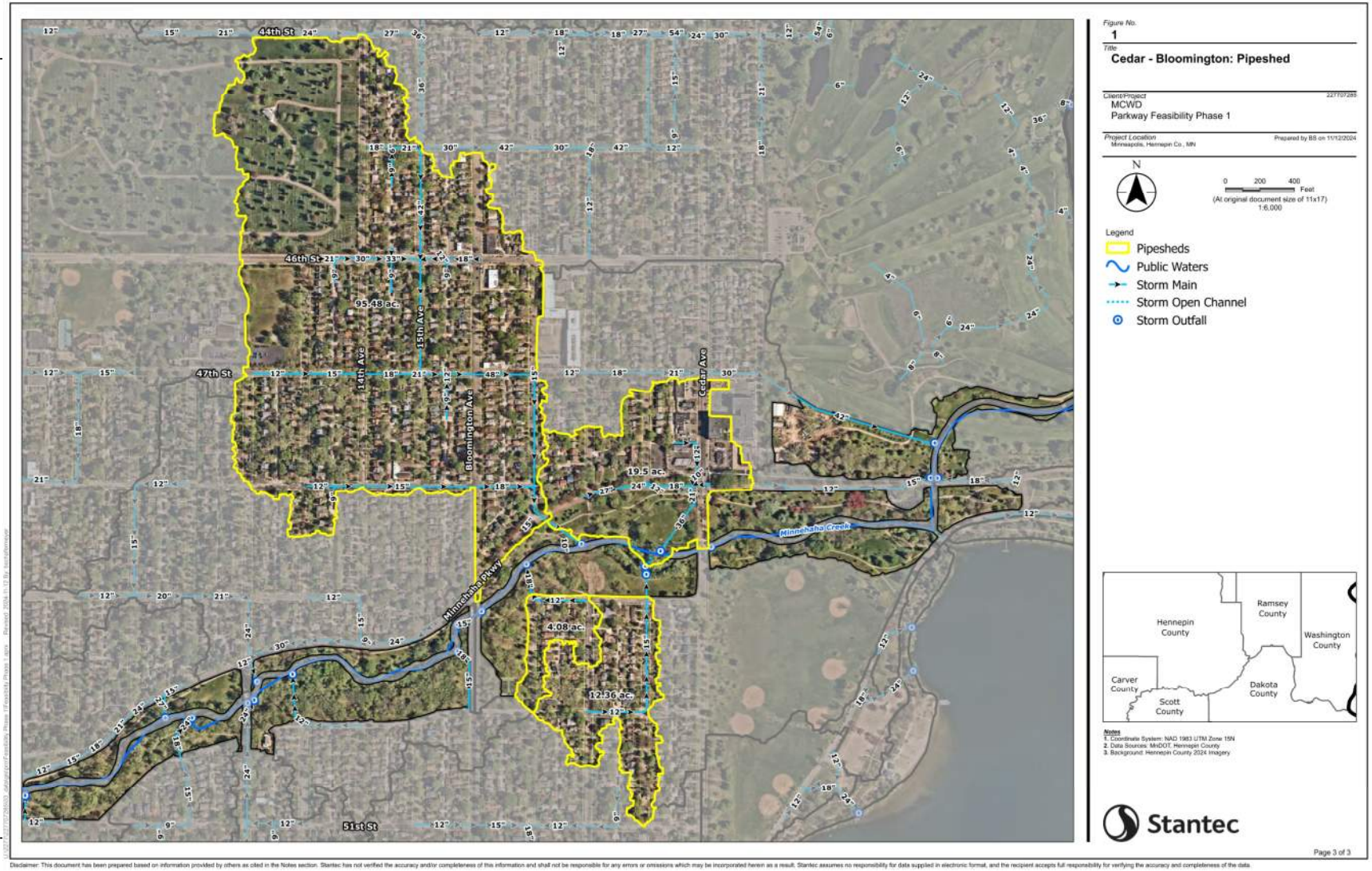


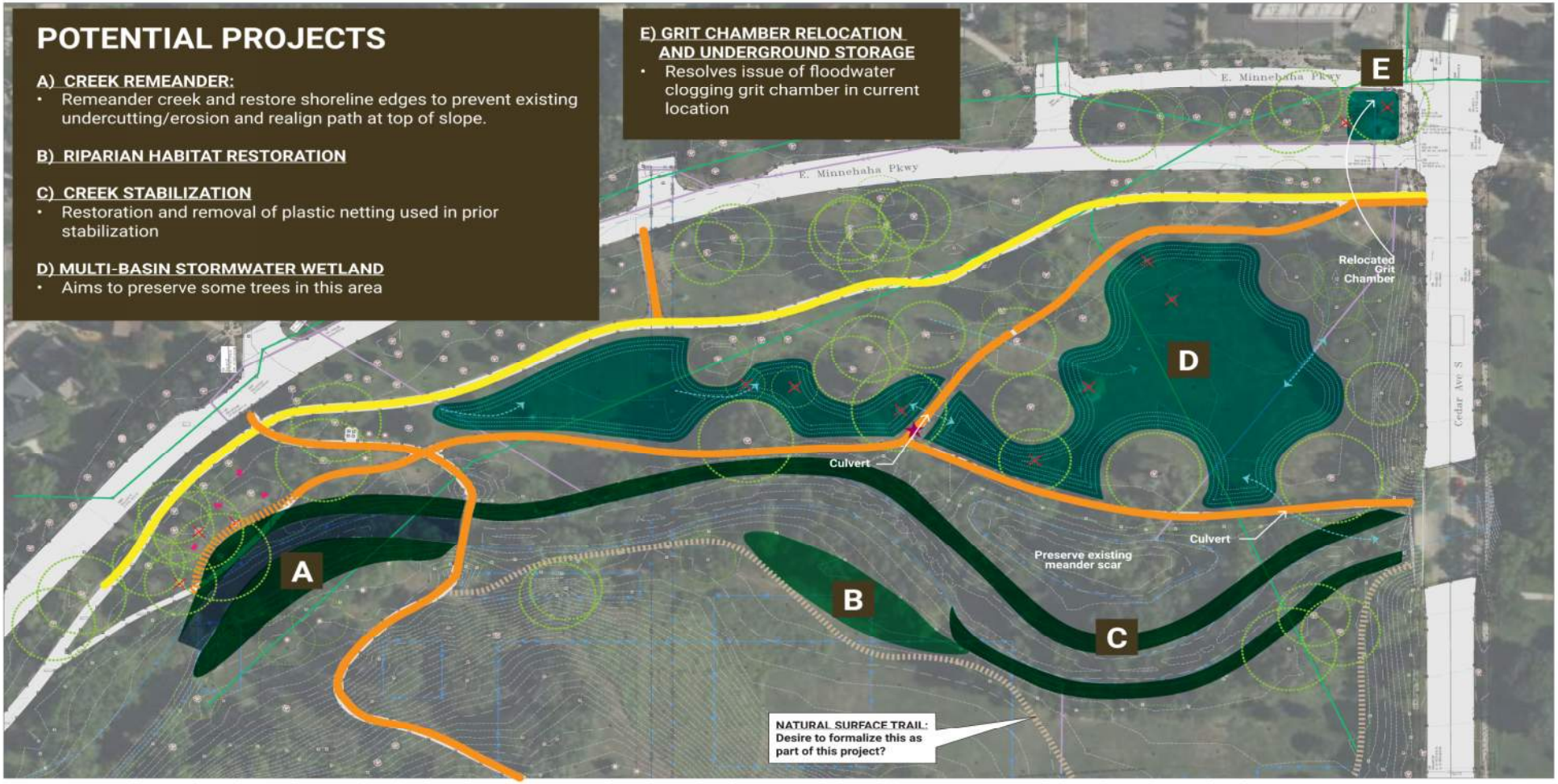
Figure 3: Schematic of flow for SPSC systems (Palmer et al. 2013)

Penn-Newton-Morgan

	Primary Criteria			
Concept Name	Alternative	Capital Cost (Excludes Trails and Landscape Architecture Components)	Water Quality Impact (lb TP/yr)	O&M Burden (1=low, 3=high)
E1 – surface pond and treatment train tiers	1	$630k	Surface: 4-6	2
E2 – underground filtration and treatment train tiers	2	$1.8M	Underground: 4-6	3



Disclaimer: This document has been prepared based on information provided by others as cited in the Notes section. Stantec has not verified the accuracy and/or completeness of this information and shall not be responsible for any errors or omissions which may be incorporated herein as a result. Stantec assumes no responsibility for data supplied in electronic format, and the recipient accepts full responsibility for verifying the accuracy and completeness of the data.



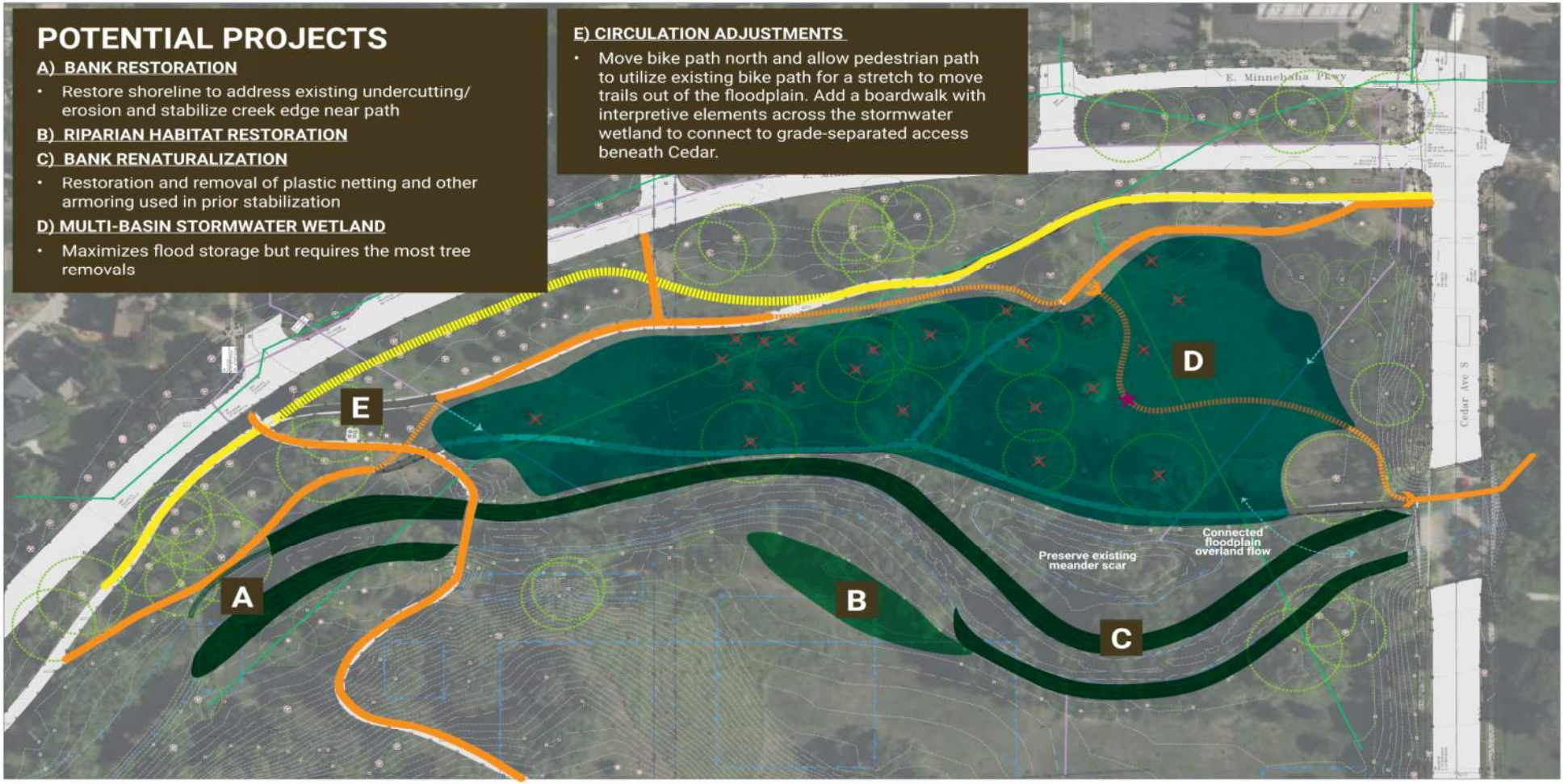
QUESTIONS: *Add natural surface trail on south side of creek to this option? If so, desired surface? Any additional lawn conversion to habitat here where it floods? Preference for interpretive/gathering feature in this concept?*

CEDAR AVENUE OPTION 1

Existing/Proposed Ped Trail (paved)
Existing/Proposed Ped Trail (natural surface)
Existing/Proposed Bike Trail
Significant Tree
Creek Stabilization
Stormwater Feature
Riparian Restoration
Recreation Features
Sanitary Sewer
Stormwater

0 20' 40' 80'
SCALE: 1" = 40'-0"
NORTH

DRAFT
NOVEMBER 2024



QUESTIONS: *Add natural surface trail on south side of creek to this option? Preference for armored shoreline or remeander + restoration for project "A"? Any specific trees we want to try to save (tradeoff is reduced flood storage volume)?*

CEDAR AVENUE OPTION 2

Existing/Proposed Ped Trail (paved)
Existing/Proposed Ped Trail (natural surface)
Existing/Proposed Bike Trail
Significant Tree
Bank Restoration
Stormwater Feature
Riparian Restoration
Recreation Features
Sanitary Sewer
Stormwater

0 20' 40' 80'
SCALE: 1" = 40'-0"
NORTH

DRAFT
NOVEMBER 2024

POTENTIAL PROJECTS

A) BANK RESTORATION

- Restore shoreline to address existing undercutting/ erosion and stabilize creek edge near path

B) RIPARIAN HABITAT RESTORATION

C) BANK RENATURALIZATION

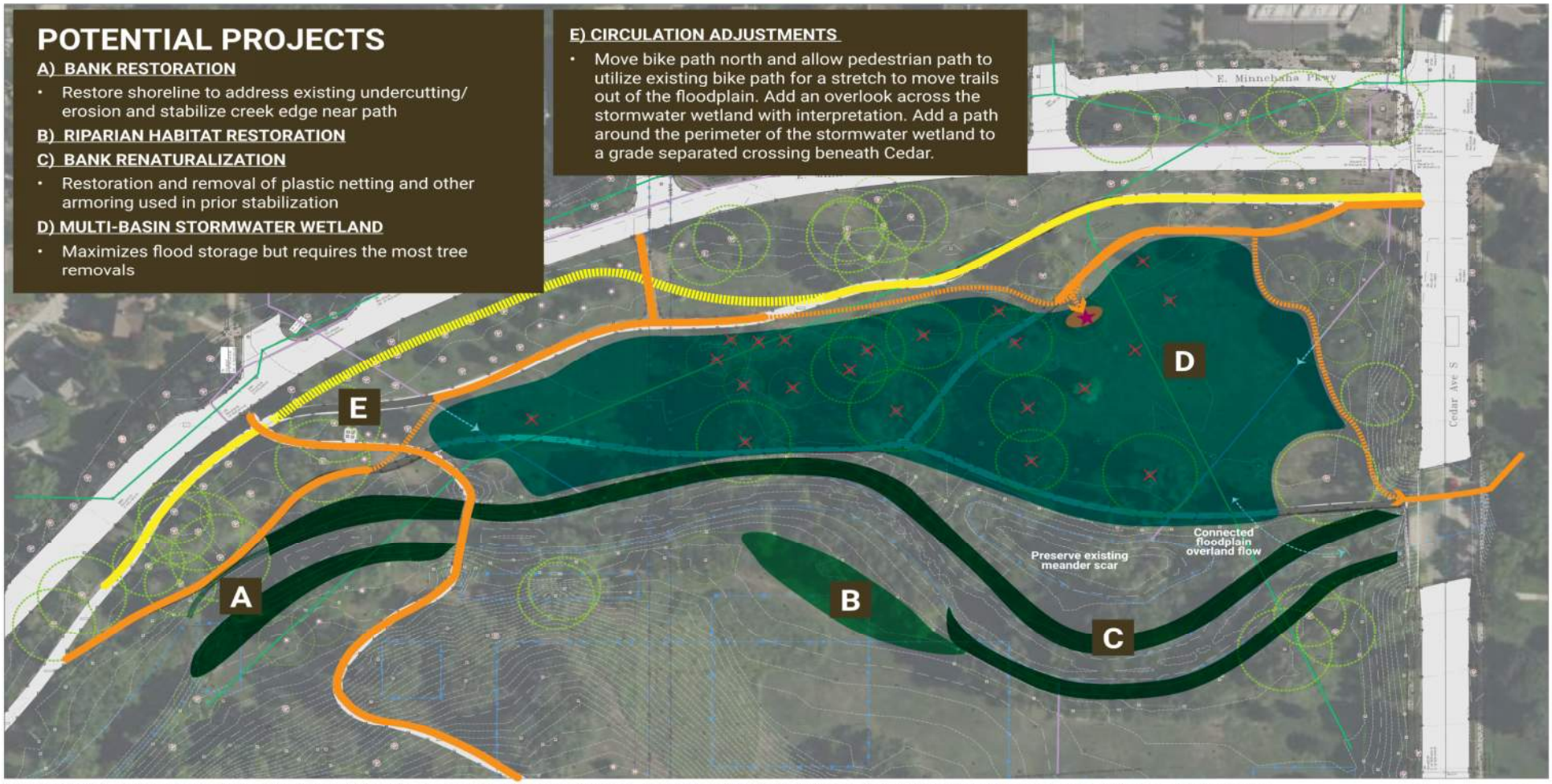
- Restoration and removal of plastic netting and other armoring used in prior stabilization

D) MULTI-BASIN STORMWATER WETLAND

- Maximizes flood storage but requires the most tree removals

E) CIRCULATION ADJUSTMENTS

- Move bike path north and allow pedestrian path to utilize existing bike path for a stretch to move trails out of the floodplain. Add an overlook across the stormwater wetland with interpretation. Add a path around the perimeter of the stormwater wetland to a grade separated crossing beneath Cedar.



QUESTIONS: *Add natural surface trail on south side of creek to this option? If so, desired surface? Preference for armored shoreline or remeander + restoration for project "A"? Any specific trees we want to try to save (tradeoff is reduced flood storage volume)?*

0 20' 40' 80'
SCALE: 1" = 40'-0"

NORTH

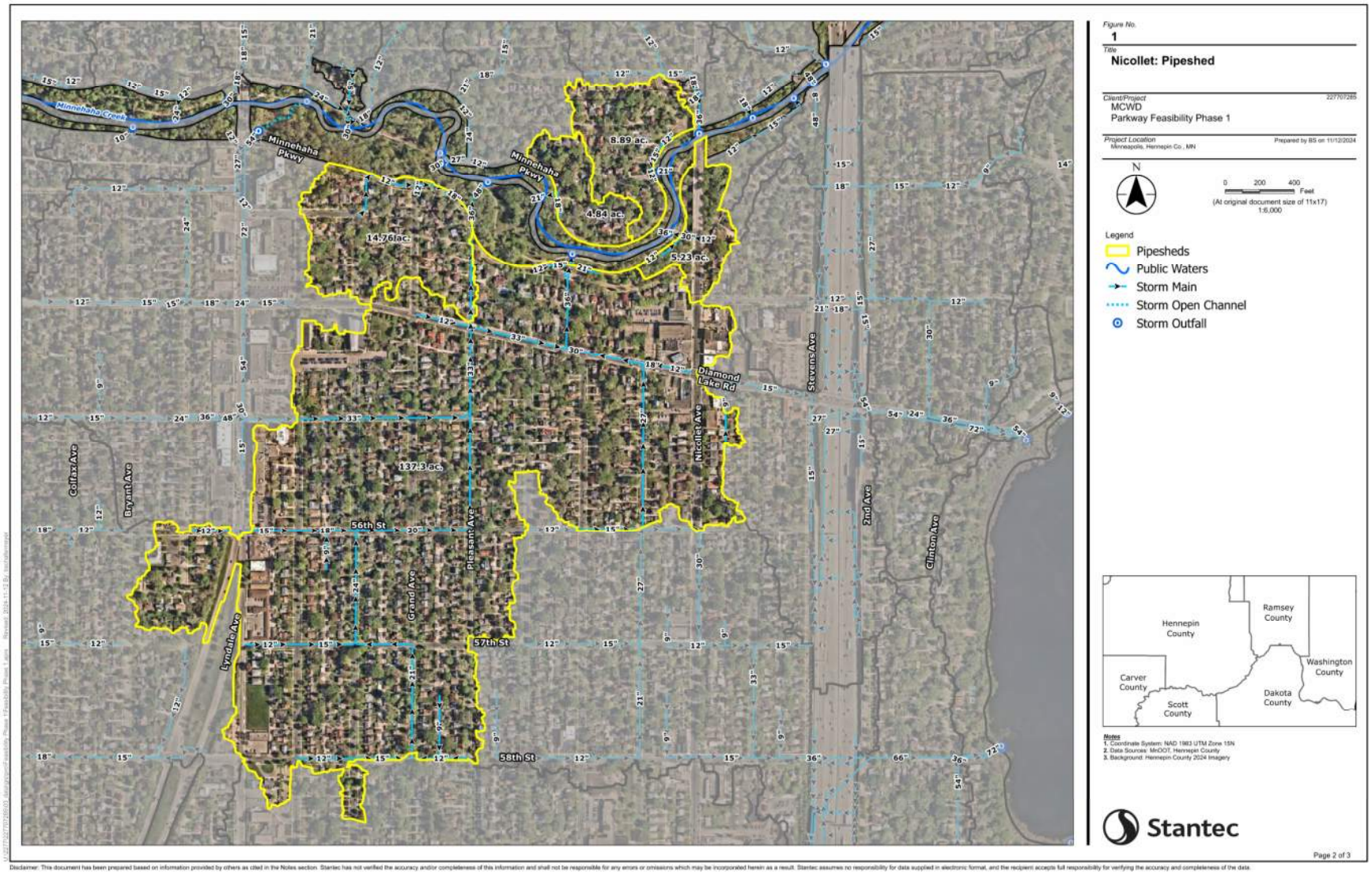
CEDAR AVENUE OPTION 3

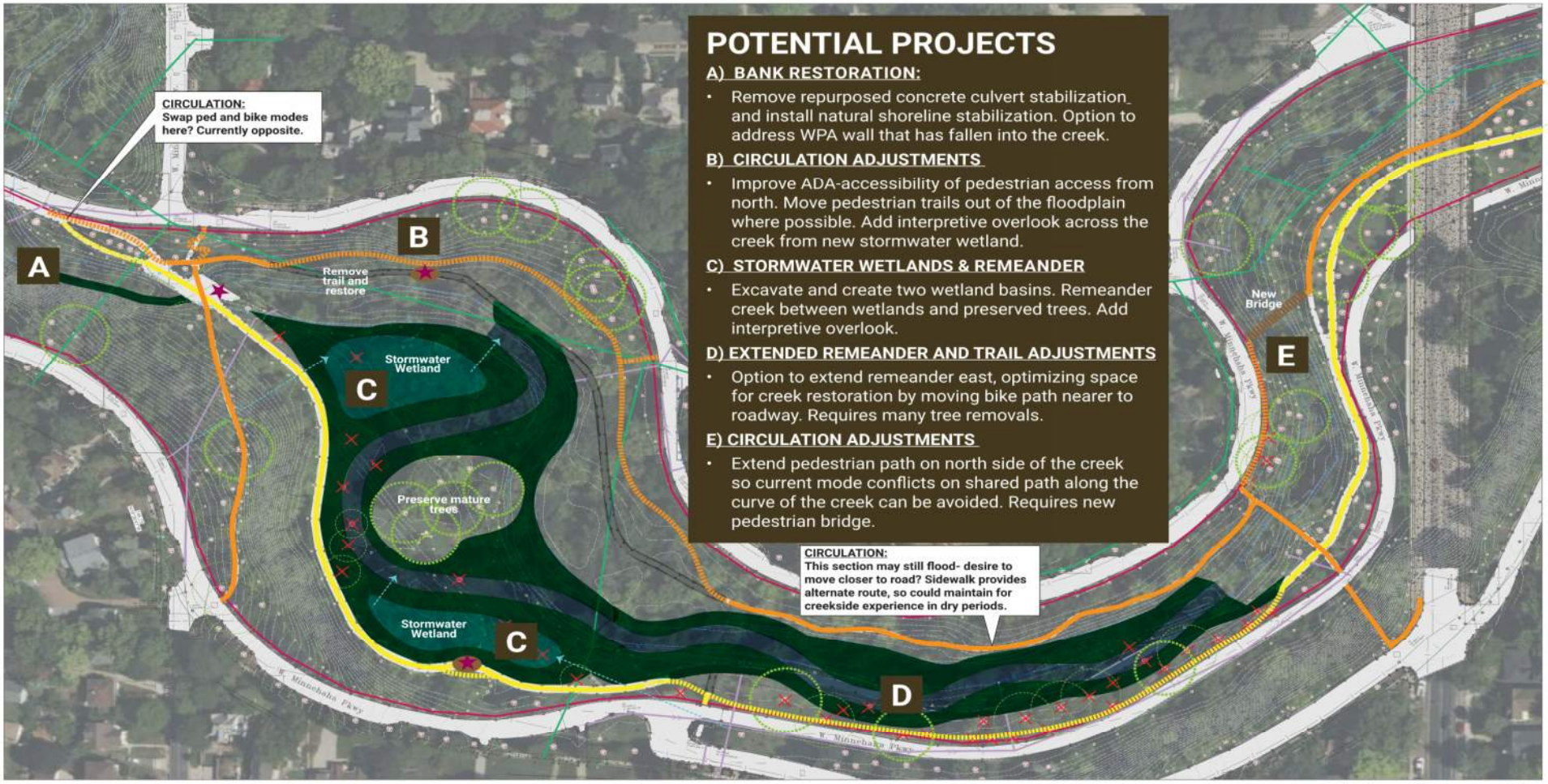
Existing/Proposed Ped Trail (paved)
Existing/Proposed Ped Trail (natural surface)
Existing/Proposed Bike Trail
Significant Tree
Bank Restoration
Stormwater Feature
Riparian Restoration
Recreation Features
Sanitary Sewer
Stormwater

DRAFT
NOVEMBER 2024

Cedar Ave

	Primary Criteria			
Concept Name	Alternative	Capital Cost (Excludes Trails and Landscape Architecture Components)	Water Quality Impact (lb TP/yr)	O&M Burden (1=low, 3=high)
Option 1 - Smaller Basin w/ grit chamber	1	$1.0M	38-45	2
Option 2 - Larger Basin w/ boardwalk	2	$2.2M	63-71	2
Option 3 - Larger Basin w/ trail	3	$1.4M	63-71	2





QUESTIONS: *Interest in addressing WPA wall as part of project "A"? Is extended remeander (D) worth the tree removals? Appetite to take on additional Nicollet Hollow recreation amenities (paddle launch, parking bumpout, restroom, bouldering) if coordination with NIcollet Ave bridge repairs is timely?*

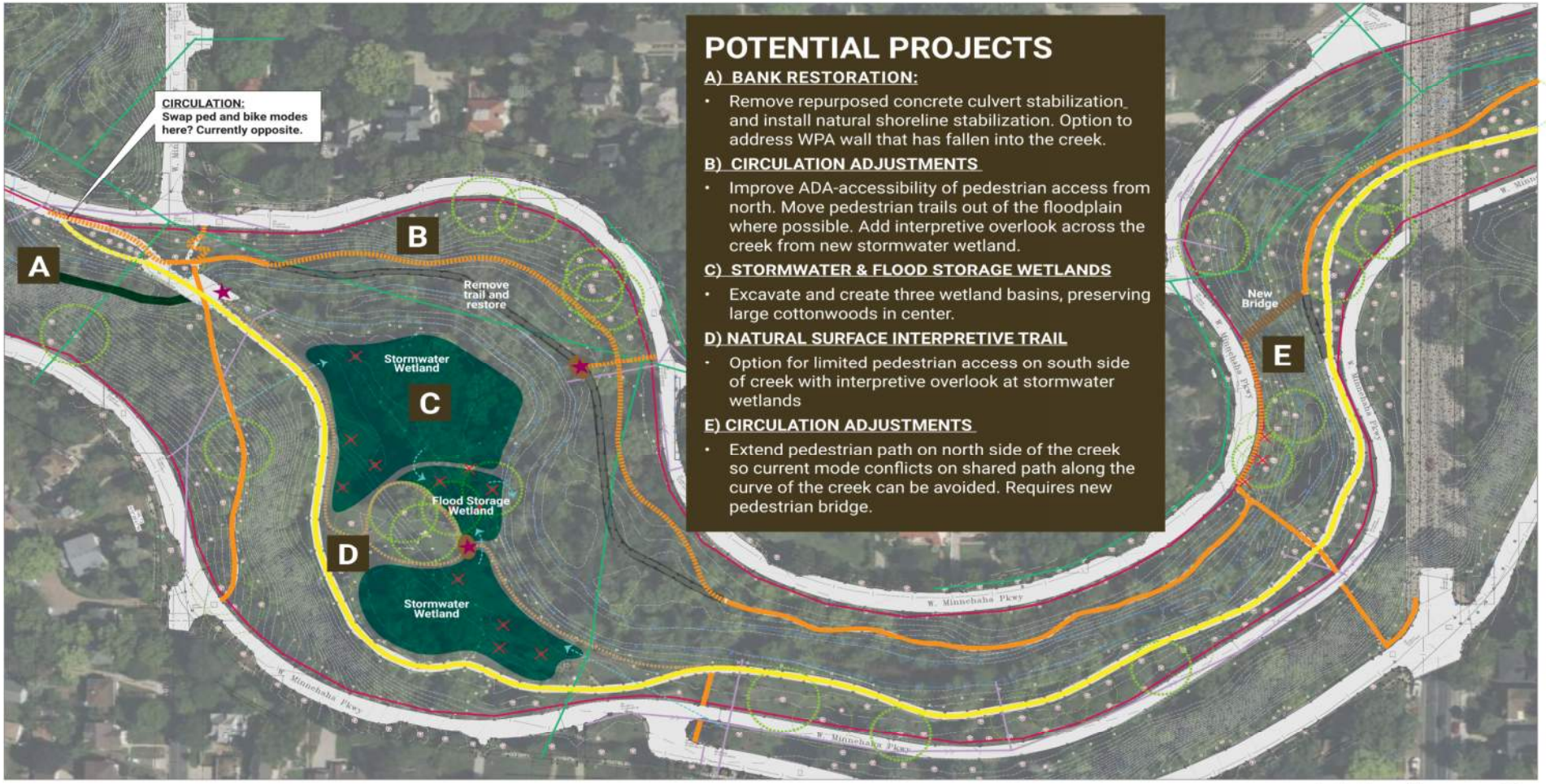
0 25' 50' 100'
SCALE: 1" = 50'-0"

NORTH

NICOLLET HOLLOW OPTION 1

Existing/Proposed Ped Trail (paved)
Existing/Proposed Ped Trail (natural surface)
Existing/Proposed Bike Trail
Significant Tree
Bank Restoration
Stormwater Feature
Bridge
Recreation Features
Sanitary Sewer
Stormwater
Electrical

DRAFT
NOVEMBER 2024



QUESTIONS: *Add natural surface trail on south side of creek for up close stormwater wetland interpretation to this option? If so, desired surface? Should ped trail on the south side of the creek be extended to the bridge? Interest in addressing WPA wall as part of project "A"?*

0 25' 50' 100'
SCALE: 1" = 50'-0"
NORTH

NICOLLET HOLLOW OPTION 2

Existing/Proposed Ped Trail (paved)
Existing/Proposed Ped Trail (natural surface)
Existing/Proposed Bike Trail
Significant Tree
Bank Restoration
Stormwater Feature
Bridge
Recreation Features
Sanitary Sewer
Stormwater
Electrical

DRAFT
NOVEMBER 2024

Nicollet Hollow

	Primary Criteria			
Concept Name	Alternative	Capital Costs (Excludes Trails and Landscape Architecture Components)	Water Quality Impact (lb TP/yr)	O&M Burden (1=low, 3=high)
Option 1: Stormwater Wetlands w/ remeander	1	$2.4M	20-28	2
Option 2: Stormwater & Flood Storage Wetlands	2	$1.7M	41-49	2

Operations & Maintenance

Wet Ponds

- Visual inspections **(City)**
    - Embankments
    - Vegetative
    - Inlets / outlets
- Vegetative buffer maintenance & mowing **(MPRB)**
- Remove sediment, debris, trash from pretreatment **(City)**
- Remove accumulated sediment (2-7 years or when 50% full) **(City)**
- Debris & trash removal **(City)**

Underground Filtration

- Visual inspections **(City)**
    - Filtration effectiveness / standing water, drawdown rate
    - Scour / short circuiting
    - Inlets / outlets
- Remove sediment, debris, trash from pretreatment **(City)**
- Jet system to remove sediment **(City)**
    - Maintenance drawdown mechanism
- Replacement of filter media (top layer 3-5 years, full 5-10 years) **(City)**

Tiered Ponds

- Visual inspections **(City)**
    - Embankments
    - Vegetative
    - Inlets / outlets
    - Trails and retaining walls
- Vegetative buffer maintenance & mowing **(MPRB)**
- Remove sediment, debris, trash from pretreatment **(City)**
- Remove accumulated sediment (2-7 years or when 50% full) **(City)**
- Debris & trash removal **(City)**

Operations & Maintenance

Trails

- Widths and turn radii for plowing and maintenance (**MPRB**)
- Surface management (**MPRB**)

Streambank Restoration

- Vegetation establishment & maintenance (3-yr) (**Contractor**)
- Vegetative buffer maintenance **(MPRB)**

Streambank Remeander

- Vegetation establishment & maintenance (3-yr) (**Contractor**)
- Inspections (**Contractor)**
- Vegetative buffer maintenance **(MPRB)**

Oak Savanna

- Low intensity prescribed burns coordinated with herbicide applications (3-5 years) **(MPRB)**
- Inspect for oak-wilt disease (annually) **(MPRB)**
- Mow to control woody invasives (annually) **(MPRB)**

Boardwalks

- Winter plowing **(MPRB)**
- Surface management (i.e. inspection, cleaning) **(MPRB)**

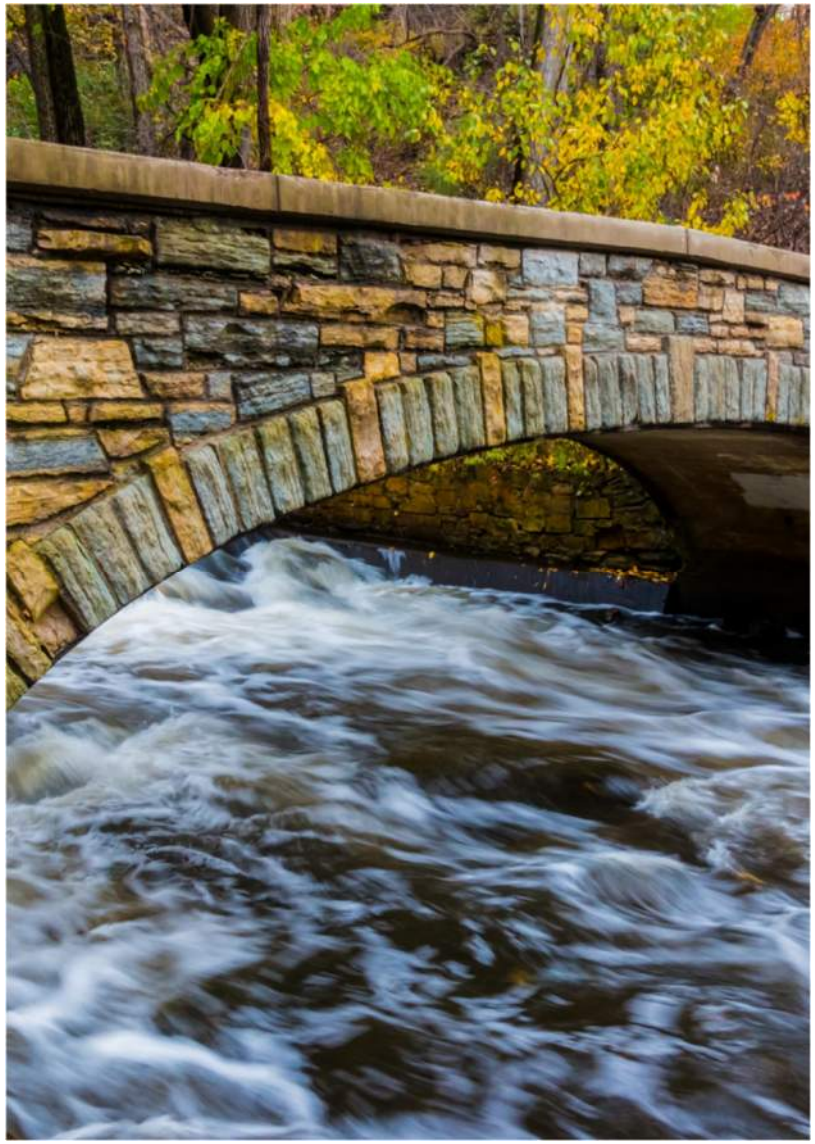
Grit Chamber

- Inspections **(City)**
- Vac-truck to clean (annually) **(City)**

Permitting

- No-rise
- DNR – Public Water
- WCA
- Cultural Resources
- MCWD
    - Floodplain Alteration
    - Erosion Control
    - Stormwater Management
    - Streambank Stabilization
    - Wetland Protection
- MPRB
- City of Minneapolis
    - Streets, SWS
- MCES (Penn-Newton, Cedar)

- DNR & USFWS - T&E
    - Rusty Patched Bumble Bee (all)
    - Pugnose Shiner (all)
    - Lake Sturgeon (Penn-Newton)
    - Least Darter (Penn Newton, Cedar-Bloomington)
    - Forster's Tern (all)
    - Blanding's Turtle (Nicollet)
    - Tricolored Bat (Nicollet)



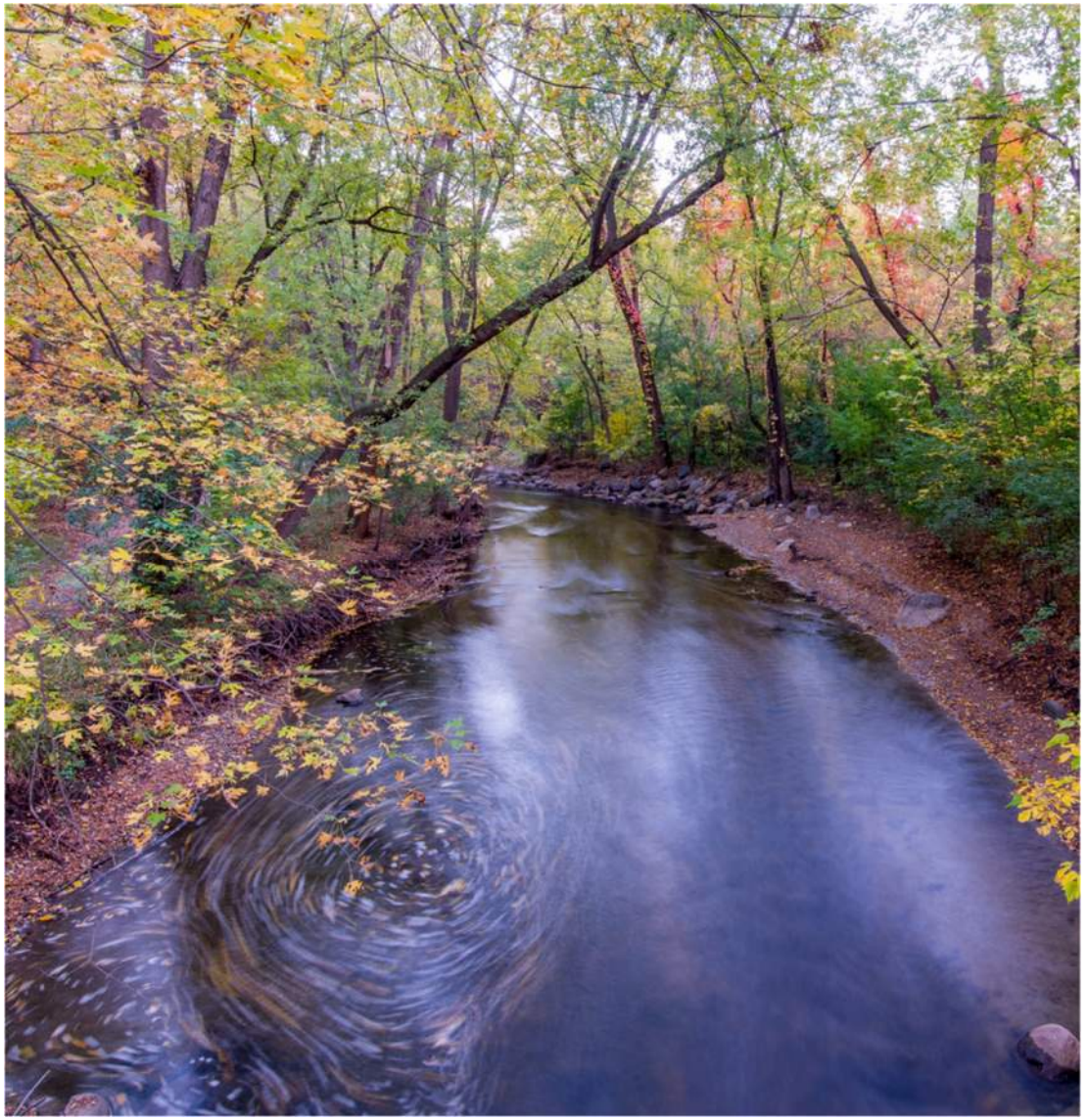
Next Steps

- Summarize feedback collected today and seek confirmation
- Finalize decision matrix
- Refine preferred solutions and incorporate any new alternatives for preferred solutions
    - Complete detailed infrastructure analysis
    - Complete detailed modeling
    - Develop wholistic cost estimates
- Develop phasing plan

Stantec

Wrap up/Comments

GOAL ALIGNMENT AND ALTERNATIVES



Agenda

Parkway Feasibility Study Phase 1 | Alternatives Workshop 2

Location: **MPRB Office**
Date: **December 18, 2024**
Attendees: **MCWD (Gabe Sherman, Michael Hayman, James Wisker, Rachel Baker, Sam Hoppe)**
City of Minneapolis (Liz Stout, Rose Stenglein)
MPRB (Rachael Crabb, Michael Schroeder, Deb Pilger, Adam Arvidson, Cliff Swenson)
Stantec (Rena Weis, Nick Wyers)
Inter-Fluve (Maren Hansell, Adam Weis)
HKGI (Sarah Evenson, Bryan Harjes)

3:00-3:05 | Introductions

3:05-3:15 | Review 1st Workshop Feedback

Overall

- Several Operations & Maintenance (O&M) concerns were raised, including, but not limited to questions and concerns around mowing, trail management, controlled burning, stormwater facility maintenance, native vegetation management, and boardwalk maintenance. Group did not spend time discussing O&M logistics or costs during this meeting, such as to focus on technical feasibility findings.
- Feedback received to-date indicates that flooding at the sites may be driven by ice jams in Minnehaha Creek (Creek).

Penn-Newton

- Feedback indicates there is interest in providing ADA access from Penn Ave down to the park area, if feasible.

Cedar

- Separation of the combined sewer (CSO) is a priority for the City.
- The Field Regina Northrop Neighborhood Group (FRNNG) hosts an annual rubber duck race on the Creek and may use the space at Cedar for gathering.
- MPRB requested that a concept schematic be included showing what a bike tunnel could look like.

- Information provided by the City indicates the grit chamber in the green space is functioning.
- Group consensus that it is acceptable to undo previously implemented bank work to further improve the integrity and quality of the bank restoration.

Nicollet

- The Nicollet Ave bridge rehab project is ongoing.

3:15-4:05 | Review Alternatives and Decision Matrix

Penn & Newton

- Design team revised graphic to show multi-celled stormwater basin to leave cover and land access over sanitary pipe.
- Added alternative such that one cell of the multi-celled stormwater basin is a wet settling basin and one cell is a filtration basin.
- Confirmed that ADA accessible trail down to park area from Penn is feasible if desired.
    - Discussion highlighted that since there is a lack of ADA accessibility on the walking paths in the park area, it likely does not make sense to provide ADA access down to the park. The overlooks (future along Penn) would provide viewing access for those who need ADA accommodations to experience parks. The use of stairs would indicate to users that the rest of the system is not ADA accessible. Stairs are potentially a temporary option. Alternatively, the trails in the park could be revised to be ADA accessible.
- Added a check dam alternative off of Newton to replace the failing concrete flume, in addition to the previously developed tiered pools alternative.
- Added recommendation to add a grit chamber upstream of whatever feature (tiered pools or check dams) is implemented off of Newton.
- Added a project alternative to stabilize the Creek bank north of the main project area, where the bank is actively eroding and the Creek is moving. It was noted that it's important to not move the creek such that the sledding hill is impacted. Natural surface trail (desire trail) would be impacted, but a new one would likely eventually be established. There is an option to incorporate more formal trails.
- From the Master Plan efforts, it was noted that users enjoyed the Penn Forest area as it is, like the savanna.
- Penn basin could capture and treat runoff from approximately 8.5 acres. Newton feature could capture and treat runoff from approximately 14.5 acres. This results in limited water quality benefit potential.

Cedar

- Design team revised graphics to show cover and land access over existing sanitary pipes. As shown currently, this results in straight lines, which could be naturalized with curvature as design is advanced.
- Updated Schematic Designs show a concept for what a bike tunnel under Cedar Avenue could look like.
    - Implementation of a bike tunnel under Cedar would require a vertical barrier and pump.

    - MPRB shared that recent intersection enhancements have been effective, so preserving space for a bike tunnel is becoming less of a priority and noted that it is probably better to increase other aspects of the project.
    - If implemented, the goal would be to have the tunnel closer to the intersection, not by the creek, to reduce the distance users have to travel away from intersection to safely cross.
- MPRB would rather focus on trying to remove impervious surface of the Parkway frontage road, which could entail reconfiguration of storm drains and catch basins.
- City indicated that addressing the CSO is a high priority; the City has addressed 95-97 percent of CSOs and have a goal of addressing as related projects are designed.
    - Discussed the need for additional information to better understand the feasibility of separating the CSO.
- The FRNNG hosts an annual rubber duck race and uses this site for the event. Would be good to think about how the project design could accommodate this event, but any design components should be universal enough that the space is useful the rest of the year and if the duck race event does not continue indefinitely. General lack of interest in incorporating design elements solely for the purpose of enhancing the user experience at the duck race.
    - Discussed that access to the Creek could be improved to make it easier for removal of rubber ducks from the race. MPRB noted that 2022 data indicates roughly 2,000 visitors annually.
- Option A of the Schematic Designs shows the user circulation as-is today, near the Creek. Option B of the Schematic Designs shows a boardwalk, and relocation of the user circulation components further from the Creek, which would improve user experience during periods of high water.
- The existing “meander scar” is actually a remnant of when the Creek was channelized, and its current alignment was purposefully re-meandered several decades ago. Not necessarily a natural channel migration relic. Consider incorporating this story into educational signage.
- Most recent info from the City indicates that the grit chamber at this site is functioning, and that no relocation is needed. Relocating it to the north would not necessarily improve the inundation conditions, and would likely reduce the drainage area it is treating.
- Desktop review indicates that there may be a wetland on the east portion of the site near Cedar. Construction of a basin in this area would be more permittable if wetland plantings are incorporated, such that wetland function is maintained or enhanced.

Nicollet Hollow

- Design team gained revised knowledge of storm sewer routing and depths and determined that capture of the 36-inch storm sewer that runs north through an alley from Diamond Lake Road is not feasible due to the depth of the existing storm sewer and it being inundated under typical conditions.
    - This makes it infeasible to capture flows through that pipe via gravity, so design team has recommended addition of a grit chamber here.
- There is lack of clarity around the flow direction at the intersection of Diamond Lake Road and Pleasant Avenue. Some data sources indicate that low flows are routed north along Pleasant Ave, while other data sources indicate that low flows are routed east along Diamond Lake Rd.
    - The City has since completed field investigation to confirm that there is a weir in the storm sewer structure at this intersection which routes low flows north along Pleasant Avenue and makes it feasible to capture the majority of that drainage area via gravity flow. This

means that ~107 acres of drainage area can be captured via gravity for water quality treatment.
    - Further analysis should be completed to see if grid flooding is an issue in the area and if any future improvement could help alleviate it.
- Option A, which includes remeander of the Creek, would likely require a LOMR, ESA, and may require mitigation of impacts to pugnose shiners. Even without the remeander component, all work will be within the regulatory floodway, which will require floodplain management coordination and consideration of no-rise implications.
- Group agrees to avoid impact to the WPA wall near this site.
- The group discussed that recreational development at this site and the work at Nicollet Ave bridge (2026 project) present unique options.
    - If included, a restroom at this site would be a temporary/portable facility, not a plumbed restroom.
    - Access to this area for Tangletown neighborhood residents is a major priority, since they are otherwise in a playground-scarce area. The location where the schematic drawings currently show the bridge is not optimal. Preferred location would be at Belmont and Valley View. Would like to see costs for both options, based on associated tree impacts.
    - Discussion about creative pedestrian bridge opportunities – consider suspending a pedestrian bridge from the Nicollet Avenue bridge to prevent adding another Creek Crossing and enhance the recreational experience. Also discussed that the Master Plan shows bouldering at this bridge. This work could be isolated from the rest of the project. The bridge project is likely only repairs and aesthetics, not full replacement. It is likely a historic landmark restoration project. MPRB has a meeting with the City in Jan/Feb and can get additional information.
- Discussion about whether the 36-inch outlet has scour on the other side of the Creek and if stabilization should be included at that location; design team to review.

4:05-4:15 | Phasing Plan

- Recognizing that quality, feasible projects exist at all three sites, a draft matrix was shared to demonstrate how various criteria may be used to inform which project(s) to advance first, and to convey an initial, draft opinion of how the three sites compare to each other for each category. Additional decision-making tools will continue to be developed and shared as the project progresses, and additional feedback will be sought and incorporated prior to making final recommendations. Subsequent feasibility studies may identify other projects that slot in before some that are included in the current feasibility study, but the goal is to start advancing projects that have a meaningful impact on water quality and implement the Master Plan.

    - Cedar is the strongest site in three of five reviewed categories, however the decision makers may decide that a single category takes preference over another, in terms of project phasing and sequencing. For example, if it is desired to advance a project as quickly as possible, the Penn site presents the least amount of project complexity / timeline hurdles, and could be advanced more quickly than the other sites.

- The group discussed that Nicollet should be ranked the highest of the three sites in terms of park amenities.

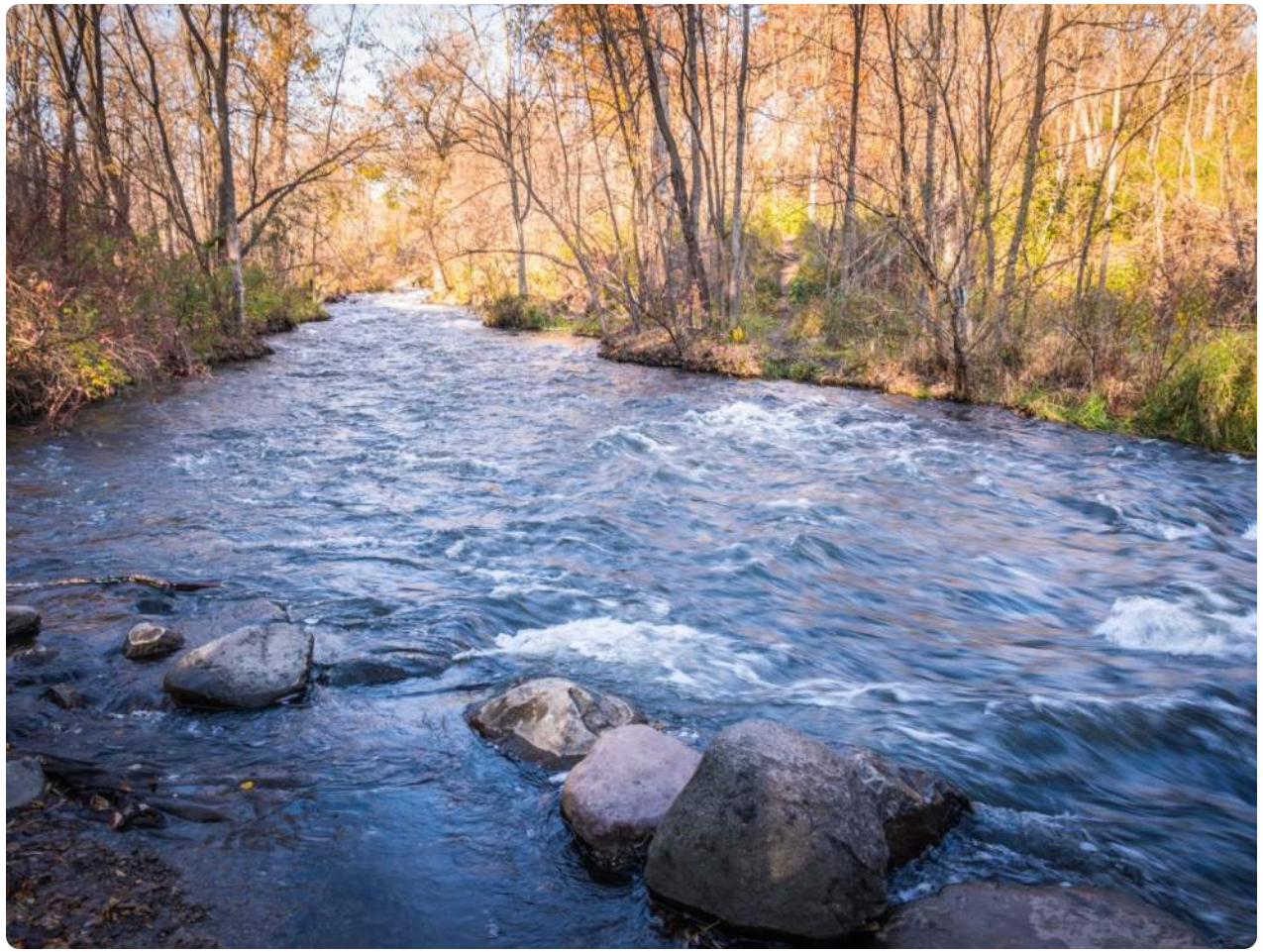
- MPRB expressed interest in considering the cost/benefit of impacts to park land for water quality features.
- MPRB does want to review O&M needs.
- Group discussed that costs can be evaluated in different ways. For example, a water quality cost-benefit figure could be based only on project components that are required to implement the water quality treatment device and exclude other project components.
- Group still has desire for a prioritization matrix to rank projects and criteria at a more granular scale, which the design team intends to do. May make sense to weight certain criteria.
- Group agreed that coordination with MCES will be necessary. Met Council may be willing to relocate sanitary sewer pipes. Determine whether Met Council is willing to have pipes under water features. Either way, there are technically feasible projects if the answer to both of those questions is “no.” The ability of having ponds not follow interceptors would also create a more aesthetic natural feel to the ponds. MCES contacts are Jeffrey Schwartz (Minneapolis Area Program Manager) and Adam Gordon.
- Group will need to consider whether now is the right time to advance the Nicollet project, since the bridge work is progressing.
- Should assess what needs to be corrected in a timely manner, such as failing infrastructure, bank erosion, and protection of existing infrastructure.
- Need to determine when/how the CSO separation would be reviewed for feasibility and designed.
- Group interest in whether more water quality treatment could be achieved if additional money is spent on capital and maintenance.

4:15-5:00 | Planning for Steering Committee and Next Steps

- City to determine flow directions at Diamond Lake Rd & Pleasant Ave (has since been completed).
- City and design team to discuss sewer data in relation to CSO separation.
- Design team to develop prioritization matrix that evaluates projects independently of each other.
- First “wave” of projects could be an RFP for 1 or 2 project(s) to focus on and gain momentum. Then, a separate RFP to advance feasibility for additional sites in the Master Plan.
- MPRB noted that this is an election year and expressed interest in starting a project soon to show action.

Stantec

Parkway Feasibility Phase 1: Alternatives Workshop #2



Agenda

1. Intros
2. Summary of Feedback
3. Review Alternatives
    1. Penn & Newton
    2. Cedar
    3. Nicollet Hollow
4. Phasing Plan
5. Steering Committee Planning
6. Wrap up questions

Feedback Summary

Overall:

- O&M Concerns – mowing, trail management, burning, stormwater BMP maintenance, native vegetation management, boardwalks, etc.
- Ice jams may drive flood concerns

Penn-Newton

- Interest in ADA access from Cedar

Cedar

- CSO separation is priority
- Duck races occur here annually
- Show concept of what bike tunnel could look like
- Grit chamber seems to be functioning
- Ok to undo previously implemented bank work to further improve

Nicollet

- Nicollet Ave bridge rehab project is ongoing

Key Areas

1. **Penn & Newton**
2. Cedar
3. Nicollet Hollow

PROJECTS

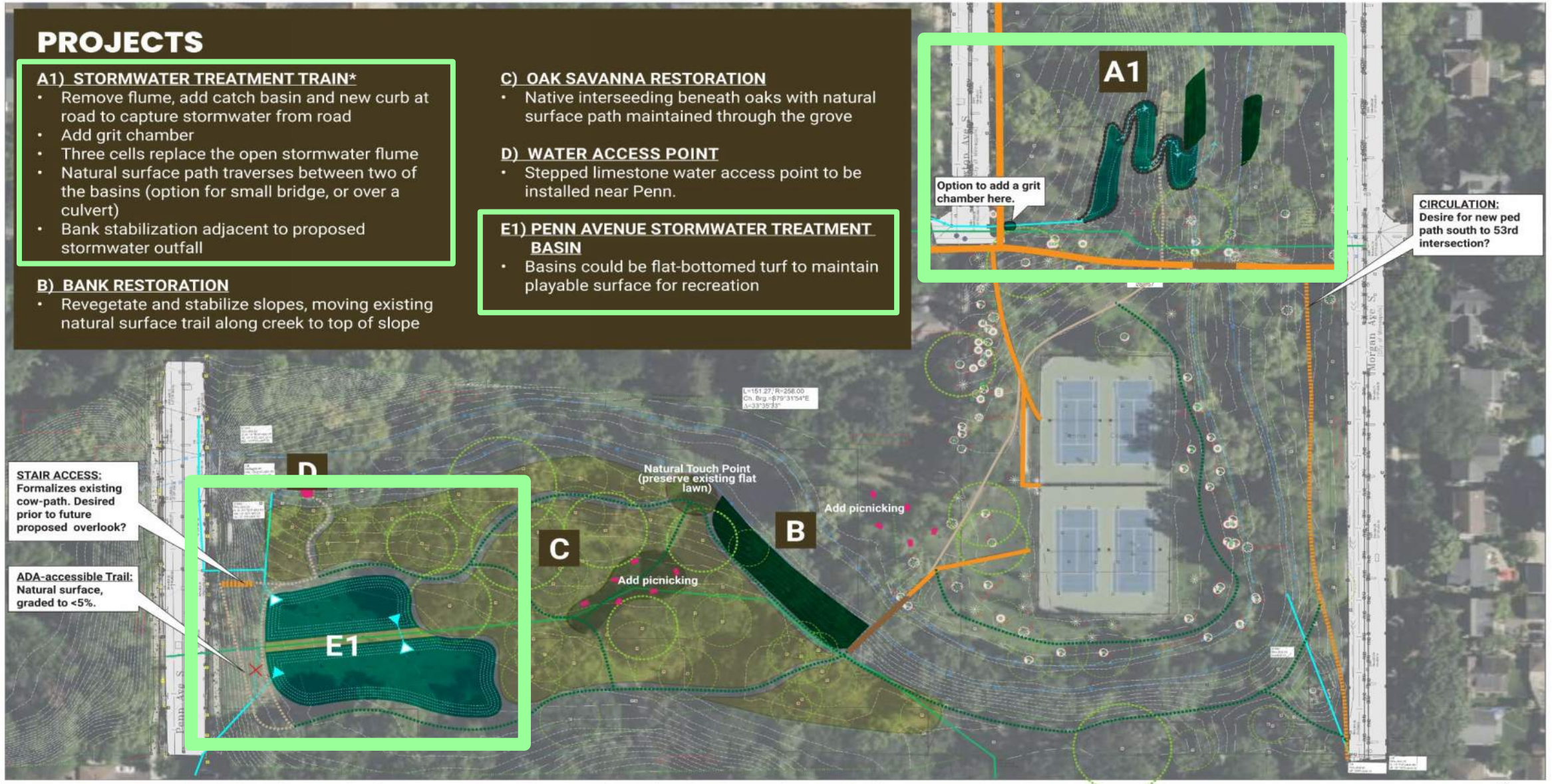
A1) STORMWATER TREATMENT TRAIN*
- Remove flume, add catch basin and new curb at road to capture stormwater from road
- Add grit chamber
- Three cells replace the open stormwater flume
- Natural surface path traverses between two of the basins (option for small bridge, or over a culvert)
- Bank stabilization adjacent to proposed stormwater outfall

B) BANK RESTORATION
- Revegetate and stabilize slopes, moving existing natural surface trail along creek to top of slope

C) OAK SAVANNA RESTORATION
- Native interseeding beneath oaks with natural surface path maintained through the grove

D) WATER ACCESS POINT
- Stepped limestone water access point to be installed near Penn.

E1) PENN AVENUE STORMWATER TREATMENT BASIN
- Basins could be flat-bottomed turf to maintain playable surface for recreation



Notes: *Mown trails until packed earth. Formalized access up/down hill to Penn desired at this phase? If so- crushed limestone paths with or without edger? Long-range plan had nature play components on north side of creek- desire to mock these up as part of this project?*

0 20' 40' 80'
SCALE: 1" = 40'-0"

NORTH

PENN–NEWTON–MORGAN (OPTION A)

Existing/Proposed Ped Trail (paved)
Existing/Proposed Ped Trail (natural surface)
Existing/Proposed Bike Trail
Significant Tree
Bank Restoration
Stormwater Feature
Savanna
Recreation Features
Sanitary Sewer
Stormwater

DRAFT
DECEMBER 2024

PROJECTS

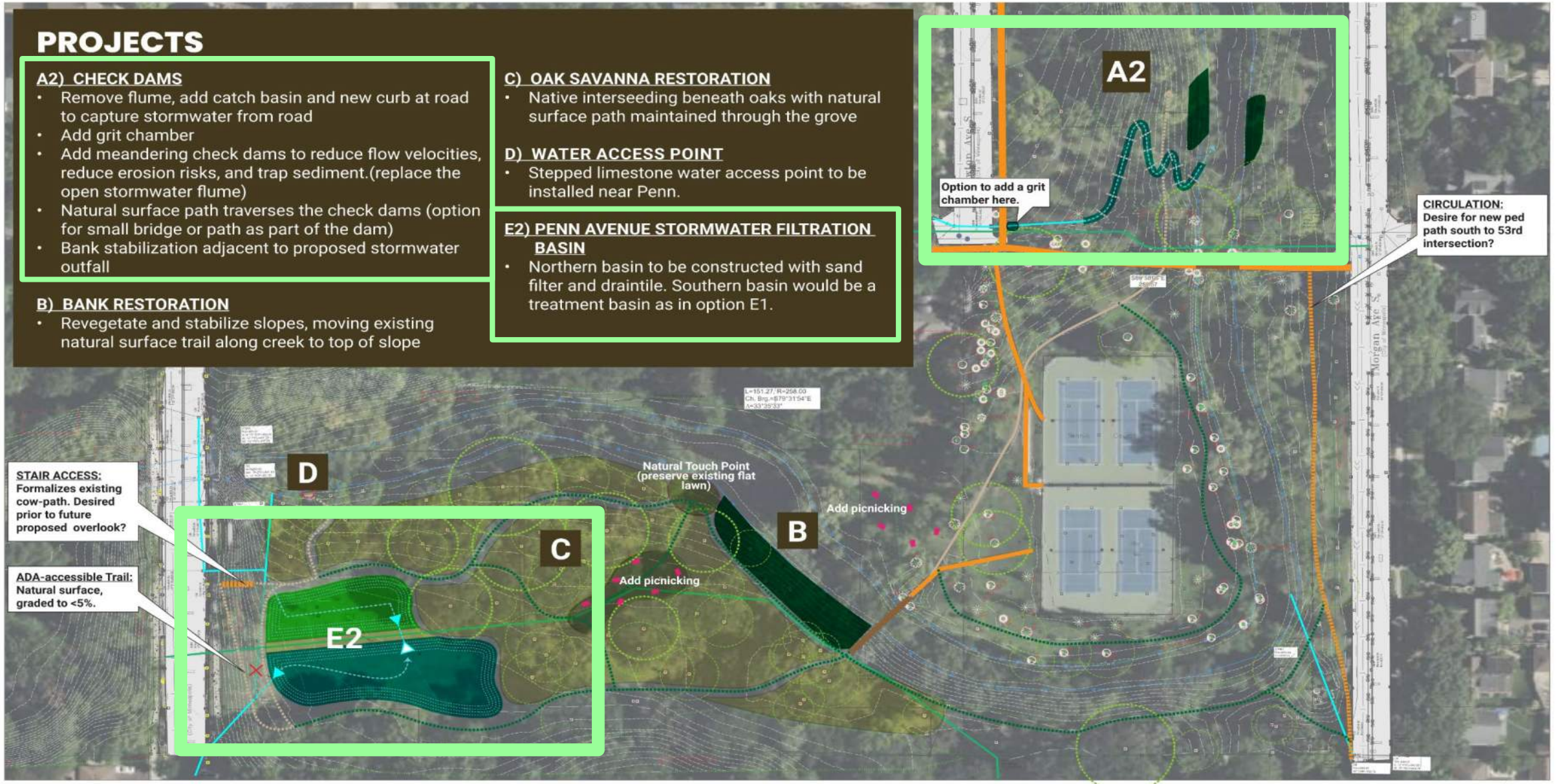
A2) CHECK DAMS
- Remove flume, add catch basin and new curb at road to capture stormwater from road
- Add grit chamber
- Add meandering check dams to reduce flow velocities, reduce erosion risks, and trap sediment.(replace the open stormwater flume)
- Natural surface path traverses the check dams (option for small bridge or path as part of the dam)
- Bank stabilization adjacent to proposed stormwater outfall

B) BANK RESTORATION
- Revegetate and stabilize slopes, moving existing natural surface trail along creek to top of slope

C) OAK SAVANNA RESTORATION
- Native interseeding beneath oaks with natural surface path maintained through the grove

D) WATER ACCESS POINT
- Stepped limestone water access point to be installed near Penn.

E2) PENN AVENUE STORMWATER FILTRATION BASIN
- Northern basin to be constructed with sand filter and draintile. Southern basin would be a treatment basin as in option E1.



Notes: *Mown trails until packed earth. Formalized access up/down hill to Penn desired at this phase? If so- crushed limestone paths with or without edger? Long-range plan had nature play components on north side of creek- desire to mock these up as part of this project?*

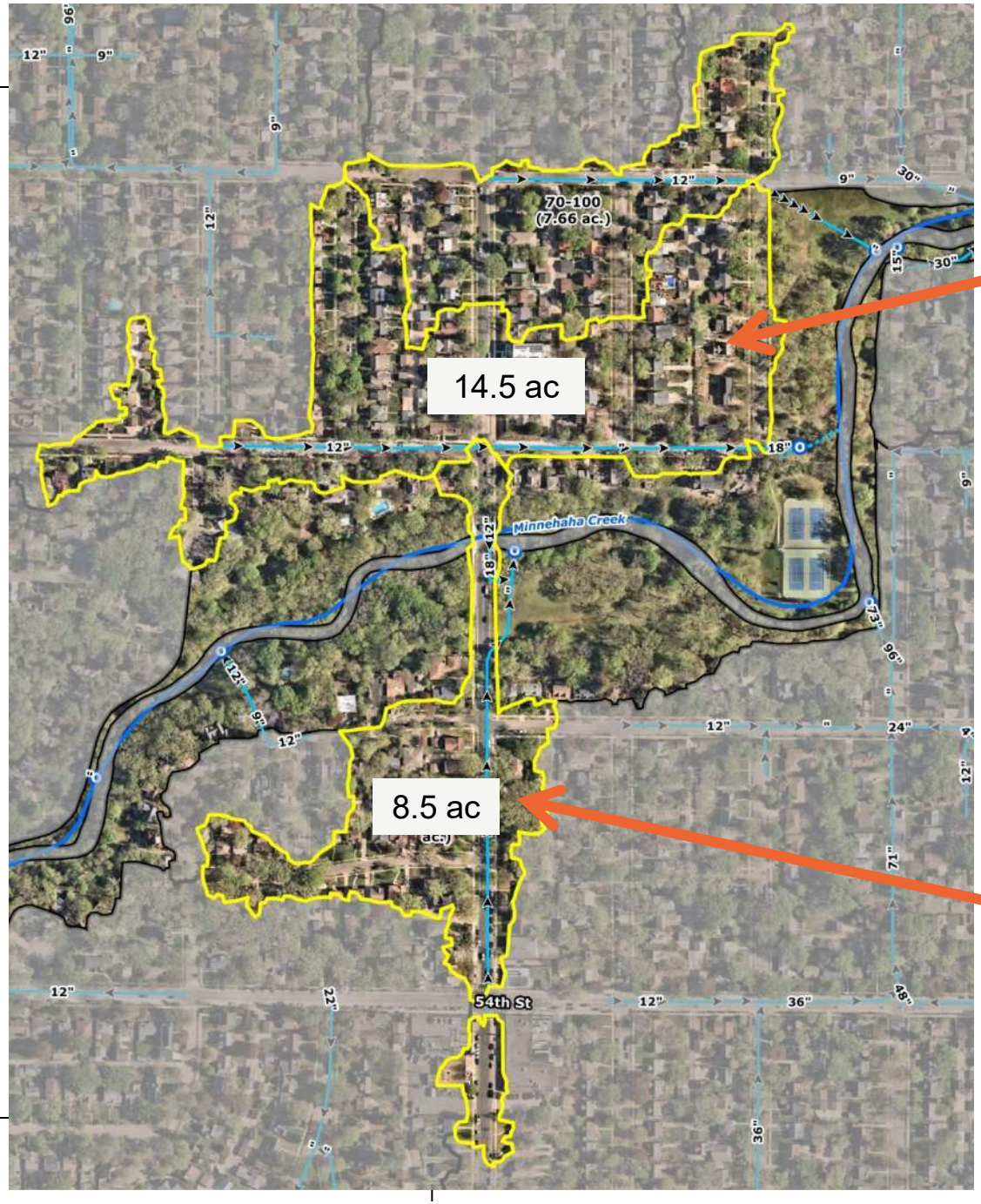
0 20' 40' 80'
SCALE: 1" = 40'-0"

NORTH

PENN-NEWTON-MORGAN (OPTION B)

Existing/Proposed Ped Trail (paved)
Existing/Proposed Ped Trail (natural surface)
Existing/Proposed Bike Trail
Significant Tree
Bank Restoration
Stormwater Feature
Savanna
Recreation Features
Sanitary Sewer
Stormwater

DRAFT
DECEMBER 2024



Drains to Newton tiered pools or check dams

Drains to Penn wet basin or filtration

Penn-Newton-Morgan

Concept Name	Capital Cost	Water Quality Impact (lb TP/yr removed)
Option A	$1,450,000	4-16
Option B	$1,530,000	4-13

PROJECTS

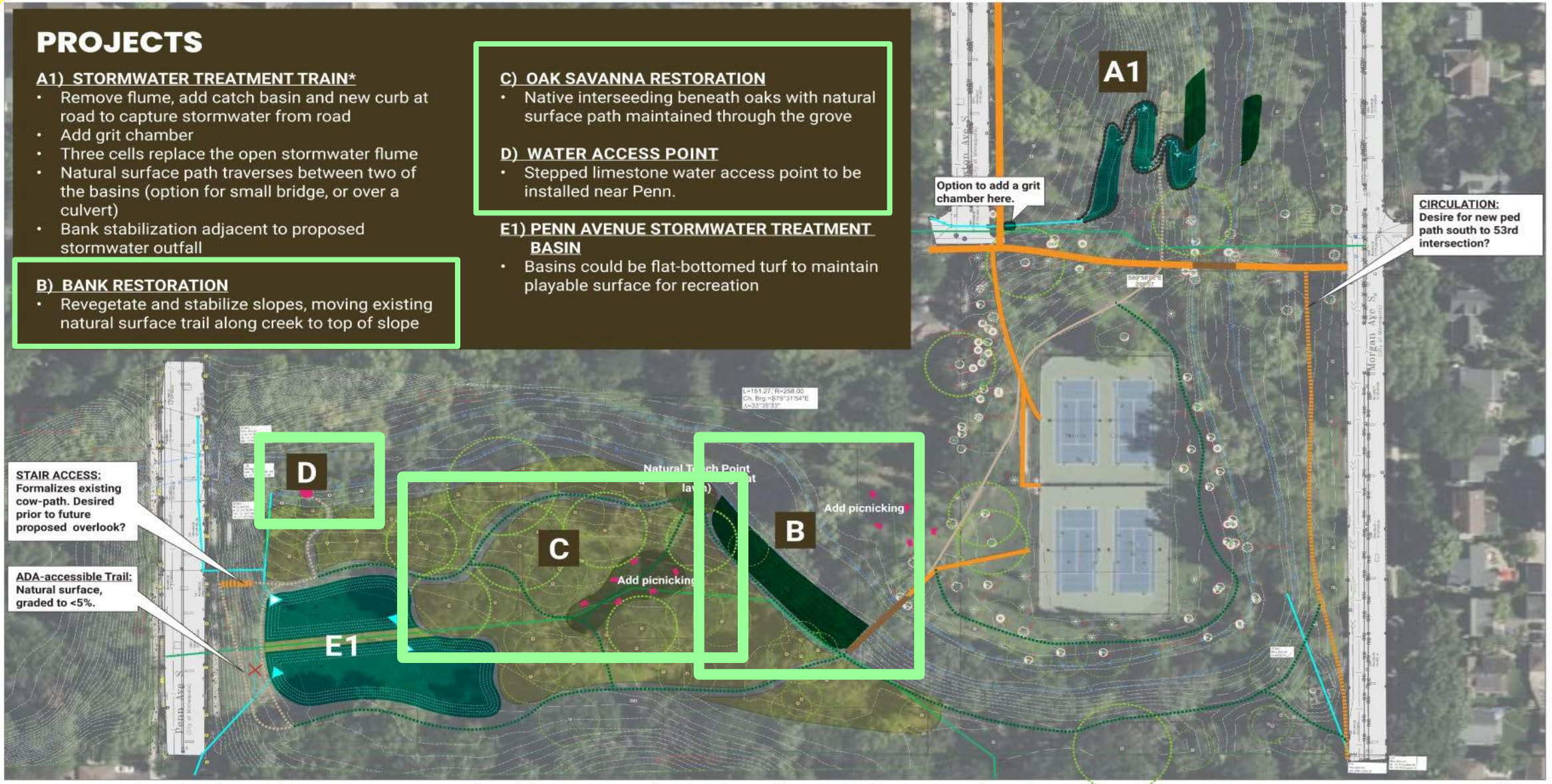
A1) STORMWATER TREATMENT TRAIN*
- Remove flume, add catch basin and new curb at road to capture stormwater from road
- Add grit chamber
- Three cells replace the open stormwater flume
- Natural surface path traverses between two of the basins (option for small bridge, or over a culvert)
- Bank stabilization adjacent to proposed stormwater outfall

B) BANK RESTORATION
- Revegetate and stabilize slopes, moving existing natural surface trail along creek to top of slope

C) OAK SAVANNA RESTORATION
- Native interseeding beneath oaks with natural surface path maintained through the grove

D) WATER ACCESS POINT
- Stepped limestone water access point to be installed near Penn.

E1) PENN AVENUE STORMWATER TREATMENT BASIN
- Basins could be flat-bottomed turf to maintain playable surface for recreation



Notes: *Mown trails until packed earth. Formalized access up/down hill to Penn desired at this phase? If so- crushed limestone paths with or without edger? Long-range plan had nature play components on north side of creek- desire to mock these up as part of this project?*

SCALE: 1" = 40'-0"

NORTH

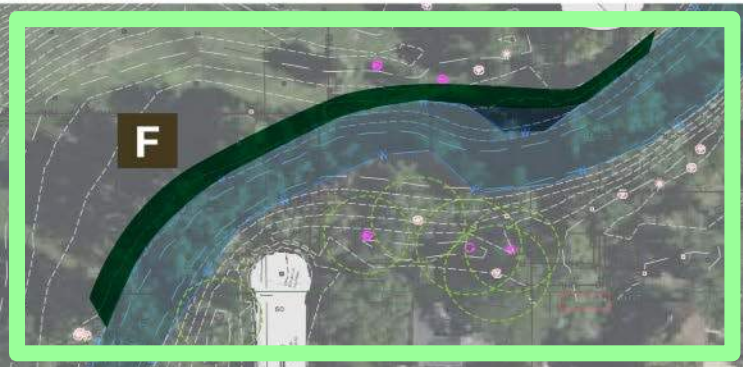
PENN-NEWTON-MORGAN (OPTION A)

Existing/Proposed Ped Trail (paved)
Existing/Proposed Ped Trail (natural surface)
Existing/Proposed Bike Trail
Significant Tree
Bank Restoration
Stormwater Feature
Savanna
Recreation Features
Sanitary Sewer
Stormwater

DRAFT
DECEMBER 2024

PROJECTS

F) BANK RESTORATION
Remove and reset the existing rip rap as part of a reshaped and stabilized bank. Informal natural surface trail along the top of slope may require minor adjustment.



PENN-NEWTON-MORGAN (NORTH)

Existing/Proposed Ped Trail (paved)
Existing/Proposed Ped Trail (natural surface)
Recreation Features
Significant Tree
Bank Restoration
Stormwater Feature
Sanitary Sewer
Stormwater

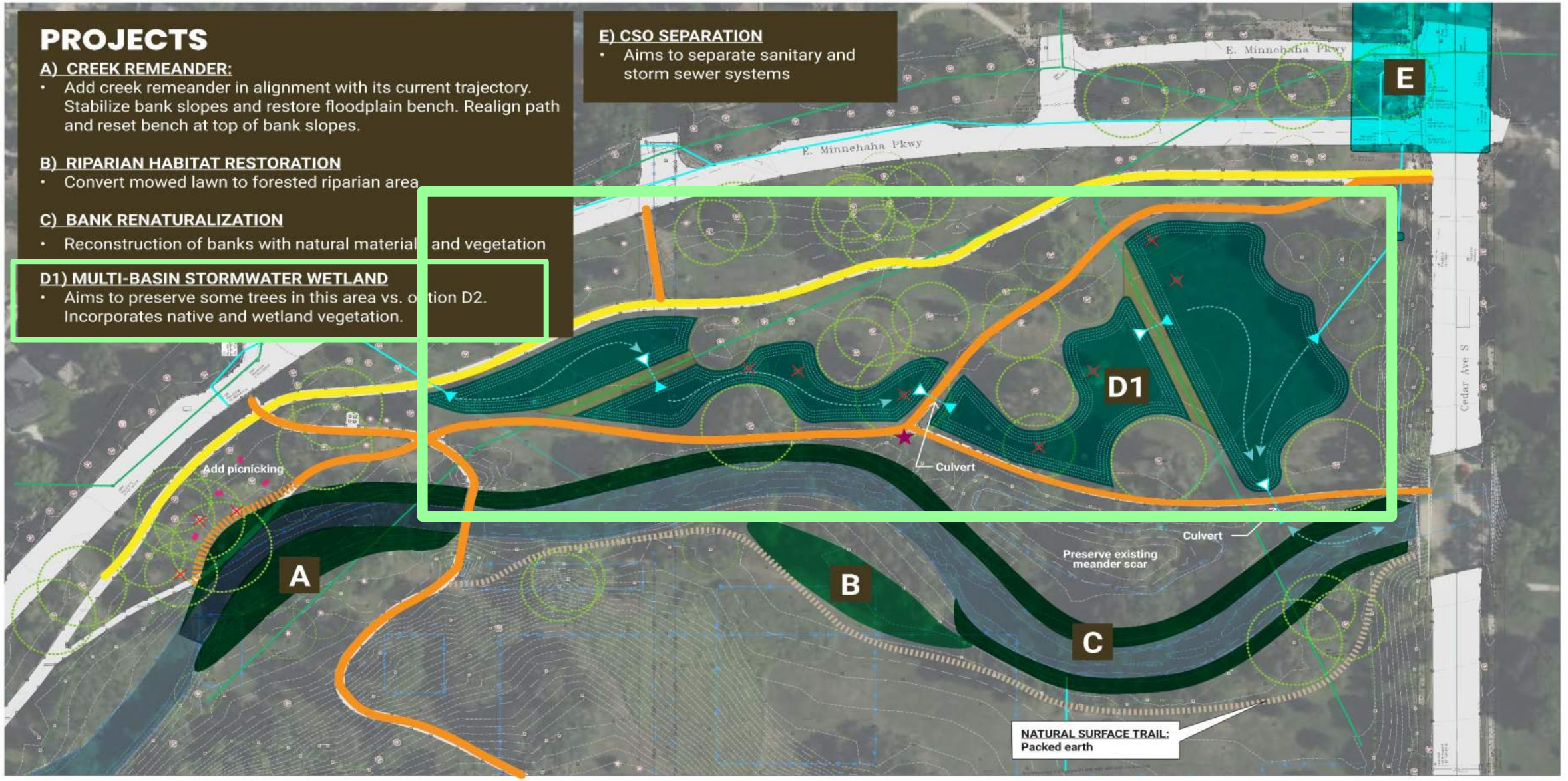
0 35' 70' 140'
SCALE: 1" = 70'-0"

NORTH

DRAFT
DECEMBER 2024

Key Areas

1. Penn & Newton
2. **Cedar**
3. Nicollet Hollow



QUESTIONS: *Where does gathering for the FRRN annual duck race take place in this concept? Could add tiered seating as part of project C (bank renaturalization) for easy viewing.*

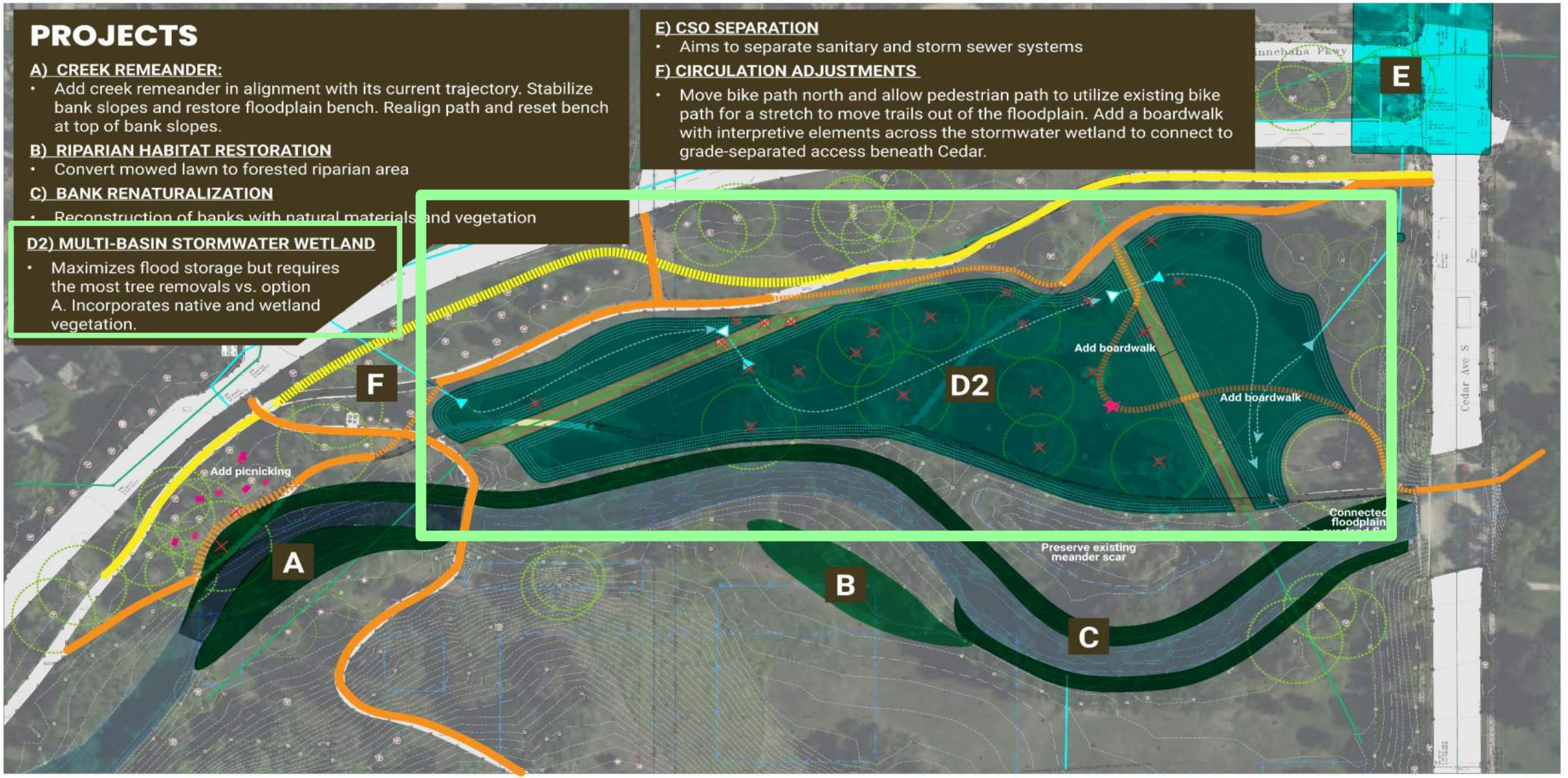
0 20' 40' 80'
SCALE: 1" = 40'-0"

NORTH

CEDAR AVENUE OPTION A

Existing/Proposed Ped Trail (paved)
Existing/Proposed Ped Trail (natural surface)
Existing/Proposed Bike Trail
Significant Tree
Bank Restoration
Stormwater Feature
Riparian Restoration
Recreation Features
Sanitary Sewer
Stormwater

DRAFT
DECEMBER 2024



QUESTIONS: *Add natural surface trail on south side of creek to this option? Where does gathering for the FRRN annual duck race take place in this concept? Could add tiered seating as part of project C (bank renaturalization) for easy viewing.*

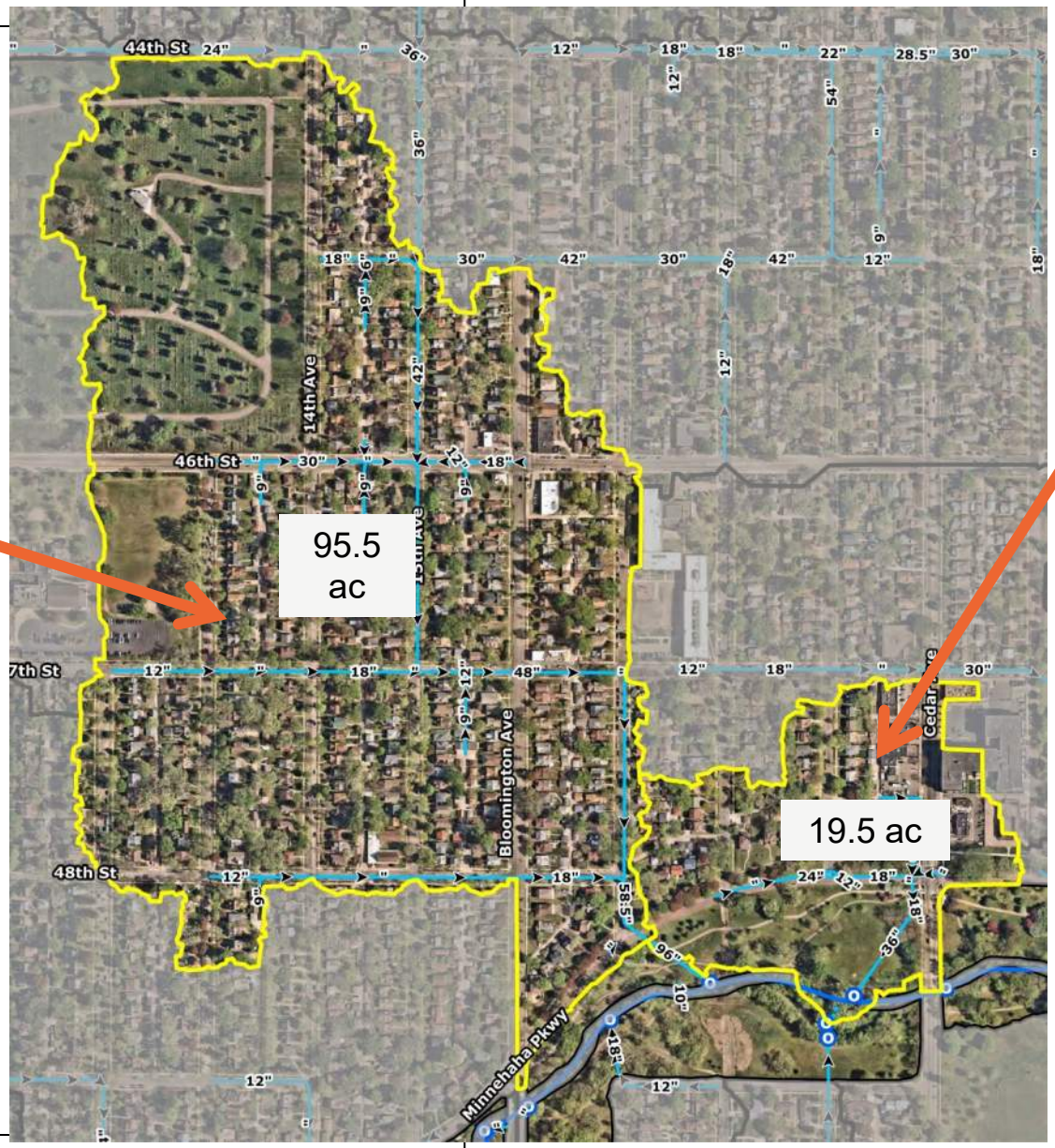
SCALE: 1" = 40'-0"

NORTH

CEDAR AVENUE OPTION B

Existing/Proposed Ped Trail (paved)
Existing/Proposed Ped Trail (natural surface)
Existing/Proposed Bike Trail
Significant Tree
Bank Restoration
Stormwater Feature
Riparian Restoration
Recreation Features
Sanitary Sewer
Stormwater

DRAFT
DECEMBER 2024


Drains to west cell
Drains to east cell; includes CSO
95.5 ac
19.5 ac
44th St
46th St
48th St
14th Ave
Bloomington Ave
Minnehaha Pkwy

Cedar

Concept Name	Capital Cost	Water Quality Impact (lb TP/yr removed)
Option A	$960,000*	20-35
Option B	$2,580,000*	30-40

*Costs do not include CSO separation

PROJECTS

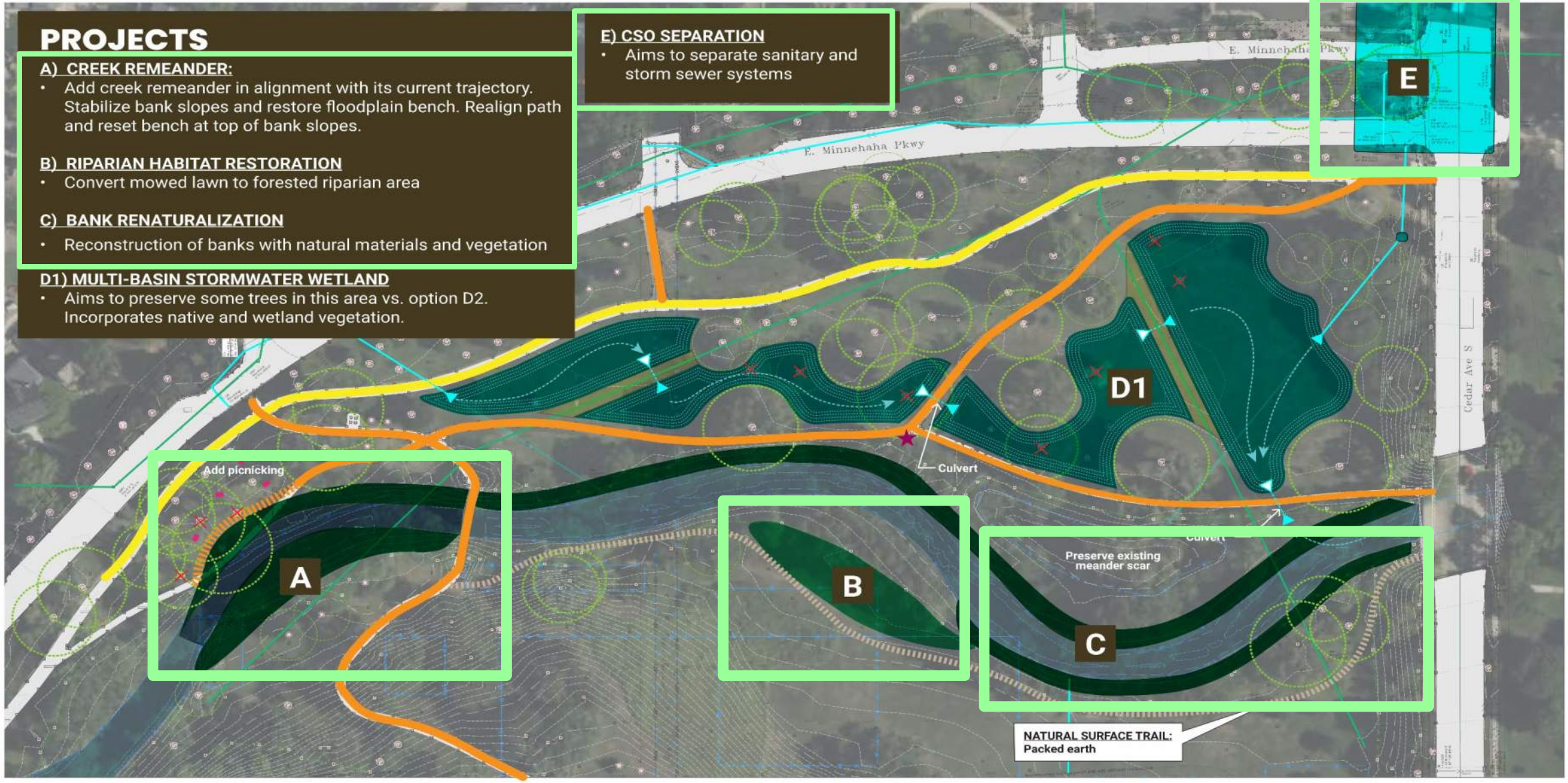
A) CREEK REMEANDER:
- Add creek remeander in alignment with its current trajectory. Stabilize bank slopes and restore floodplain bench. Realign path and reset bench at top of bank slopes.

B) RIPARIAN HABITAT RESTORATION
- Convert mowed lawn to forested riparian area

C) BANK RENATURALIZATION
- Reconstruction of banks with natural materials and vegetation

D1) MULTI-BASIN STORMWATER WETLAND
- Aims to preserve some trees in this area vs. option D2. Incorporates native and wetland vegetation.

E) CSO SEPARATION
- Aims to separate sanitary and storm sewer systems



QUESTIONS: *Where does gathering for the FRRN annual duck race take place in this concept? Could add tiered seating as part of project C (bank renaturalization) for easy viewing.*

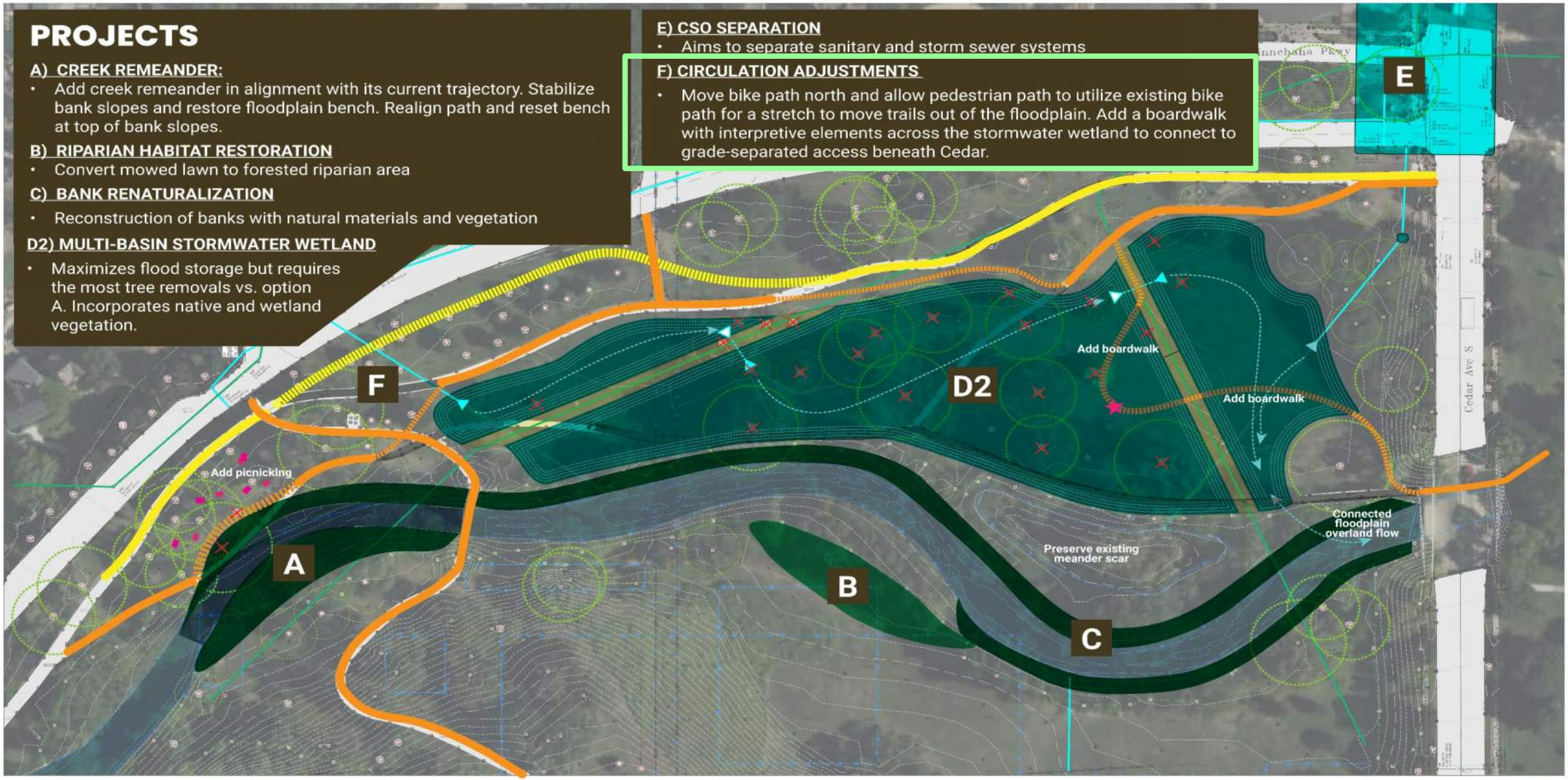
0 20' 40' 80'
SCALE: 1" = 40'-0"

NORTH

CEDAR AVENUE OPTION A

Existing/Proposed Ped Trail (paved)
Existing/Proposed Ped Trail (natural surface)
Existing/Proposed Bike Trail
Significant Tree
Bank Restoration
Stormwater Feature
Riparian Restoration
Recreation Features
Sanitary Sewer
Stormwater

DRAFT
DECEMBER 2024



QUESTIONS: *Add natural surface trail on south side of creek to this option? Where does gathering for the FRRN annual duck race take place in this concept? Could add tiered seating as part of project C (bank renaturalization) for easy viewing.*

0 20' 40' 80'
SCALE: 1" = 40'-0"

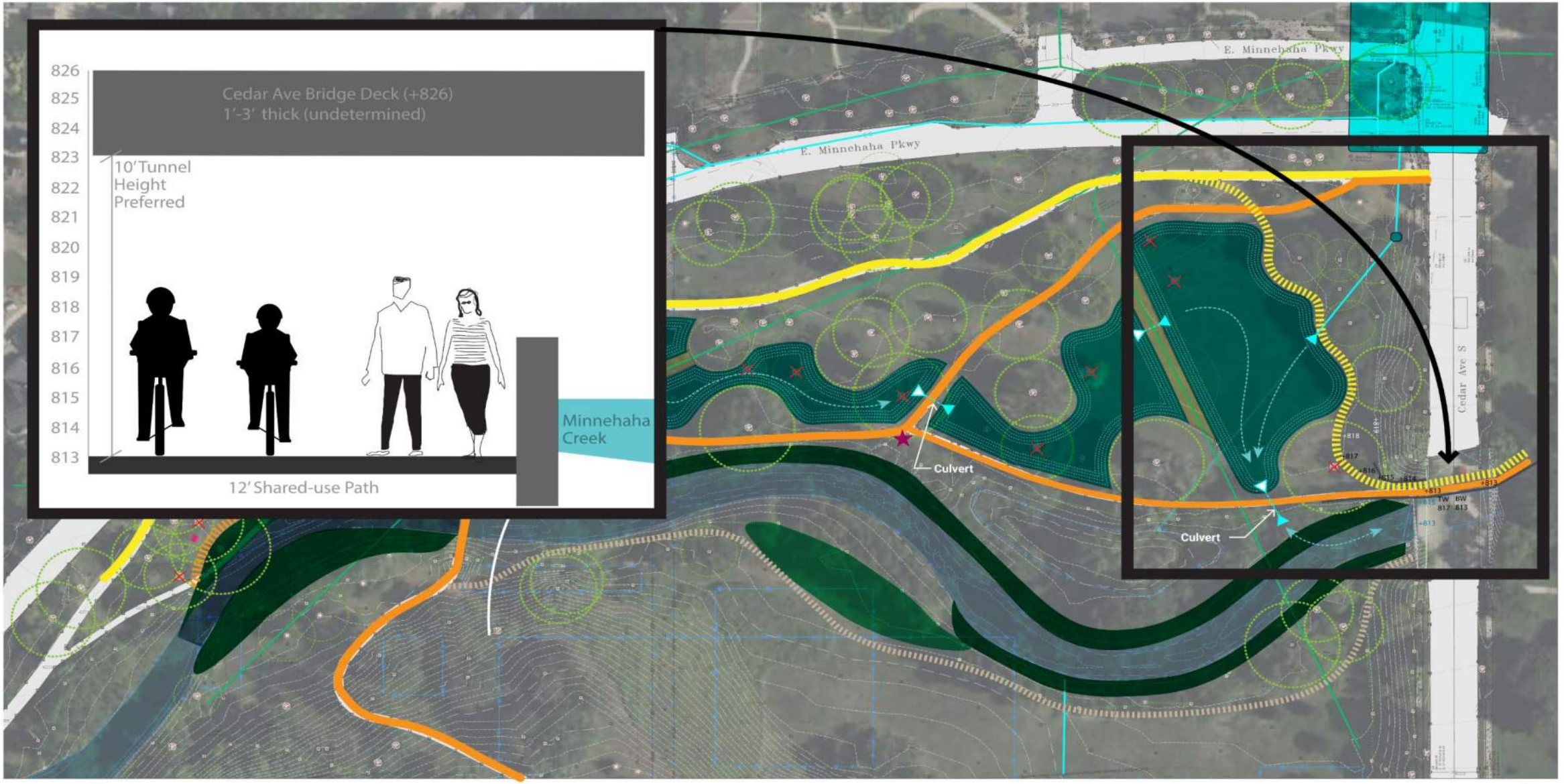
NORTH

CEDAR AVENUE OPTION B

Existing/Proposed Ped Trail (paved)
Existing/Proposed Ped Trail (natural surface)
Existing/Proposed Bike Trail
Significant Tree
Bank Restoration
Stormwater Feature
Riparian Restoration
Recreation Features
Sanitary Sewer
Stormwater

DRAFT
DECEMBER 2024

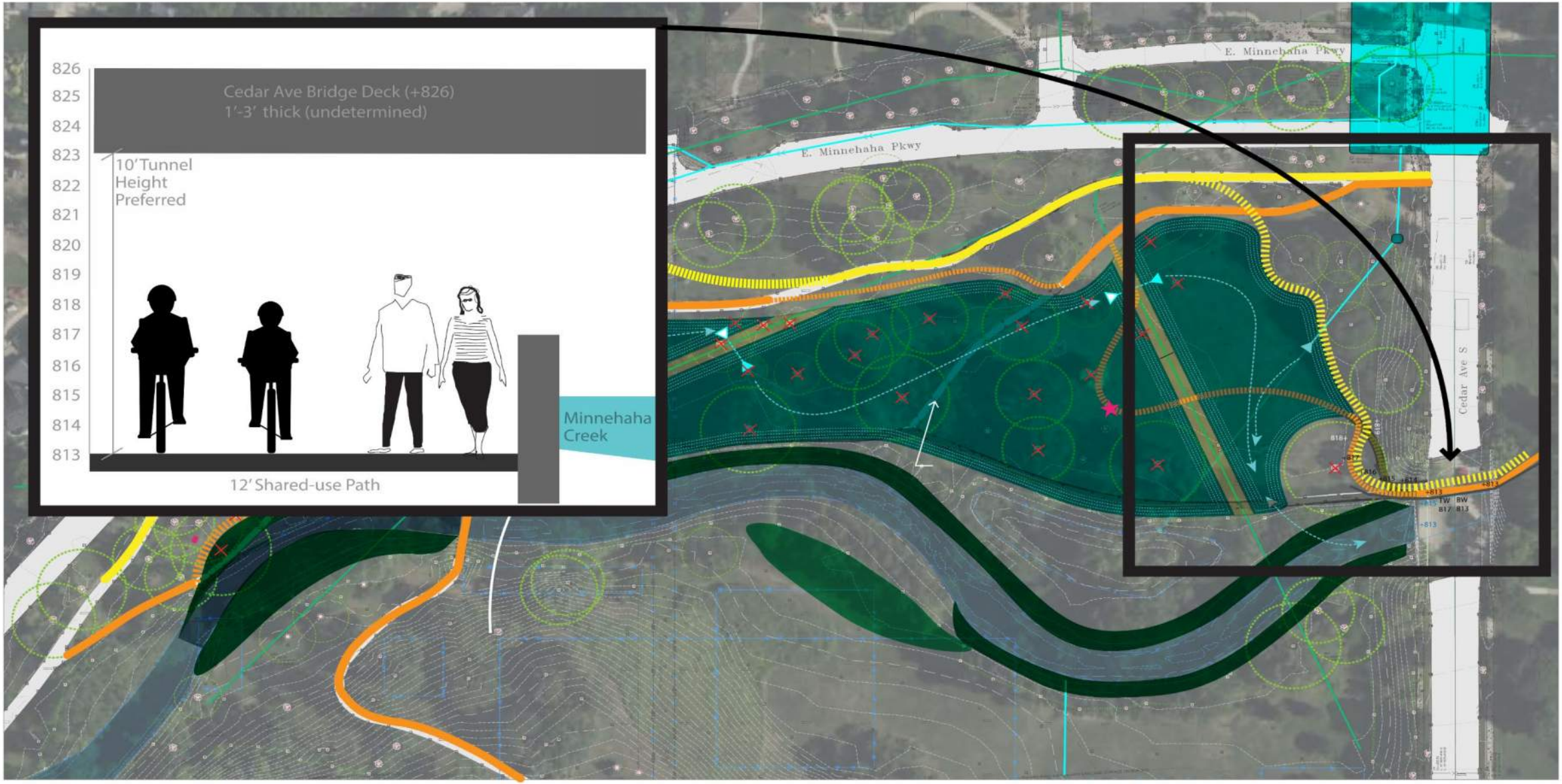

Rim Elv = 818.112
Inv Elv = 815.512
Rim Elv = 818.006
Inv Elv = 815.106
Rim Elv = 817.369
Inv Elv = 813.439
Invert is almost
the same as the outfall
Possible connection to
Storm system on
Minehaha parkway.
~~Grit Chamber does not function as intended.~~
~~Per survey in 2007.~~
Grit chamber appears to be functioning. It was just cleaned on 10/22/2024 - they removed 8 yards the previous time. But creek backflows into it making cleaning difficult on occasion.
Rim Elv = 818.141
Inv Elv = 813.990
Outfall Elv
813.074



OPTION A WITH SHARED-USE PATH TUNNEL

Existing/Proposed Ped Trail (paved)
Existing/Proposed Ped Trail (natural surface)
Existing/Proposed Bike Trail
Significant Tree
Bank Restoration
Stormwater Feature
Riparian Restoration
Recreation Features
Sanitary Sewer
Stormwater

DRAFT
DECEMBER 2024



OPTION B WITH SHARED-USE PATH TUNNEL

Existing/Proposed Ped Trail (paved)
Existing/Proposed Ped Trail (natural surface)
Existing/Proposed Bike Trail
Significant Tree
Bank Restoration
Stormwater Feature
Riparian Restoration
Recreation Features
Sanitary Sewer
Stormwater

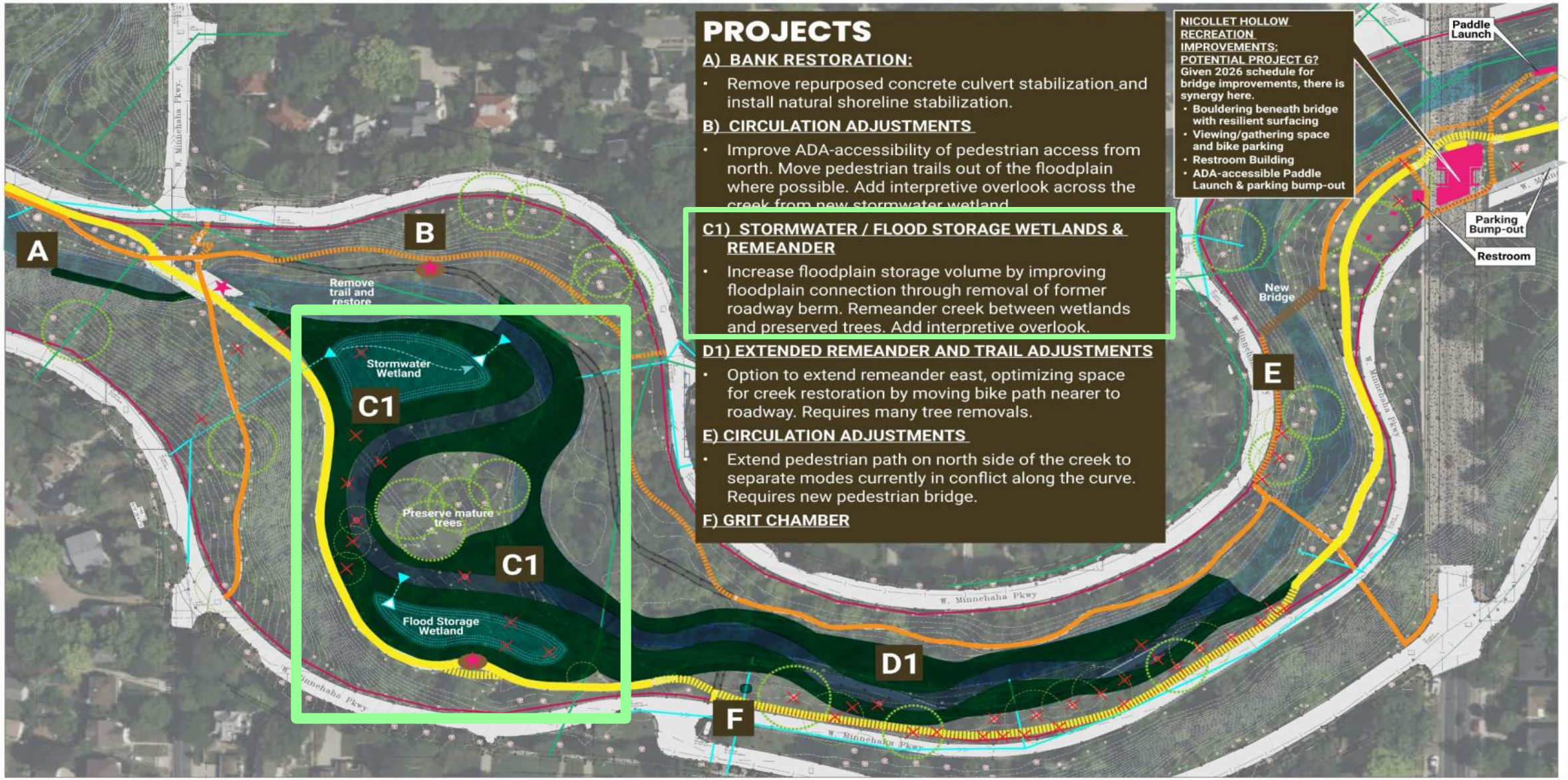
0 20' 40' 80'
SCALE: 1" = 40'-0"

NORTH

DRAFT
DECEMBER 2024

Key Areas

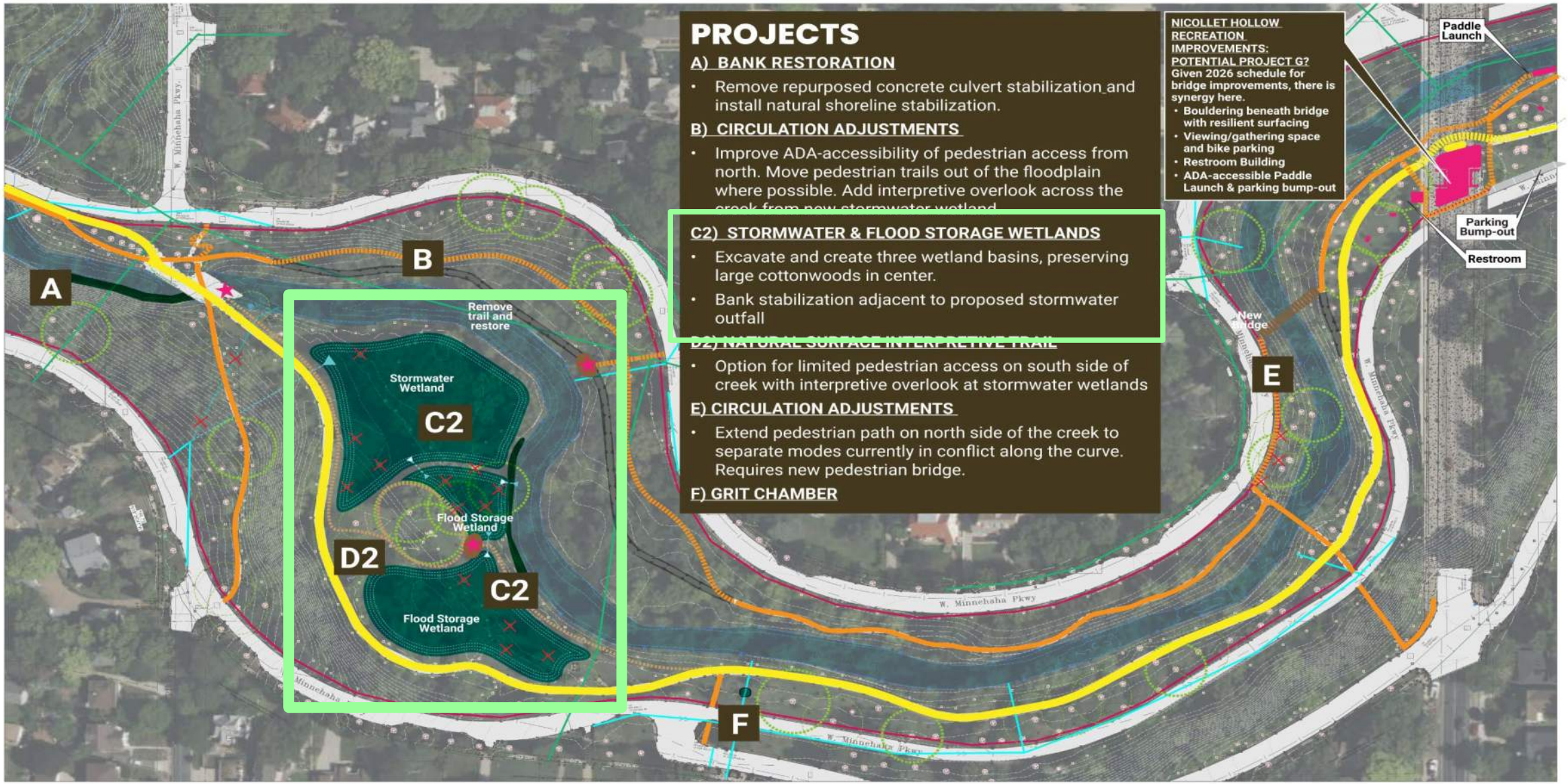
1. Penn & Newton
2. Cedar
3. **Nicollet Hollow**



NICOLLET HOLLOW OPTION A

Existing/Proposed Ped Trail (paved)
Existing/Proposed Ped Trail (natural surface)
Existing/Proposed Bike Trail
Significant Tree
Bank Restoration
Stormwater Feature
Bridge
Recreation Features
Sanitary Sewer
Stormwater
Electrical

DRAFT
DECEMBER 2024



NICOLLET HOLLOW OPTION B

Existing/Proposed Ped Trail (paved)
Existing/Proposed Ped Trail (natural surface)
Existing/Proposed Bike Trail
Significant Tree
Bank Restoration
Stormwater Feature
Bridge
Recreation Features
Sanitary Sewer
Stormwater
Electrical

DRAFT
DECEMBER 2024

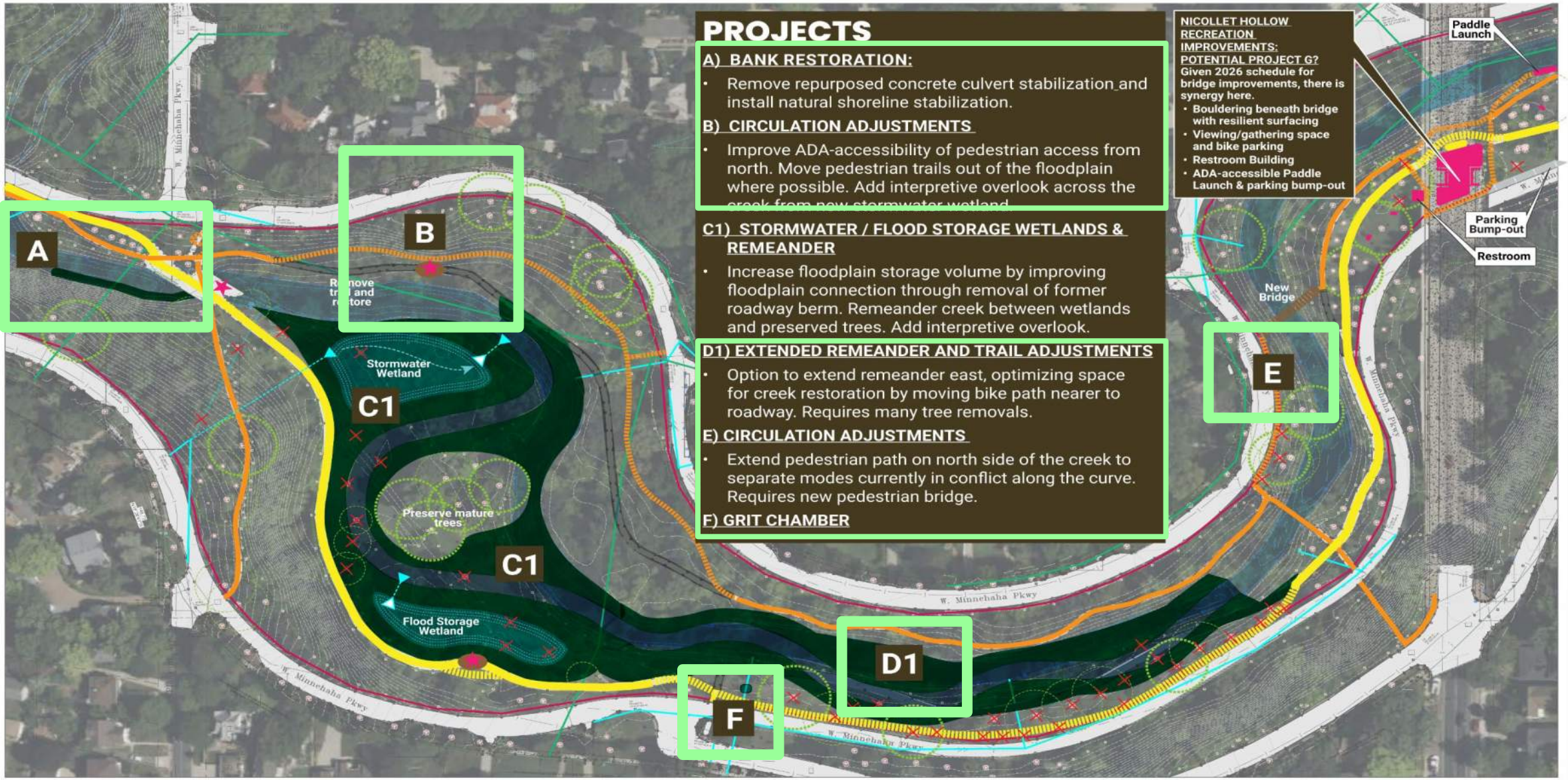
Additional data required at Diamond Lake Rd & Pleasant Ave intersection to verify flow directions

- Can City assist in better understanding this area?
- Design will require understanding of this area and may require flow diversion
- Significant impact on feasible water quality benefits

Nicollet Hollow

Concept Name	Capital Cost	Water Quality Impact (lb TP/yr removed)
Option A	$2,860,000	3-20*
Option B	$2,160,000	3-34*

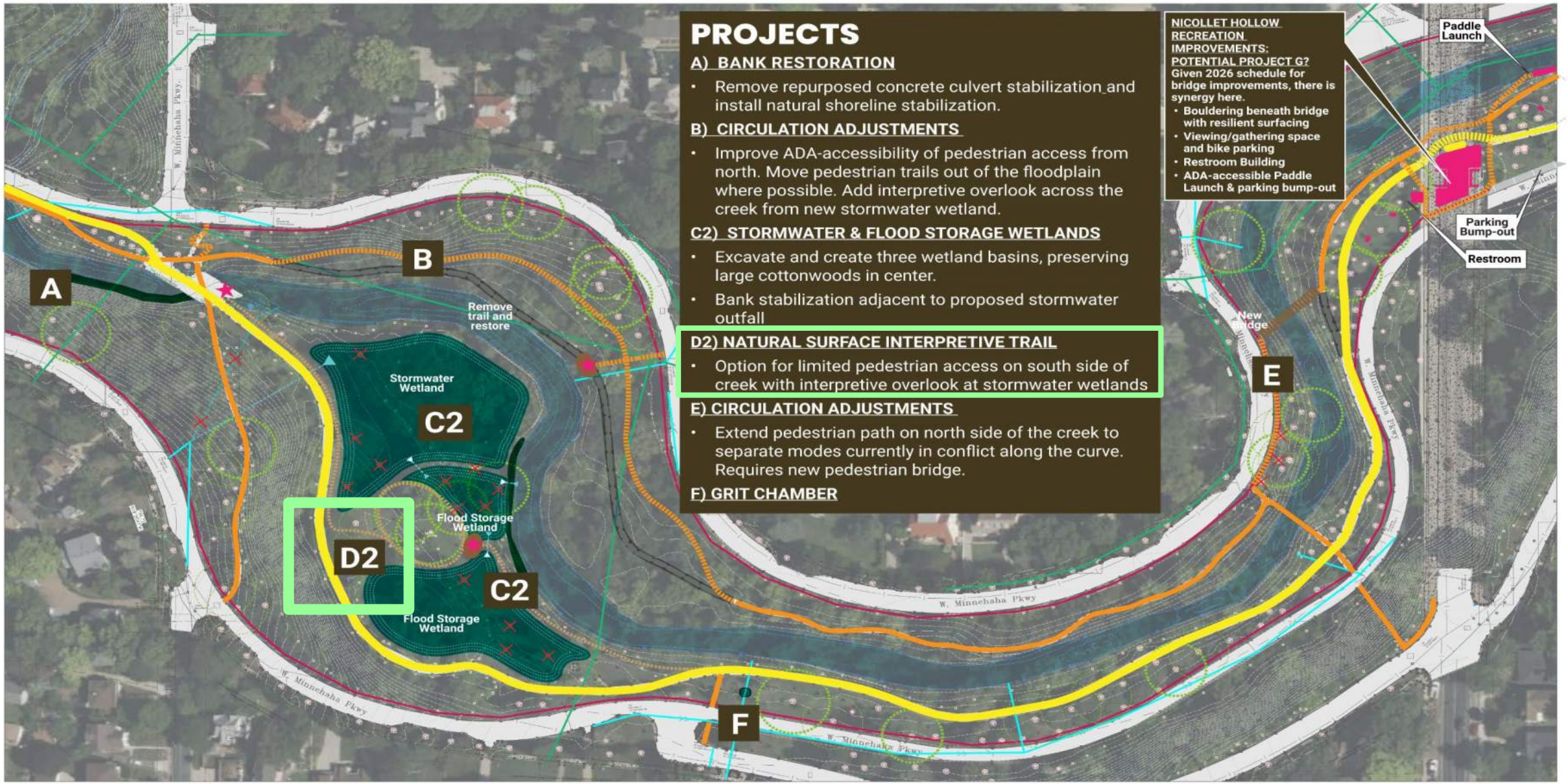
*Water quality benefit is highly dependent on storm sewer routing at Diamond Lake Road and Pleasant



NICOLLET HOLLOW OPTION A

Existing/Proposed Ped Trail (paved)
Existing/Proposed Ped Trail (natural surface)
Existing/Proposed Bike Trail
Significant Tree
Bank Restoration
Stormwater Feature
Bridge
Recreation Features
Sanitary Sewer
Stormwater
Electrical

DRAFT
DECEMBER 2024



NICOLLET HOLLOW OPTION B

Existing/Proposed Ped Trail (paved)
Existing/Proposed Ped Trail (natural surface)
Existing/Proposed Bike Trail
Significant Tree
Bank Restoration
Stormwater Feature
Bridge
Recreation Features
Sanitary Sewer
Stormwater
Electrical

DRAFT
DECEMBER 2024

All Sites – Water Quality Comparison

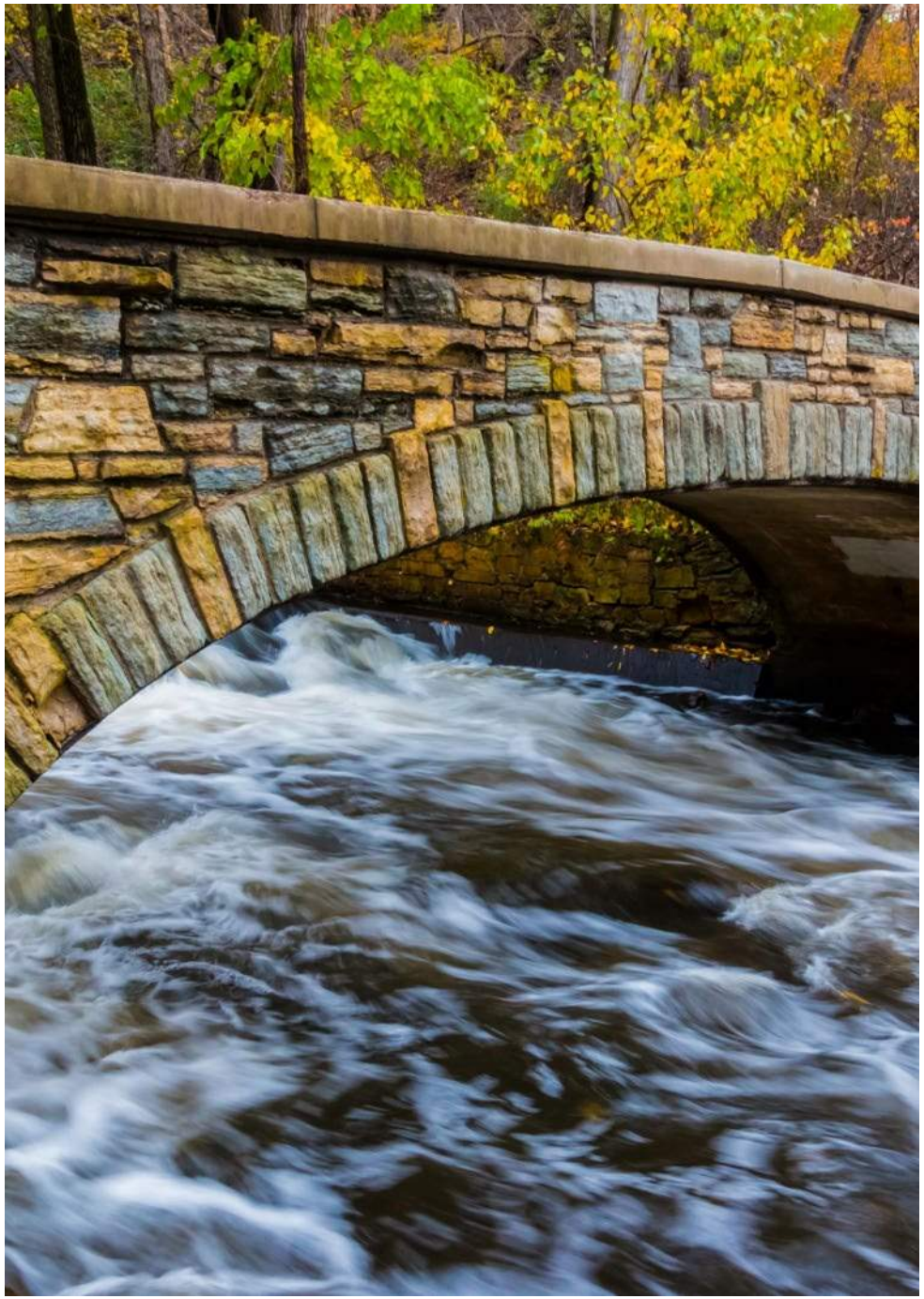
Concept Name	Capital Cost	Water Quality Impact (lb TP/yr removed)
Penn-Newton Option A	$1,450,000	4-16
Penn-Newton Option B	$1,530,000	4-13
Cedar Option A	$960,000*	20-35
Cedar Option B	$2,580,000*	30-40
Nicollet Option A	$2,860,000	3-20**
Nicollet Option B	$2,160,000	3-34**

*Costs do not include CSO separation
**Water quality benefit is highly dependent on storm sewer routing at Diamond Lake Road and Pleasant

Phasing Plan Considerations and Priorities

Criteria	Penn	Cedar	Nicollet
Water Quality	3	1	2
Infrastructure Needs	2	1	3
Park Amenities	3	1	2
Cost-Benefit ($/lb TP)*	3	1	2
Timeline / Ease of Implementation	1	2	3
TOTAL (low score is better)	12	6	12

*Cost excludes CSO at Cedar; costs include all project elements shown on figures



Next Steps

- Determine level of effort to clarify CSO details and Nicollet flow routing
- Compile feasibility report with final recommendations
- Drive toward decision on project implementation preferences

Steering Committee Planning

Appendix G

106 Group Interpretive Features Assessment

106GROUP
Connecting People + Place + Time

INTERPRETIVE FRAMEWORK & RECOMMENDATIONS

Minnehaha Parkway Phase I Project Feasibility Study

May 16, 2025

SUBMITTED BY:
106 Group
550 Vandalia St, Suite 102
St. Paul, Minnesota 55114

PREPARED BY:
Val Heider, Project Manager
Bill Walker, Interpretive Planner

Background

From the summer of 2018 through December of 2020, 106 Group served on the consultant team that developed the Minnehaha Parkway Regional Trail Master Plan. The plan, which has been adopted by the Minneapolis Park and Recreation Board (MPRB) and its partners, currently guides inter-agency management of the roughly 7-mile stretch of Minnehaha Creek as it winds through Minneapolis between Zenith Ave at 54th Street and Longfellow Gardens. Our team, which included an architectural historian and interpretive planner, contributed key sections to the master plan including a brief cultural history of the creek, identification of historic resources along the Trail, and an interpretive plan.

The interpretive plan – which constitutes Chapter 6 of the Minnehaha Parkway Regional Trail Master Plan – provides a basic framework for the development of interpretive messaging throughout the trail corridor. It defines the foundational principles upon which all future interpretive messaging should be built, fostering the creation of distinctive, thematically linked visitor experiences that connect trail users both emotionally and intellectually with Minnehaha Creek, and the natural and cultural resources present within the trail corridor. It prescribes the purposeful development of interpretive programming that fosters an ethic of personal stewardship, encouraging trail users to become active partners in the future protection of this unique place and the resources it protects.

Under the guidance provided by the Minnehaha Parkway Regional Trail Master Plan, MPRB recently contracted with Stantec Consulting Services Inc. to complete a feasibility study for three (3) Phase I projects within the trail corridor. The purpose of this study is to analyze the identified projects for technical feasibility (including engineering, landscape design, policy and regulatory feasibility), and to produce cost and cost/benefit estimates that will assist agency staff in determining which of the assessed projects will advance to future planning and development stages. To ensure that the potential for interpretive messaging related to these projects is addressed in a manner consistent with the guidance provided within the master plan, Stantec has partnered with 106 Group to provide an interpretive assessment of the three project areas and to provide preliminary recommendations for interpretive opportunities that may be realized during future planning phases.

The three (3) projects being assessed through this feasibility study are:

1. **Segment 1: Penn/Newton/Morgan Focus Area**

   The feasibility study will assess Projects 1.1-E Stormwater BMP East of Penn, 1.1-F Creek Restoration West of Newton, and 1.1-L Stormwater Treatment at 52nd Street Outfall (to replace concrete flume) located within the Segment 1 Penn/Newton/Morgan Focus Area. Details related to the projects described above can be found in the following sections of the Master Plan:

   - Existing Conditions (Chapter 3)
   - Master Plan (Chapter 5): pages 5-16 to 5-19

- Implementation (Chapter 7): pages 7-6 to 7-9

2. **Segment 2: Nicollet Hollow Focus Area**

   The feasibility study will assess Project 2.1-H Creek Restoration, Remeander and Constructed Wetlands, Nicollet Hollow located within the Nicollet Focus Area. Details related to the project described above can be found in the following sections of the Master Plan:

   - Existing conditions: Chapter 3
   - Master plan: pages 5-22 to 5-25
   - Implementation: pages 7-16 to 7-18

3. **Segment 3: Cedar/Bloomington Focus Area**

   The feasibility study will assess Project 3-P Stormwater BMP (with restored wetland) west of Cedar Avenue. Project 3-R Roadway Removal/Stormwater BMP will be assessed alongside Project 3-P to determine if design, construction, and cost considerations suggest 3-R should be combined with 3-P at the design stage. Details related to the projects described above can be found in the following sections of the Master Plan:

   - Existing conditions (Chapter 3)
   - Master Plan (Chapter 5): pages 5-26 to 5-27
   - Implementation (Chapter 7): pages 7-20 to 7-22

Interpretive Foundations

The Minnehaha Parkway Regional Trail (MPRT) attracts a wide variety of visitors to its scenic beauty, natural and historic resources and recreational amenities, providing countless opportunities to relax and gather with friends. Interpretive programming along the Trail adds depth to an already enjoyable experience by providing context: a way to understand the history of the Trail and an encouragement to explore further.

To ensure that the interpretive messaging along the trail (often developed at different times and at disparate locations) presents a unified whole, Chapter 6 of the master plan provides a conceptual framework to guide interpretive planning throughout the trail corridor. It identifies the foundational concepts upon which all interpretive programming – regardless of method or media – should be planfully constructed. The following foundational elements, drawn from Chapter 6 of the master plan, will inform the interpretive assessment and preliminary recommendations associated with the three projects that are the focus of the current feasibility study:

Interpretive Principles:

Interpretation messaging throughout the MPRT will:

- Convey factual information and authentic stories
- Encourage stewardship of the trail and its resources
- Foster preservation and restoration of natural and historic resources
- Complement other interpretation and visitor experiences in the MPRB park system
- Be accessible to the greatest number of people possible
- Encourage active and passive recreation along the trail

Interpretive Goals:

Interpretive programming and media developed across the MPRT will:

- Build awareness of the natural and cultural history of the path that is now the Minnehaha Parkway Regional Trail, and its resources
- Strengthen Trail identity as part of the MPRB system
- Create a cohesive visitor experience linked to the interpretive theme and subthemes
- Engage visitors with experiences that are relevant to their lives
- Provide opportunities for visitors to engage in stewardship
- Ensure the interpretive experience is not intrusive on the natural environment

Primary Interpretive Theme (the "Big Idea"):

The primary interpretive theme (sometimes referred to as the "Big Idea") is the unifying message that connects all interpretive programming and media along the MPRT. While necessarily broad in scope, it provides a conceptual structure for storytelling and is the overarching message visitors will repeatedly encounter along the trail.

The primary interpretive theme for MPRT is:

"Minnehaha Parkway Regional Trail brings you to the intersection of nature and city, recreation and culture."

Interpretive Subthemes:

Subthemes support and develop the primary interpretive theme. They help organize the stories told, the resources revealed, and the preferred experiences prescribed for trail users. The master plan identifies four key subthemes for MPRT:

- **Subtheme 1- Natural Resources:** *"This should be a wetland. Creekside wetlands, flood storage, and other enhancements help with flood mitigation, promote resiliency, create and preserve habitat, and encourage stewardship."*
    - Interpretive messaging developed for this subtheme focuses on natural resources from the evolution of the creek to BMPs and stormwater management to wildlife that people could encounter. Interpretation can also be used to answer questions, such as, "What am I looking at?" "Who made those paw prints in the mud?" and "What bird made that thrilling sound?"
- **Subtheme 2 - Cultural Resources:** *"This is a designed landscape. Before Europeans arrived, Minnehaha Creek was a place for work, daily life, and play for Dakota people. Then, European settlers harnessed the creek to power several mills. The creek became a key feature in the development of the Minneapolis park system today. The mill structures are gone, but contemporary and historic walls guide the creek meander, and bridges cross the creek."*
    - Interpretive messaging developed for this subtheme focuses on cultural resources from Indigenous heritage to mills, bridges, and WPA structures to the Grand Rounds. Interpretation can also be used to answer questions, such as, "What am I looking at?" "Who built that?" and "Why should I care about it?"
- **Subtheme 3 - Place Names:** *"What's in a Name? The names of the creek, lakes, streets, and neighborhoods are derived from people, poems, and pragmatism, with many street names assigned to follow the alphabet."*
    - Interpretive messaging developed for this subtheme focuses on why the places and infrastructure adjacent to the MPRT were named as they were. Interpretation can also be used to answer questions, such as, "What does Minnehaha mean?" "Why do neighborhoods have those names?" and "How are streets named?"
- **Subtheme 4 - Recreation:** *"Amble along the meander. Whether picnicking or paddling, walking or cycling, there are recreational opportunities on the creek and along the Trail year-round."*
    - Interpretive messaging developed for this subtheme focuses on recreation, past and present, water- and land-based. Interpretation can also be used to answer questions, such as, "Can I fish in the creek?" and "How do I paddle a canoe and a kayak?"

Interpretive Assessments & Recommendations by Project Area

Segment 1: Penn/Newton/Morgan Focus Area

Two feasibility-level designs (identified as “Option 1” and “Option 2”) have been developed that meet the operational needs associated with the projects identified in Segment 1. The primarily evident features of both “Option 1" and "Option 2” (i.e., the elements that are most likely to be perceived by park and trail users as significant changes to the existing landscape) include:

- The construction of a stormwater treatment basin south of Minnehaha Creek and immediately to the east of Penn Ave. S (labeled E1 and E2 on the accompanying maps)
- The establishment of an Oak Savannah habitat restoration area on the creek’s south bank (area “C”)
- The installation of bank restoration measures at several locations on both the north and south banks of the creek (areas “B,” “F” and portions of A1 and A2)
- The establishment of a public water access point (area “D”)
- The construction of a variety visitor use amenities – including a picnic shelter and picnic tables, Creekside seating areas and a nature play area – at various locations throughout the project area (labeled 1-7)

If advanced to the next phase of design development, the project features associated with Segment 1 provide the following opportunities for enhancing interpretive programming along the MPRT:

- **Oak Savannah Habitat Restoration Area:**
    - Once common in southern Minnesota (especially along the region’s prominent creeks and riverways), oak savanna is a transitional zone ecosystem characterized by areas of dispersed oak trees interconnected by an underlayer of mixed prairie grasses. While the acreage proposed here is not large enough to constitute a fully intact and functional ecosystem, the oak savannah restoration area can serve as meaningful and easily accessible interpretive example of a habitat type that was once common throughout the region.
    - Interpretation addressing the oak savannah restoration area could serve multiple subthemes and interpretive topics outlined in the master plan, including:
        - Natural Resources: What defines an oak savannah? What natural forces (e.g, climate, topography, fire, etc.) helped to create oak savannah? What did the land look like before European settlement? How has Euro-American settlement impacted Minnesota’s natural landscapes? Can public land managers recreate landscapes that were once naturally occurring in Minnesota? What environmental changes to our region make recreating historic landscapes difficult for modern land managers (e.g., climate change, the introduction of invasive species, changes in soil properties, etc.)?

        - Cultural Resources: For generations prior to European settlement, the Dakota people used active land management practices (including controlled burns) to shape the world they inhabited. What made oak savannah a landscape worth managing? What can today's scientists and land managers learn from traditional indigenous practices? How do all human cultures both shape and get shaped by the natural world?
        - Recreation: Oak savanna provides habitat for a wide variety of species. Can you spot the animals that benefit from this unique ecosystem? What makes oak savannah attractive to the animals that are drawn to it?
    - While additional planning will be required during subsequent design phases before appropriate program and interpretive media delivery methods can be confidently prescribed, potential opportunities include:
        - The installation of interpretive wayside exhibits in or around the proposed picnic area within the oak savannah restoration. These can be simple text and image driven panels or more complex wayside exhibits that include enhancements such as sign-mounted 3D tactile models (e.g., key plant species, animal tracks, etc.) or audio enhancements to relay supplementary stories (such as how the Dakota people used fire to shape the landscape and promote the presence of game species). Audio components can be developed in multiple languages to meet a wider variety of audience needs, or to provide "soundscape" opportunities (such as introducing the Dakota language to the space).
        - Guided "ranger talks" led by MPRB or partner agency staff, could be developed to occasionally highlight more complex or nuanced topics, or to provide a more interactive experience such as prairie seed collection. While guided interpretive programs can be prohibitive based on the availability of trained interpretive staff, guided programs can often provide more meaningful experiences built on interpersonal connection.
- **Creekside Bank Restoration:**

    Creekside viewsheds – like the "touch point" proposed on the south bank near the oak savannah restoration area (labeled "4"), or the waterside seating area proposed near the nature play area (labeled "5") – provide excellent opportunities to highlight MPRB's efforts to reduce shoreline erosion and improve downstream water quality (Natural Resources subtheme). They also provide opportunities to highlight how human development along the corridor has interrupted the natural flow of the watershed, increasing shoreline erosion as the creek channel becomes more rigid with the disappearance of surrounding wetlands (Cultural Resources subtheme). To capitalize on the "captive audiences" utilizing the proposed waterside seating areas while minimizing the potential intrusion of fixed interpretive features like wayside exhibits, app-based interpretive tools (for example, smart-phone based augmented reality experiences that highlight past erosion events) should be considered.
- **Public Water Access Point:**
    - Since trail users are likely to pause at the proposed water access point (for example, while launching a canoe or float tube), this spot provides interpretive opportunities for connecting trail users to the stories of Minnehaha Creek itself. For example:

- Interpretive information can be incorporated into wayfinding and safety signage to highlight appropriate use while softening regulatory messaging (providing a "why" behind the rules [Recreation subtheme]).
- While preparing to paddle or float down the creek, interpretive wayside exhibits near the water access point can highlight the journeys that previous visitors have made along this very stretch of the creek (such as Joseph R. Brown's 1822 journey from Ft. Snelling to Lake Minnetonka – the first documented Euro-American ascension of the creek above Minnehaha Falls [Cultural Resources subtheme]). Interpretive messaging can also highlight how the waters of Minnehaha Creek move natural resources (from aquatic species to the rainwater itself) over a nation-wide transportation system that links this place to destinations as far removed as New Orleans and the Gulf of Mexico (Natural Resources subtheme). They can also highlight additional opportunities for water recreation within the trail corridor and beyond (Recreation subtheme).

Segment 2: Nicollet Hollow Focus Area

Two feasibility-level designs (identified as "Option 1" and "Option 2") have been developed that meet the operational needs associated with the project identified in Segment 2. The primarily evident features of both "Option 1" and "Option 2" (i.e., the elements that are most likely to be perceived by park and trail users as significant changes to the existing landscape) include:

- Alignment adjustments to the existing bicycle and pedestrian trails (labeled "B" and "E" on the accompanying maps)
- Remeandering of the existing creek bed and the development of a new stormwater wetland on the west side of the project area (labeled "C1" and C2")
- The development of a new active recreation area at the eastern edge of the project area which includes the construction of a bouldering wall and dynamic seating spaces under the historic Nicollet Avenue Bridge, as well as an ADA accessible kayak launch and picnic facilities immediately east of the bridge (labeled "G").

If advanced to the next phase of design development, the project features associated with Segment 2 provide the following opportunities for enhancing interpretive programming along the MPRT:

- **Creek Remeander and Stormwater Wetland Development:**
  - The creek remeander and the development of the stormwater wetland provide significant opportunities for connecting trail users with a key concept at the heart of the Natural Resources subtheme: "This should be a wetland." Interpretive messaging at this location should highlight how Minnehaha Creek (and similarly sized waterbodies) once functioned in their natural state, providing water conveyance channels that both slowed and retained floodwaters to reduce landscape erosion (Natural Resources subtheme). It should also highlight how human

interference with creek's natural systems have at times both helped and hindered the creek's core functions (Cultural Resources subtheme).

- These messages can be relayed through a wide variety of interpretive programming and media, though given the location of this stormwater wetland feature within the project area (set apart from natural gathering spots such as picnic areas and the active recreation feature on the east side of the project area) self-guided media will likely provide the best medium for relaying key storylines. Self-guided interpretive media may include interpretive wayside exhibits located at the proposed interpretive overlook on the north bank of the realigned creek, 3D tactile models illustrating the differences between a healthy floodplain and one impaired by human interventions (allowing visitors to "feel the flow" to imagine how water moves through different types of creek bed), or app-based augmented reality tools that illustrate how healthy/natural floodplains perform during flooding events.

- **Nicollet Avenue Bridge Active Recreation Feature:**
  - The development of a "bouldering" park for rock climbers under the Nicollet Avenue Bridge will provide significant opportunities for passive interpretation designed to capture the interest of visitors congregating around the bouldering walls and seating areas as they watch active climbers. For example, the seating area will provide visitors with a unique perspective of the underside of the Nicollet Avenue Bridge, which was built in 1923, and has been determined eligible for listing on the National Register of Historic Places. Interpretive messaging at this location could highlight the history of the bridge while encouraging visitors to explore the question, "what makes a bridge historic (Cultural Resources subtheme)?" Since the bridge itself isn't the primary reason people have gathered at this location (the bouldering wall is), interpretive messaging highlighting the bridge should be addressed in a more subtle manner. For example, basic signboards with large QR codes might be placed where the bouldering wall meets the bridge piers (where climbers end their ascent). If visitors choose to use their smartphones to scan the QR codes, they can "discover" the hidden history of the bridge through a web-based app, providing a "pop-up" history experience.
  - Additional opportunities for interpretive messaging under the Nicollet Avenue Bridge might include more traditional wayside exhibits that highlight the many bridges built across the creek during development of the parkway (as well as the broader Grand Rounds system), or how prescribed use of the trail corridor has changed over time (e.g., from horse trails and carriage paths to bicycle and multi-use trails as recreation trends have changed or evolved [Cultural Resources subtheme, Recreation subtheme).
  - Given the prominence of the Nicollet Avenue Bridge, this segment would also support interpretive messaging that explores subtheme 3, "Place Names." Wayside exhibits positioned along the proposed pedestrian or bicycle trail alignments with a view of the Nicollet Avenue Bridge could highlight the life Joseph Nicollet, and his contributions to the Euro-American exploration and mapping of Minnesota. Nicollet's 1843 map, "Hydrological Basin of the Upper Mississippi River" would provide a particularly useful image for storytelling at this location as it shows Minnehaha Creek as "Cascade Creek," recognizes the Twin Cities region as "Mdewakanton Country," and completely omits the existence of Lake Minnetonka despite

highlighting other smaller bodies of water (including Lake of the Isles, Lake Harriett and Lake Calhoun (known today as Mde Mka Ska). The map provides an excellent example of how place names have shifted over time (and how they continue to do so today), and how place names can play a role in both the empowerment and disenfranchisement of the people who live in the spaces they portray.

- The proposed ADA Accessible Kayak Launch provides interpretive opportunities for highlighting adaptive recreation opportunities within the corridor, as well as an alternate location for highlighting stories related to the creek itself and its history (see the recommendations provided for the proposed public water access point in Segment 1).

Segment 3: Cedar/Bloomington Focus Area

Two feasibility-level designs (identified as “Option 1” and “Option 2”) have been developed that meet the operational needs associated with the projects identified in Segment 3. The primarily evident features of both “Option 1" and "Option 2” (i.e., the elements that are most likely to be perceived by park and trail users as significant changes to the existing landscape) include:

- Remeandering of the existing creek bed on the western edge of the project area (labeled A on the accompanying maps)
- The conversion of a mowed turfgrass area on the south bank of the creek to a restored riparian habitat (e.g., native tallgrass prairie, oak savannah and/or riparian forest [labeled “B”])
- The development of a large, multi-basin stormwater wetland (labeled “D1” and “D2”) as well as pedestrian trail realignments that may include the development of a boardwalk and overlook features to carry pedestrian traffic over the stormwater wetland basin (labeled “4” and “5” respectively)
- The construction of a “Moses Bridge” or tunnel redirecting pedestrian and/or bicycle trail alignments beneath Cedar Avenue.

If advanced to the next phase of design development, the project features associated with Segment 3 provide the following opportunities for enhancing interpretive programming along the MPRT:

- **Multi-Basin Stormwater Wetland and Related Trail Realignments:**
  - The development of the multi-basin stormwater wetland provides the most significant opportunities for interpretive enhancements within this project area. This will be especially true if “Option 2” is selected, as it includes the development of a boardwalk trail over the wetland basin, and dedicated overlook platforms that provide viewsheds of the wetland itself, as well as the riparian habitat restoration area located on the south bank on Minnehaha Creek.
  - The boardwalk and overlook platforms provide an excellent forum for introducing trail users to the topic of “engineered nature” – areas that appear “natural” to the untrained eye but are actually the result of significant engineering measures taken by humans. Given the history of Euro-American development along Minnehaha Creek, this is a key storyline that runs

throughout the trail corridor. Interpretive messaging that explores the concept of "engineered nature" can address Natural Resources, Cultural Resources and Recreation subthemes.

- While additional planning will be required during subsequent design phases before appropriate program and interpretive media delivery methods can be confidently prescribed, potential opportunities include:
  - The installation of interpretive wayside exhibits, particularly along the proposed boardwalk and overlook features, highlighting storylines related to the topic, "engineering nature."
  - "Playful" interactive features that encourage the engagement of young audiences. These may include "framing" or "sighting" devices installed on the landscape that when aligned draw the visitor's attention to particular landscape features. This might also include more interactive interpretive signage, such as designs that incorporate flip-panels, bronze tactile models (e.g., of small animals that inhabit the wetland), or other mechanical elements.
  - Guided "ranger talks" led by MPRB or partner agency staff, could be developed to occasionally highlight more complex or nuanced topics. For example, a "behind the scenes" tour highlighting how the multi-basin stormwater retention wetland is designed to function during a flooding event could provide a more hands-on and meaningful experience to an audience of adult "lifelong learners."

- **Riparian Habitat Restoration Area:**
  - The "Riparian Habitat Restoration Area" provides many of the same opportunities for interpretive messaging as highlighted under the "Oak Savannah Restoration Area" located in Segment 1, but with the caveat that the restoration area here is less immediately accessible to trail users (e.g., there are no trails that traverse the restoration area at this location). Nevertheless, the proposed interpretive overlook shown in Option 1 would provide opportunities for passive interpretation highlighting
  - The interpretive overlook shown in Option 1 (located near the center of the project area) could provide viewsheds of both the riparian habitat restoration area to the south, and the multi-basin stormwater wetland to the north. This would provide trail users with a broader perspective for understanding the "engineered nature" concept highlighted above. A small interpretive kiosk, consisting of several grouped wayside exhibits providing a 360-degree "caption" of the landscape surrounding the viewer, could more fully explore the many changes that have been made to the creek's natural flow as a result of urban expansion.

- **"Moses Bridge" (under Cedar Avenue)**
  - Should a "Moses Bridge" be developed under the Cedar Avenue bridge deck, the unique nature of the architecture would lend itself well to interpretive messaging highlighting the bridge itself - how it works, where it was first developed, and why the architects proposed this type of structure at this location (Cultural Resources subtheme). To minimize visual impact on the bridge and to avoid damage during flooding events, digital media (such as smart phone-based apps) would likely provide the best tool for interpretive messaging.

Appendix H

Inter-Fluve Basis of Conceptual Design Memo

DRAFT TECHNICAL MEMORANDUM

To:	Stantec Consulting Services Inc. (Chris Meehan, PE)
From:	Inter-Fluve (Maren Hansell, PE; Marty Melchior; Adam Weis)
Date:	May 8, 2025 Project: Minnehaha Parkway Phase I Project Feasibility
Re:	Basis of Conceptual Design for Stream Restoration Projects

This draft technical memorandum documents the findings of Inter-Fluve's geomorphic reconnaissance efforts and basis for conceptual design development for the project entitled Minnehaha Parkway Phase I Project Feasibility. This project is being completed for a steering committee of project partners consisting of the Minnehaha Creek Watershed District, Minneapolis Park & Recreation Board, and City of Minneapolis (herein, "project partners"), in efforts to identify priority projects for design and implementation to achieve project goals. Goals for the overall project include water quality treatment and recreational improvement, as well as habitat uplift and restoration along the Minnehaha Creek corridor in the City of Minneapolis. Inter-Fluve's efforts on this project focused on opportunities for habitat uplift, functional ecosystem improvement, flood storage, and stream process, as discussed in this technical memorandum.

PROJECT BACKGROUND AND GOALS

The Minnehaha Creek watershed drains approximately 47 square miles. The 23-mile-long mainstem and its tributaries run from Lake Minnetonka through several western suburbs, then across south Minneapolis, over Minnehaha Falls, and ultimately to the Mississippi River. The watershed is highly urbanized, and the stream channel has been straightened and confined to accommodate development, resulting in loss of wetlands and floodplains, corridor fragmentation, disruption of fluvial processes, increased runoff volumes and pollutant loading, decreased infiltration and baseflow, and fragmented and degraded upland, riparian, and aquatic habitat. The three feasibility study project sites (Penn-Newton-Morgan, Cedar Avenue, and Nicollet Hollow) are located within residential areas of the City of Minneapolis.

Specific project objectives relative to habitat, ecosystem, flood storage, and stream process are listed below.

- Reduce flooding by creating floodplain storage in incised segments of Minnehaha Creek, where possible.
- Restore channel planform, slope and geometry where possible to increase the complexity and availability of aquatic and riparian habitat, and to facilitate stream processes.

- Restore a natural river aesthetic for improved recreation.
- Improve bank stability, reduce erosion and sediment loss, restore native plant communities, and create riparian habitat.
- Improve the vegetated riparian area between the creek and upland areas to protect habitat and increase filtration.
- Restore valuable floodplain wetland habitat.

GEOMORPHIC RECONAISSANCE FINDINGS AND PROPOSED CONCEPTUAL DESIGNS

On October 10, 2024, Inter-Fluve completed a geomorphic reconnaissance of the three sites. The stream-focused projects in the Master Plan were reviewed and additional opportunities were sought to achieve project objectives. Significant findings and restoration opportunities at each site are noted below by proposed concept design number on the conceptual renderings developed by HKGi (Attachment A.) Site conditions noted in this report reflect findings at the time of the site visit. The conceptual renderings include feasibility study analysis considerations, design evaluation, and project partner input. The conceptual renderings were authored by HKGi with input from Stantec and Inter-Fluve (Attachment A). Inter-Fluve contributed to the project elements listed in this technical memorandum, including those referred to as the "stream restoration projects," for which Inter-Fluve lead the conceptual design and provided Engineer's Opinion of Probable Construction Costs (EOPCCs.) The stream restoration projects include of portions of or the entirety of the following projects:

- Projects A1/A2 (bank restoration only), B, and F at Penn-Newton-Morgan
- Projects A, B, and C at Cedar Avenue
- Projects A, C1/C2 (remeander/bank restoration only), and D at Nicollet Hollow

Additional considerations for each project are included in Stantec's project evaluation matrix (separate cover.)

PENN - NEWTON - MORGAN

A. Stormwater Treatment Train (Project A1; Master Plan Project 1.1-L)

Site Visit Findings:

Relocating the outfall location could significantly impact stream dynamics and cause destabilization of the downstream reach.

Concept Design Considerations:

It is recommended that the location of the existing stormwater discharge be maintained for the new stormwater feature. It is also recommended that the banks on both sides of the creek adjacent to the new outfall be stabilized (likely with a stone toe and fabric-encapsulated lifts) to minimize impacts from the discharge to the creek. Necessary extents of the bank stabilization should be evaluated in design.

B. Bank Restoration (Project B; Master Plan Project 1.1-F)

Site Visit Findings:

There is a segment of near-vertical, eroding bank upstream of the pedestrian bridge located downstream of Penn Avenue. A natural tread path on top of the bank in this location is likely contributing to the erosion and is being compromised as the bank continues to erode.

Concept Design Considerations:

It is recommended that this bank (for a length of approximately 175 feet) be re-built with a stone toe and fabric-encapsulated soil lifts, and that the trail be redirected away from the top of the slope. Bank reconstruction should preserve the existing canopy trees along the bank.

Figure 1. Bank erosion upstream of pedestrian bridge near Penn Ave.
OCTOBER 10, 2024. Photo credit Maren Hansell

C. Oak Savanna Restoration (Project C; Master Plan Project 1.1-F)

Site Visit Findings:

The masterplan included a remeander and floodplain reconnection project on the left bank. However, space between the existing channel and adjacent private improvements is limited. Given the site layout, stream stability, space limitations, and existing mature trees, the benefit of a remeander and/or floodplain reconnection project would be limited.

Concept Design Considerations:

In lieu of a floodplain forest restoration, an opportunity was identified to restore oak savanna habitat within the existing oak grove on the south side of the creek. Given the mature oak trees, height of the existing grade above the stream channel, existing floodplain bench, and regulated flow of the creek, the oak savanna opportunity is recommended instead of cutting grade to reconnect floodplain in this location. Oak savannas play an important role in floodplain ecosystems, providing both biodiversity and ecological benefits, and would provide a habitat type that is currently lacking from the creek corridor. Oak savannas have open canopies which provide sunlight essential for understory development of grasses and flowering plants, and provide ideal conditions for open canopy and disturbance-dependent species, such as red-headed woodpeckers and various Lepidoptera, while offering forage and shelter for terrestrial species. Oak savannas are maintained though regular occurrences of fire, and without fire, oak savannas would follow natural succession and become a closed-canopy forest. If burning is not a feasible option for maintenance, a lower-maintenance native planting area could be implemented that could provide similar habitat benefits.

D. Water Access Point (Project D; Master Plan Project 1.1-F)

Site Visit Findings:

The proposed access location in the master plan is appropriate and the existing condition provides reasonable access and boulders for sitting.

Concept Design Considerations:

Recommendations for this access include removing existing fabric from the bank, resetting and adding boulders for sitting, and resetting larger armor stones in the creek to accommodate boater access.

Figure 2. Location of proposed creek access downstream of Penn Ave.
OCTOBER 10, 2024. Photo credit Maren Hansell

F. Bank Restoration (Project F)

Site Visit Findings:

A meander bend at the bottom of the Newton Sledding Hill is migrating northwest (toward the sledding hill) and a point bar is forming on the inside bend. Based on local topography, it is suspected that at one point the creek ran along the toe of the sledding hill and it is currently moving back toward that direction. There is a row of boulders lining a short segment of the bank at the outer limit of the meander, likely placed to prevent stream movement toward the sledding hill. Now, the creek is eroding the banks upstream and downstream of the row of boulders, and will likely cut around the boulders if left as is.

Concept Design Considerations:

Given the recreational value of the sledding hill, it is understood that it is the project partner's goal to stabilize the creek and prevent it from moving farther northwest. Therefore, is recommended that the bank be stabilized in place for the entire length of the meander bend (likely with a stone toe and bioengineered upper bank) and that the existing boulders be reset and incorporated into the newly-stabilized bank. It is important that the upstream and downstream extents of the proposed bank stabilization be evaluated in design and extended for a sufficient length upstream and downstream to prevent the current condition (erosion upstream and downstream of the treatment) from happening in the future. There is a natural tread path along the top of the bank that will need to be redirected farther from the creek.

Figure 3. Upstream limit of row of boulders lining bank at the bottom of the Newton sledding hill and upstream bank erosion.
OCTOBER 10, 2024. Photo credit Maren Hansell

Figure 4. Bank erosion downstream of the row of boulders lining the bank at the bottom of the Newton sledding hill.
OCTOBER 10, 2024. Photo credit Maren Hansell

NICOLLET HOLLOW

A. Bank Restoration (Project A; Master Plan Project 2.1-H)

Site Visit Findings:

Upstream of the former parkway bridge, concrete pipes have been vertically incorporated into the stream banks among the rocks and boulders, used as bank stabilization (Figure 5). Just upstream of those pipes, a portion of a wall (presumed to be a Works Progress Administration wall) has fallen into the creek.

Concept Design Considerations:

It is recommended that the concrete pipes and fallen portions of the wall be removed (if acceptable per the Minnesota State Historic Preservation Office), and that the bank be stabilized with bioengineering techniques. The dead trees are recommended to be removed and replaced with black and/or weeping willows that grow quickly and provide important shade and cover to the stream, stabilize bank soil, and improve water quality, all of which benefit the stream and stream-dwelling species.

Figure 5. Vertical concrete pipes along stream bank upstream of the former parkway bridge.
OCTOBER 10, 2024. Photo credit Maren Hansell

C. Stormwater Wetlands & Remeander (Projects C1/C2; Master Plan Project 2.1-H)

Site Visit Findings:

In this reach the former parkway road prism bisects the available floodplain, and the creek has been straightened. There are two mature cottonwood trees in the vicinity of the proposed stormwater ponds and stream realignment that are recommended to be preserved with any proposed alternative. Mature cottonwoods provide shade, floodplain stability, and migratory canopy habitat.

Concept Design Considerations:

Removing the embankment would provide a significant opportunity to improve floodplain connectivity, add valuable floodplain wetland habitat, and provide space to restore meanders and a stable planform geometry. Meander restoration would add stream length and thus habitat volume, provide flood capacity, and create diverse riverine habitat.

There are two recommended alternatives for the stormwater wetland and channel remeander (see concept renderings, Attachment A). Option 1 includes construction of a new creek meander around the existing cottonwoods, with a stormwater wetland located within the inside bend on river-right. Option 2 includes a larger stormwater wetland and bank restoration, but no remeandering. Revegetation with floodplain forest species, such as cottonwood, silver maple, willows (*Salix sp.*), along with invasive species management practices are recommended for the restoration site.

D. In-Stream Habitat Improvements (Project D; Master Plan Project 2.1-H)

Site Visit Findings:

This section of Minnehaha Creek from the downstream end of the former parkway roadway embankment to the Nicollet Avenue Bridge is generally ditched and confined to a narrow corridor between existing recreational trails. There is a grade control riffle downstream of the existing pedestrian bridge in the middle of this reach.

Concept Design Considerations:

Meander restoration would be limited by the narrow existing belt width of 150 feet between the two sides of Minnehaha Parkway. The benefits of mild meandering through this segment are likely not worth the high cost of major channel reconstruction. Therefore, it is recommended that rock structures, boulder erratics, and large wood are added to this reach of the creek to provide pocket water, riffle habitat, and refugia for fish.

CEDAR AVENUE

A. Creek Remeander (Project A; Master Plan Project 3-P)

Site Visit Findings:

Significant erosion is occurring on the outside (left) bank near the pedestrian path and newly-installed bench at the west end of the project reach. This creek bend is actively migrating northward, and the edge of the near-vertical bank is approaching the paved path.

Concept Design Considerations:

It is recommended to add creek sinuosity (a meander) in this location along the creek's current trajectory and to shift the trail and park improvements away from the creek. This would involve constructing a stabilized outside bank (likely with a stone toe and bioengineering) and encouraging bar development along the inside of the bend. It is also recommended that a larger, shrub and tree dominated (no-mow) riparian buffer be created. Riparian vegetation will help stabilize bank soils and prevent further erosion, while providing additional habitat.

Figure 6. Outside bank erosion on the west end of the reach with new sitting bench installed.
OCTOBER 10, 2024. Photo credit Maren Hansell

B. Riparian Habitat Restoration (Project B; Master Plan Project 3-P)

Site Visit Findings:

There is currently an area of mowed turf grass south of the creek, between a narrow riparian buffer and the existing trail. This area appears to be underutilized for recreation. Conversion to riparian habitat could provide added habitat area and reduce the maintenance burden of mowing the area, likely with little impact to recreation.

Concept Design Considerations:

This area provides an opportunity to expand the riparian buffer width through revegetation, connecting riparian forest and the existing upland prairie on the opposite side of the trail. This area could be restored to native tallgrass prairie or oak savanna, or could be an expansion of the existing riparian forest.

C. Bank Re-Naturalization (Project C; Master Plan Project 3-P)

Site Visit Findings:

Upstream of the Cedar Avenue bridge, both sides of the channel are vegetated with riparian buffer. However, the buffer is limited in certain areas near pedestrian paths. Boulder rip rap and plastic mesh line the majority of the banks. The former straightened creek alignment, or 'meander scar' is visible on the landscape and provides valuable floodplain wetland habitat that is relatively secluded from human access.

Concept Design Considerations:

It is recommended to remove the plastic mesh along with removing and resetting the top layer of boulders. The top of the bank could be reconstructed fabric encapsulated soil lifts, or earthen fill and surface fabric, and revegetated. The boulders could be added to the floodplain or placed in the channel to provide additional habitat. This would provide more viable bank habitat for aquatic species and water access for riparian species and add in-stream complexity to support aquatic habitat. The 'meander scar' should remain untouched. Relocating the adjacent pedestrian trail could help further reduce anthropogenic impact and erosion, creating one of the few areas for protected floodplain habitat along the creek corridor. It is also recommended that the stormwater overflow into the creek be designed such that the stormwater pond area can act as a backwater area for increased flood storage capacity.

Figure 7. Minnehaha Creek with rip rap boulders (left) and plastic mesh material (right) along the banks. OCTOBER 10, 2024. Photo credit Maren Hansell

ENGINEER'S OPINION OF PROBABLE CONSTRUCTION COSTS

Inter-Fluve's Engineer's Opinion of Probable Construction Costs (EOPCC) for these concept design elements is included in the cost estimation produced by Stantec. Inter-Fluve estimates (Table 1) consider work items specific to stream restoration (remeandering, bank stabilization and restoration, and aquatic/riparian habitat uplift) and do not include civil infrastructure, recreational improvements, or landscape architecture elements not adjacent to the creek. These EOPCC numbers do not include site access, mobilization, demobilization, erosion control, clearing, contingency, or engineering and permitting costs for this work, which is understood to be added by Stantec as percentages on top of full project totals. Unit prices are based on recent bid tabulations for restoration projects in the Midwest and Minnesota DOT average unit bid prices. See detailed EOPCC detail in Attachment B.

Table 1. Engineer's Opinion of Probable Construction Cost subtotal for all proposed stream restoration projects, by project area/option.

Project	Sub-Total
Penn - Newton - Morgan	$276,400
Nicollet Hollow	$220,700
Cedar Avenue (Option 1)	$451,000
Cedar Avenue (Option 2)	$171,300

ATTACHMENTS

A. *Conceptual Design Renderings (authored by HKGi)*

B. *Inter-Fluve Engineer's Opinion of Probable Construction Costs*

Minnehaha Parkway
Engineer's Opinon of Probable Construction Cost for Stream Restoration Projects
Concept Design Phase
May 2025

Penn-Newton-Morgan

Project A

Item #	Item	Unit	Quantity	Unit Cost	Sub-Total	Notes
1	CONTROL OF WATER	LS	1	$ 25,000	$ 25,000	
2	CLEARING	LS	1	$ 5,000	$ 5,000	
3	FES LIFTS	FACE-FT	320	$ 50	$ 16,000	
4	BACKFILL	CY	30	$ 18	$ 540	Assumes FES Lifts composed of 50% topsoil and 50% salvaged backfill.
5	TOPSOIL	CY	30	$ 30	$ 900	
6	STONE TOE	CY	30	$ 140	$ 4,200	
7	REVEGETATION	AC	0.1	$ 12,000	$ 1,200	Includes native seeding and containerized shrubs and trees.
				Project Sub-Total	***$ 52,840***	

Project B

Item #	Item	Unit	Quantity	Unit Cost	Sub-Total	Notes
1	CONTROL OF WATER	LS	1	$ 25,000	$ 25,000	
2	CLEARING	LS	1	$ 5,000	$ 5,000	
3	FES LIFTS	FACE-FT	700	$ 50	$ 35,000	
4	BACKFILL	CY	50	$ 18	$ 900	Assumes FES Lifts composed of 50% topsoil and 50% salvaged backfill.
5	TOPSOIL	CY	50	$ 30	$ 1,500	
6	STONE TOE	CY	30	$ 140	$ 4,200	
7	REVEGETATION	AC	0.1	$ 12,000	$ 1,200	Includes native seeding and containerized shrubs and trees.
				Project Sub-Total	***$ 72,800***	

Project F

Item #	Item	Unit	Quantity	Unit Cost	Sub-Total	Notes
1	CONTROL OF WATER	LS	1	$ 35,000	$ 35,000	
2	CLEARING	LS	1	$ 10,000	$ 10,000	
3	REMOVAL OF EXISTING RIPRAP	LS	1	$ 2,000	$ 2,000	Assumes riprap can be removed and reused in stone toe.
4	FES LIFTS	FACE-FT	1,800	$ 50	$ 90,000	
5	BACKFILL	CY	120	$ 18	$ 2,160	Assumes FES Lifts composed of 50% topsoil and 50% salvaged backfill.
6	TOPSOIL	CY	120	$ 30	$ 3,600	
7	STONE TOE	CY	40	$ 140	$ 5,600	Excludes volume of salvaged existing riprap.
8	REVEGETATION	AC	0.2	$ 12,000	$ 2,400	Includes native seeding and containerized shrubs and trees.
				Project Sub-Total	***$ 150,760***	
				Site Total	**$ 276,400**	

Minnehaha Parkway
Engineer's Opinon of Probable Construction Cost for Stream Restoration Projects
Concept Design Phase
May 2025

Cedar Avenue

Project A

Item #	Item	Unit	Quantity	Unit Cost	Sub-Total	Notes
1	CONTROL OF WATER	LS	1	$ 35,000	$ 35,000	
2	EARTHWORK	CY	610	$ 18	$ 10,980	Assumes net balance, no offside disposal.
3	FES LIFTS	FACE-FT	840	$ 50	$ 42,000	
4	TOPSOIL	CY	70	$ 30	$ 2,100	Assumes FES Lifts composed of 50% topsoil and 50% salvaged backfill.
5	STONE TOE	CY	80	$ 140	$ 11,200	
6	RIFFLE STONE	CY	30	$ 140	$ 4,200	
7	SURFACE FABRIC	SY	1,500	$ 18	$ 27,000	
8	SEEDING	AC	0.4	$ 12,000	$ 4,800	Includes native seeding and containerized shrubs and trees.
				Project Sub-Total	***$ 137,280***	

Project B

Item #	Item	Unit	Quantity	Unit Cost	Sub-Total	Notes
1	REVEGETATION	AC	0.5	$ 17,000	$ 8,500	Includes native seeding, containerized shrubs and trees, and turf grass removal.
				Project Sub-Total	***$ 8,500***	

Project C

Item #	Item	Unit	Quantity	Unit Cost	Sub-Total	Notes
1	REMOVE PLASTIC MESH AND RESET BOULDERS	DAYS	3	$ 3,000	$ 9,000	
2	FES LIFTS	FACE-FT	1,250	$ 50	$ 62,500	
3	BACKFILL	CY	50	$ 18	$ 900	Assumes FES Lifts composed of 50% topsoil and 50% salvaged backfill.
4	TOPSOIL	CY	50	$ 30	$ 1,500	
5	SEEDING	AC	0.2	$ 5,000	$ 1,000	
				Project Sub-Total	***$ 74,900***	
				Site Total	**$ 220,700**	

Minnehaha Parkway
Engineer's Opinon of Probable Construction Cost for Stream Restoration Projects
Concept Design Phase
May 2025

Nicollet Hollow - *Option C1*

Project A

Item #	Item	Unit	Quantity	Unit Cost	Sub-Total	Notes
1	CONTROL OF WATER	LS	1	$ 20,000	$ 20,000	
2	REMOVE OLD CONCRETE CULVERT BANK STABILIZATION	LS	1	$ 2,000	$ 2,000	
3	ADDRESS WPA WALL	LS	1	$ 10,000	$ 10,000	
4	FES LIFTS	FACE-FT	300	$ 50	$ 15,000	
5	BACKFILL	CY	50	$ 18	$ 900	Assumes topsoil for lifts is salvaged on-site.
6	STONE TOE	CY	30	$ 140	$ 4,200	
7	REVEGETATION	AC	0.1	$ 12,000	$ 1,200	Includes native seeding and containerized shrubs and trees.
				Project Sub-Total	***$ 53,300***	

Project C1

Item #	Item	Unit	Quantity	Unit Cost	Sub-Total	Notes
1	CONTROL OF WATER	LS	1	$ 75,000	$ 75,000	
2	EARTHWORK	CY	1,000	$ 18	$ 18,000	Excludes clearing.
3	OFFSITE DISPOSAL	CY	800	$ 20	$ 16,000	Assumes clean fill.
4	FES LIFTS	FACE-FT	1,960	$ 50	$ 98,000	
5	SALVAGED TOPSOIL	CY	140	$ 17	$ 2,380	
6	BACKFILL	CY	140	$ 18	$ 2,520	
7	STONE TOE	CY	170	$ 140	$ 23,800	
8	RIFFLE STONE	CY	120	$ 140	$ 16,800	
9	HABITAT BOULDERS	EACH	8	$ 300	$ 2,400	
10	SURFACE FABRIC	SY	5,900	$ 18	$ 106,200	
11	REVEGETATION	AC	1.4	$ 12,000	$ 16,800	Includes native seeding and containerized shrubs and trees.
				Project Sub-Total	***$ 377,900***	

Project D

Item #	Item	Unit	Quantity	Unit Cost	Sub-Total	Notes
1	HABITAT BOULDERS	EACH	12	$ 300	$ 3,600	
2	LARGE WOOD	EACH	8	$ 1,500	$ 12,000	
3	RIFFLE STONE	CY	30	$ 140	$ 4,200	
				Project Sub-Total	***$ 19,800***	
				Site Total	**$ 451,000**	

Minnehaha Parkway
Engineer's Opinon of Probable Construction Cost for Stream Restoration Projects
Concept Design Phase
May 2025

Nicollet Hollow - *Option C2*

Project A

Item #	Item	Unit	Quantity	Unit Cost	Sub-Total	Notes
1	CONTROL OF WATER	LS	1	$ 20,000	$ 20,000	
2	REMOVE OLD CONCRETE CULVERT BANK STABILIZATION	LS	1	$ 2,000	$ 2,000	
3	ADDRESS WPA WALL	LS	1	$ 10,000	$ 10,000	
4	FES LIFTS	FACE-FT	300	$ 50	$ 15,000	
5	BACKFILL	CY	50	$ 18	$ 900	Assumes topsoil for lifts is salvaged on-site.
6	STONE TOE	CY	30	$ 140	$ 4,200	
7	REVEGETATION	AC	0.1	$ 12,000	$ 1,200	Includes native seeding and containerized shrubs and trees.
				Project Sub-Total	***$ 53,300***	

Project C2

Item #	Item	Unit	Quantity	Unit Cost	Sub-Total	Notes
1	CONTROL OF WATER	LS	1	$ 30,000	$ 30,000	
2	FES LIFTS	FACE-FT	1,180	$ 50	$ 59,000	
3	BACKFILL	CY	170	$ 18	$ 3,060	Assumes topsoil for lifts is salvaged on-site.
4	STONE TOE	CY	100	$ 140	$ 14,000	
5	REVEGETATION	AC	0.3	$ 12,000	$ 3,600	Includes native seeding and containerized shrubs and trees.
6	SURFACE FABRIC	SY	460	$ 18	$ 8,280	
				Project Sub-Total	***$ 117,940***	
				Site Total	**$ 171,300**	

Abbreviations; *CY - cubic yard, LS - lump sum, SY - square yard, FACE-FT - face-foot*

Totals exclude civil infrastructure, stormwater features, recreational improvements, landscape arcetecrue elements, and anything not explcitly listed. Site access, erosion and sediment control, mobilization & demobilization, clearing, contingency, and engineering design and permitting are also excluded and understood to be added on to project totals by others.

Stantec

Stantec is a global leader in sustainable engineering, architecture, and environmental consulting. The diverse perspectives of our partners and interested parties drive us to think beyond what's previously been done on critical issues like climate change, digital transformation, and future-proofing our cities and infrastructure. We innovate at the intersection of community, creativity, and client relationships to advance communities everywhere, so that together we can redefine what's possible.