Jevne Park Stormwater Improvement Project Feasibility Study

Medicine Lake, Minnesota

April 2019

Prepared for
Bassett Creek Watershed Management Commission

4300 MarketPointe Drive, Suite 200
Minneapolis, MN 55435
Phone: 952.832.2600
Fax: 952.832.2601

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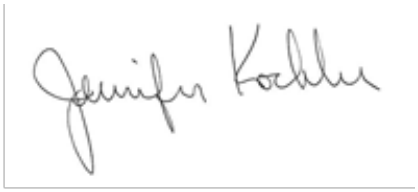
Certifications

I hereby certify that this plan, specification, or report was prepared by me or under my direct supervision and that I am a duly Licensed Professional Engineer under the laws of the state of Minnesota.



April 25, 2019

Jennifer Koehler, PE
PE #: 47500

Date

1.0 Executive Summary

1.1 Background

As the City of Medicine Lake is nearly completely surrounded by Medicine Lake, maintaining and improving the quality of the lake itself is of paramount importance to the city. Given the city's size, current infrastructure, and limited opportunity to construct projects in other locations in the city, constructing the stormwater improvement project in the Jevne Park area will offer the opportunity to improve drainage, provide additional flood storage volume for the smaller, more frequent events, and provide additional water quality volume that will reduce pollutant loads to Medicine Lake, an impaired water body due to excess nutrients.

1.2 Site Conditions

Jevne Park is a public park located on the peninsula that includes the City of Medicine Lake. The park is surrounded by Peninsula Road (see Figure 2-1). The proposed project will be fully within the park area, focusing on the existing low area/wetland in the park. This wetland is located completely in the park, and receives runoff from the adjacent road and residential areas. Water discharges from the wetland area via a 15-inch diameter corrugated metal pipe (CMP) culvert, which carries the water to the ditch on the south side of Peninsula Road. The outlet from the ditch is an 18-inch diameter CMP culvert that discharges into a small channel directly connected to Medicine Lake.

The normal water level (NWL) of the wetland in Jevne Park is controlled by the 18-inch culvert, and the invert of this culvert (887.7 ft MSL (NAVD88)) is the same as the NWL of Medicine Lake. The Minnesota Department of Natural Resources' (MnDNR) ordinary high water level (OHWL) for Medicine Lake is 889.3 ft MSL (NAVD88). Although the wetland area in Jevne Park area is not mapped as a MnDNR public water or wetland, the MnDNR has jurisdiction over work completed in Jevne Park because the wetland is hydraulically connected to Medicine Lake and below the OHWL of Medicine Lake.

1.3 Project Alternatives

Two conceptual designs were evaluated for developing water quality and flood storage volume along with improved habitat within the Jevne Park area. The first conceptual design focused on developing water quality treatment volume and flood storage in the existing wetland footprint, and the second concept concentrated on developing water quality and flood storage in an expanded footprint.

In addition to expanding flood storage across varying footprints within the project area, measures considered for potential implementation in all scenarios included the following:

- Increasing the Jevne Park flood storage volume area will help improve conditions for smaller, more frequent storm events where Peninsula Road is temporarily inundated. However, this project is not intended to reduce the 100-year flood elevations resulting from the influence of Medicine Lake.

- Increasing the Jevne Park water quality treatment volume through expanding contours below the NWL. The proposed expansion will lower the overall depth of the existing ponds, and will provide additional water quality treatment volume and reduce pollutant loads to Medicine Lake.
- Slightly modifying the bituminous surface on Peninsula Road east of Jevne Park to redirect runoff from the south side of Peninsula Road to the expanded pond in Jevne Park; this modification will allow more runoff to be treated before draining into Medicine Lake.
- The modifications to the ponding area will provide the opportunity to restore/expand wetland habitat, create additional aquatic habitat for fish, turtles, waterfowl, macroinvertebrates, and macrophytes, and establish/expand a 25-foot wetland buffer around the open water areas, as space allows.

The alternatives are discussed in more detail in Sections 5.0 and 6.0.

1.4 Relationship to Watershed Management Plan

The Bassett Creek Watershed Management Commission (BCWMC) included the Jevne Park Stormwater Improvement Project in its Capital Improvement Plan (CIP), based on the following "gatekeeper" policy from the BCWMC Plan. Those items in bold italics represent those that directly apply to the Jevne Park Improvement Project.

110. The BCWMC will consider including projects in the CIP that meet one or more of the following "gatekeeper" criteria.

- Project is part of the BCWMC trunk system (see Section 2.8.1, Figure 2-14 and Figure 2-15 of the report)
- ***Project improves or protects water quality in a priority waterbody***
- ***Project addresses an approved TMDL or watershed restoration and protection strategy (WRAPS)***
- Project addresses flooding concern

The BCWMC will use the following criteria, in addition to those listed above, to aid in the prioritization of projects:

- Project protects or restores previous Commission investments in infrastructure
- Project addresses intercommunity drainage issues
- Project addresses erosion and sedimentation issues
- ***Project will address multiple Commission goals (e.g., water quality, runoff volume, aesthetics, wildlife habitat, recreation, etc.)***
- Subwatershed draining to project includes more than one community
- Addresses significant infrastructure or property damage concerns

The BCWMC will place a higher priority on projects that incorporate multiple benefits, and will seek opportunities to incorporate multiple benefits into BCWMC projects, as opportunities allow.

The Jevne Park Stormwater Improvement Project meets several gatekeeper criteria— the project will improve water quality as its primary goal by reducing the amount of sediment and pollutants that go into Medicine Lake. Additionally, this project will also help address multiple BCWMC goals by capturing increased runoff volume, improving drainage conditions during more frequent events, enhancing water quality, providing recreation and education opportunities, and improving wildlife habitat.

1.5 Project Impacts and Estimated Costs

Potential impacts of the proposed project (increasing the flood storage and water quality treatment volumes of Jevne Park) are summarized in Table 6-1 and discussed in Section 6.0. This section also summarizes permit requirements (e.g., Minnesota Department of Natural Resources public waters work permit), temporary impacts to wetlands, tree loss, and temporary closure of part of the park.

The proposed project will redirect currently untreated water to an expanded wetland area and will result in increased permanent pooling volume in the wetland and wetland depth, therefore, reducing sediment and phosphorus loading to Medicine Lake. Estimates of existing pollutant loadings are presented in Section 6.0. The estimated increase in annual total phosphorus removal ranges from approximately 4.1 pounds per year (Concept 1) to 4.9 pounds per year (Concept 2).

This project is not intended to solve the flooding associated wither larger storm events as flooding during these events (e.g. 100-year event) is the result of high water levels on Medicine Lake. Concept 1 lowers the flood elevations of the 1-year and 2-year events by 0.2 ft, while Concept 2 lowers the flood elevations for the 1-year, 2-year, and 10-year events by 0.5 ft, 0.5 ft, and 0.2 ft, respectively. Further information on flood levels and reductions are discussed in Section 6.0.

To develop the flood storage and water quality volume, some tree removal will be required within the project disturbance/grading limits. Wetland and upland restoration, including planting of new trees and shrubs, will occur in all areas disturbed by construction. Tree replanting and restoration will be taken into consideration during final design and is included in the feasibility-level opinion of cost estimate.

The feasibility-level opinion of costs for implementing the various concepts for the 2020-2021 Jevne Park Improvement Project is presented in Table 1-1. This table also lists the 30-year annualized total phosphorus reduction costs. The annualized cost per pound of phosphorus removed for this project using the current P8 model analysis is high when compared to most other BCWMC CIP projects, but within the range of other costly projects. For example, the Northwood Lake Improvement Project had a cost per pound of phosphorus removal of $5,900. For this project, the high cost is due to the relatively small tributary area for this project, which does not generate a large amount of phosphorus load. However, there may be opportunities to optimize the design during final design to reduce overall project costs.

For a complete summary of the estimated impacts and costs of the concepts, including the methodology and assumptions used for the cost estimate, refer to Section 6.0, Section 7.0, and Table 6-1.

Table 1-1 Feasibility-level Cost Estimates Summary

Concept	Total Project Cost (-20%/30%)	30-Year Annualized Cost per Pound of Total Phosphorus Removed
1	$404,000 ($324,000-526,000)	$5,800
2	$562,000 ($450,000-731,000)	$6,700

1.6 Recommendations

Based on review of the project impacts; feedback from the Medicine Lake City Council, the public, and the Medicine Lake representatives; and the overall project costs and benefits, the BCWMC Engineer recommends constructing Concept 1, which provides the necessary volume to achieve the goals of the project.

With a larger footprint, Concept 2 develops more flood and water quality treatment volume than Concept 1. This results in more significant reductions in the peak flood elevations for the smaller, more frequent storm events and temporary inundation of Peninsula Road. However, most residents who attended the public open house did not indicate they had significant concern about the inundation of Peninsula Road.

Although Concept 2 provides slightly more pollutant removal than Concept 1 (an increase in total phosphorus removal of 4.9 lbs per year versus 4.1 lbs per year), the cost-benefit for pollutant removal is better for Concept 1, suggesting that Concept 1 is a more cost-effective project.

The estimated tree removal for Concept 1 is only 8 trees (three times fewer trees than estimated for Concept 2). Concept 1 results in a total wetland area of 0.92 acre, including the open water area, and develops 0.47 acres of wetland buffer. This concept also provides an opportunity to incorporate additional wildlife habitat such as turtle logs and water fowl nesting structures, along with educational opportunities.

The planning level estimated cost for the recommended Concept1 is $404,000 (-20%/+30%). The BCWMC CIP funding (ad valorem tax levied by Hennepin County on behalf of the BCWMC), will be the sole source of funding for this project.

2.0 Background and Objectives

As the City of Medicine Lake is nearly completely surrounded by Medicine Lake, maintaining and improving the quality of the lake itself is of paramount importance to the city. Given the city's size, current infrastructure, and limited opportunity to construct projects in other locations in the city, constructing the stormwater improvement project in the Jevne Park area will offer the opportunity to improve drainage, provide additional flood storage volume for the smaller, more frequent events, and provide additional water quality volume that will reduce pollutants loads to Medicine Lake.

Medicine Lake is listed as impaired on the Minnesota Pollution Control Agency (MPCA) 303d list for mercury, chlorides, and excess nutrients (e.g. total phosphorus), and a Total Maximum Daily Load study (TMDL) for the excess nutrients impairment was approved in 2011. The TMDL identified a needed reduction in watershed total phosphorus loads to Medicine Lake by 28 percent (1,287 pounds/year); however, the waste load allocation assigned in the TMDL was categorical, meaning the City of Medicine Lake was not assigned a specific load reduction.

2.1 Project Area Description

Jevne Park is a public park located on the peninsula that includes the City of Medicine Lake. The park is surrounded by Peninsula Road (see Figure 2-1). The proposed project will be fully within the park area, focusing on the existing low area/wetland in the park. This wetland is located completely in the park, and receives runoff from the adjacent road and residential areas.

The topographic survey indicates that the existing bottom elevation of the wetland in Jevne Park is 886.6 ft MSL (NAVD88). Water discharges from the wetland area via a 15-inch diameter corrugated metal pipe (CMP) culvert, which carries water to the ditch on the south side of Peninsula Road. The outlet from the ditch is an 18-inch diameter CMP culvert that discharges into a small channel directly connected to Medicine Lake.

The normal water level (NWL) of the wetland in Jevne Park is controlled by the 18-inch culvert, and the invert of this culvert (887.7 ft MSL (NAVD88)) is the same as the NWL of Medicine Lake.

The wetland area in Jevne Park area is not mapped as a Minnesota Department of Natural Resources' (MnDNR) public water or wetland. However, through communications with MnDNR staff during the feasibility study process, the MnDNR would take jurisdiction over work completed in Jevne Park because the wetland is hydraulically connected to Medicine Lake and below the ordinary high water level (OHWL) of Medicine Lake (889.3 ft MSL (NAVD88)).

This area is mapped as wetland as part of the National Wetlands Inventory (NWI) and is also flagged as a potential wetland in the Hennepin County Wetlands Inventory. A wetland delineation was completed in 2018 as part of this study (see Section 3.0).

Figure 2-1 shows the Jevne Park project area. Figure 2-2 shows the tributary subwatersheds (MLD-039A, MLD-039B, MLD-039C, MLD-039D, MLD-039E, MLD-039F, MLD-039G,), drainage patterns, and sanitary sewers.

2.2 Goals and Objectives

The goals and objectives of the feasibility study are to:

1. Review the feasibility of developing increased open water area including the development of additional flood and water quality treatment volume in Jevne Park, and identify and evaluate up to three alternatives.

2. Develop up to three conceptual designs, including preliminary grading in AutoCAD Civil 3D, modeling hydrology and hydraulics using XP-SWMM, and modeling water quality improvements using P8.

3. Provide a planning level opinion of cost for design and construction of the alternatives.

4. Identify potential project impacts and permitting requirements.

5. Develop visual representations of up to three alternatives for public input.

The goals and objectives of the stormwater improvement project are to:

1. Better manage stormwater runoff, as the city has no municipal storm sewer system.

2. Increase capacity for stormwater storage within the existing natural pond/wetland and swale in Jevne Park.

3. Provide a better way to route, carry and store excess stormwater to minimize flooding within Jevne Park and on adjacent residential properties (approximately 15).

4. Reduce sediment and phosphorus loading to Medicine Lake.

5. Reduce City of Medicine Lake capital and maintenance expenditures associated with road and culvert repair caused by excessive volumes and rates of runoff.

6. Sustain/expand existing waterfowl and wildlife habitats.

2.3 Considerations

Key considerations for project alternatives included:

1. Maximizing the amount of permanent pool storage to provide water quality benefits, and maximizing flood storage for smaller, more frequent events.

2. Minimizing the permitting required to construct the project.

3. Maintaining or improving the functionality of Jevne Park, including water quality, flood control, and habitat functions.

4. Minimizing wetland impacts.

5. Balancing tree loss and flood/water quality storage development.

The considerations listed above played a key role in determining final recommendations and will continue to play a key role through final design.


Peninsula Rd
Medicine Lake
Channel to
Medicine Lake
Peninsula Rd
Aerial Imagery: Nearmap May 2018
Jevne Park
Plymouth
New
Hope
Golden
Valley
Medicine Lake
61
70
169
6
Channel
Contour Type
10-Foot Contour
2-Foot Contour
Jevne Park Boundary
and Project Area
Parcels
Bassett Creek
Watershed
Management
Commission
N
0
50
100
Feet
Jevne Park
Project Area
BCWMC
FIGURE 2-1
BARR
Barr Footer: ArcGIS 10.6.1, 2019-04-10 07:23 File: I:\Client\BassettCreek\Work_Orders\2018\JevneParkWMaps\Reports\Figure2-1_ProjectArea_11x17_2.mxd User: RCS2

Sanitary Sewer Manholes
Runoff Direction
Culverts
Sanitary Sewer
Channel

Contour Type

10-Foot Contour
2-Foot Contour
Jevne Park Boundary and Project Area
Subwatersheds
Parcels

0 100 200
Feet

Jevne Park Subwatershed Boundaries, Drainage Patterns, and Sanitary Sewers BCWMC

FIGURE 2-2

3.0 Site Conditions

3.1 Project Location and Characteristics

3.1.1 Existing Drainage and Flooding Conditions

Under existing conditions, the watershed area tributary to Jevne Park is approximately 14.7 acres. Adjacent watersheds include 5.4 acres that drain to the wetlands along the ditch south of Peninsula Road (not to Jevne Park), and 1.8 acres that drain along the south side of Peninsula Road east of the park—this area bypasses the low point in Jevne Park and drains directly to Medicine Lake.

The watershed is fully-developed; the existing land use is primarily single-family residential.

The City of Medicine Lake has no curb and gutter or municipal storm sewer system; the drainage from the city is conveyed via ditches and culverts. Under existing conditions, during smaller, more frequent events, standing water has temporarily been observed on Peninsula Road. During the 2-year event, there is a small amount of standing water on Peninsula Road at the northeast corner of the park, and by the 10-year event, two areas of Peninsula Road are temporarily inundated.

Also, because the City of Medicine Lake is nearly completely surrounded by Medicine Lake, and the low area in Jevne Park is hydraulically connected to Medicine Lake via the series of culverts, flooding elevations for storm events greater than the 10-year (10% chance) event can result in high water levels in the park area and standing water on Peninsula Road resulting from elevated water levels on Medicine Lake. Jevne Park is within the 100-year (1% chance) floodplain for Medicine Lake, including the 100-year floodplain as modeled by the BCWMC and as officially mapped by FEMA.

3.1.2 Site Access

Construction access will be fairly straightforward because the project is located on public property (Jevne Park) or within a City of Medicine Lake drainage and utility easement. Relatively few obstacles or infrastructure elements block access to the proposed work areas.

Access to the site is via Peninsula Road, which has weight restrictions year-round, which will need to be considered in bidding and construction.

3.1.3 Environmental Site Investigation

Review of the MPCA's "What's in my Neighborhood?" database indicated the presence of a fuel tank on an adjacent residential property; the site is still currently active with the MPCA. The site included the Mikolai Property – MPCA Leak Site #19477, 224 Peninsula Road, Medicine Lake, MN 55441.

Barr completed a review of the files for this site. The leak was discovered when two fuel oil tanks (300 and 560 gallons) were removed in 2014 when the historical home was demolished for construction of a new single family home. An investigation was performed that identified petroleum contamination in the former tank basin shown by elevated Diesel Range Organic (DRO) concentrations and volatile organic headspace readings below the water table. Groundwater samples did not indicate contamination above

drinking water standards or DRO levels requiring additional investigation. The contamination was confined vertically to 12 feet below ground surface by a clay layer. Soil borings advanced in radial directions beyond the tank basin did not identify petroleum impacts in the soil or groundwater, so the extent of the contamination appears to be limited to the vicinity of the tank basin. The site is still active, and the MPCA has requested additional investigation of subslab vapors to assess the potential for vapor intrusion into the newly constructed home and homes on surrounding properties. No records of a vapor sampling plan or additional investigations were included in the MPCA files.

Given the drainage patterns in the watershed and larger region, groundwater flow was inferred to be to the east, toward Medicine Lake and away from the Jevne Park project area, it is not anticipated that the leak would result in impacts to soil, soil gas or groundwater in the project area.

3.1.4 Topographic, Utility, and Tree Surveys

Barr performed a topographic, utility, and tree survey in fall 2018 to develop the existing conditions base map and also to serve in the development and evaluation of the concepts.

A Topcon GR5 VRS, base/receiver, and PS Total Station were used to gather topographic and utility information within the project extents. Topographic information was collected in Hennepin County NAD83 horizontal datum and NAVD88 vertical datum. A detailed survey of the outlet structure and overflow around Jevne Park area was completed. Topographic survey information was imported into AutoCAD Civil 3D to create an existing conditions surface for this feasibility study.

A tree survey was conducted at the same time, where species, condition, and diameter data were collected for trees greater than four inches in diameter.

The existing conditions topographic, storm sewer/culvert and tree survey results are shown in Figure 3-1. The full topographic, utility and tree survey results can be found in Appendix C.

3.1.5 Wetland Delineations and Sediment Sampling

Barr delineated the wetlands within Jevne Park and on private property south of Peninsula Road, where authorized by the property owners. The delineation was completed on September 21, 2018. The delineated wetland boundaries and sample points were surveyed using a Global Positioning System (GPS) with sub-meter accuracy. Wetlands were classified using the U.S. Fish and Wildlife Service (USFWS) Cowardin System (Cowardin et al., 1979), the USFWS Circular 39 system (Shaw and Fredine, 1956), and the Eggers and Reed Wetland Classification System (Eggers and Reed, 1977). Minnesota Routine Assessment Method for Evaluating Wetland Functions (MnRAM) assessments were performed for each delineated wetland.

Twelve individual wetlands were delineated within the site area, one in Jevne Park and the remainder along the ditch and on private property south of Peninsula Road. The total wetland area from the delineation was 1.97 acres, including the wetland area within Jevne Park and the private properties south of the Peninsula Road. The Jevne Park wetland delineated area is 0.86 acres.

The complete wetland delineation report is included as Appendix A. The wetland delineation results within Jevne Park are shown in Figure 3-1.

As part of the wetland delineation, a preliminary investigation of sediments in the wetland within Jevne Park was conducted to determine if there appeared to be significant accumulation of stormwater runoff sediments. The hand borings exhibited sparse coarser textured sediments intermixed with a mucky/clay-loamy substrate held together by a thick root mat, representing more of a natural/native substrate layer with limited sediment accumulation at the bottom of the wetland. As a result, no further investigation of the sediments in the pond was pursued.

3.1.6 Threatened and Endangered Species

Barr performed a desktop threatened and endangered species review to determine the potential for adverse impacts to state- and federally-listed species. Specific habitat types that will be directly impacted by this project include emergent wetland, forested wetland, forested upland, and artificial paved surfaces.

In October 2018, Barr requested the Natural Heritage Information System (NHIS) database through a licensed agreement (LA-898) with the MnDNR to review potential species' impacts. The results of this query indicate that two state-listed or tracked species have been recorded within a 1-mile radius of the project area—the Blanding's turtle and the bald eagle.

The Blanding's turtle uses a variety of aquatic habitats, including marshes, bays of lakes, slow-moving waters with areas of submergent and emergent vegetation, and wet meadows near these habitats. There is suitable Blanding's turtle habitat in the immediate vicinity of the project, and Blanding's turtles have been recorded within 1 mile of the project area. During the active season (considered March–November), this species tends to spend a large majority of its time on land. Nesting typically occurs May–June, and their nesting sites are in sandy soil within 300 meters (984 feet) of a wetland. The primary measure to avoid direct impacts to this species is to install exclusion fencing around the entire work area during the turtle's non-nesting period (November–March); then work can be conducted any time of year as long as fencing is maintained. If a Blanding's turtle is observed in the work area, work would cease and the MnDNR notified. It is expected that work could resume once the turtle is removed from the construction area.

The bald eagle nests in mature trees in mature forested areas near larger bodies of water. There is suitable bald eagle habitat in the immediate vicinity of the project, and bald eagles have been recorded within 1 mile of the project area. A nest survey is recommended at this site prior to starting work, due to the potential for bald eagle presence. Preferably, the survey should be conducted no more than two weeks prior to mobilization. If a nest is observed within 660 feet of the project, an additional survey may be required to determine nest activity.

The U.S. Fish and Wildlife Service (USFWS) Information for Planning and Conservation (IPaC) tool identifies one federally-listed species, the northern long-eared bat (*Myotis septentrionalis*; threatened) as potentially occurring in the vicinity of the project.

The northern long-eared bat hibernates in caves during the winter and uses forested areas for roosting and foraging during the active season of April—September. Suitable roost trees for this species are trees measuring greater than 3 inches diameter at breast height (dbh) with loose, peeling bark or crevices. Numerous trees exceeding 3 inches dbh exist in the project area and will be cleared as part of this project. According to data available from the MnDNR and USFWS, there are no known, occupied roost trees or hibernacula located with several miles of the project. Because the project occurs within the range of the northern long-eared bat and suitable habitat trees are anticipated to be cleared as part of the project, the possibility of direct and indirect impacts cannot be completely discounted. Therefore, the project may effect, but is not likely to adversely affect the northern long-eared bat. Additionally, per the final 4 (d) rule and associated programmatic Biological Opinion published by the USFWS, no prohibited take of the northern long-eared bat will occur as part of this project due to the lack of roost trees and hibernacula in the project vicinity. To minimize potential impacts to the northern long-eared bat, the USFWS recommends that trees are cleared outside of the species' active season, which is typically considered April—September in Minnesota.

In summary, suitable habitat may be within the vicinity of the project for both the Blanding's turtle and the bald eagle. The project may affect, but is not likely to adversely affect the federally-threatened northern long-eared bat and is not expected to cause prohibited take of this species. Barr recommends following the avoidance measures identified above to minimize impacts to listed species.

3.1.7 Cultural Resources

On September 27, 2018, Barr requested a file search of the Minnesota State Historic Preservation Office (SHPO) Standing Structures (Historic) and Archaeology Inventories for all public land survey sections that include the project area.

SHPO responded to the data request with information indicating that there are numerous recorded historic and archaeological resources within the evaluated area. The evaluated area includes the township-range-section that the project is located in. The search found 18 historical inventory records and 2 archaeological inventory records within the evaluated area. Recorded resources include: one resort, two railroad corridor segments, two archaeological sites, and 15 residences. Because it is not anticipated that the project would impact private properties, impacts to cultural resources are not anticipated.

This data represents what is in the SHPO database, but is not necessarily an exhaustive list of known cultural resources in the project area. The SHPO database only reflects currently known resources, so it is possible that unidentified cultural resources may be present within the project area and could be adversely affected during construction.

Further cultural resources evaluation may be required as part of future design and permitting efforts to ensure that the project develops in a way that avoids and minimizes impacts to cultural resources.

3.1.8 Ordinary High Water Level

Being surrounded by Medicine Lake, the Jevne Park wetland's water level is directly affected by the lake. As defined in Minnesota Statutes 103G.005, the OHWL for water basins is "an elevation delineating the highest water level that has been maintained for a sufficient period of time to leave evidence upon the landscape, commonly the point where the natural vegetation changes from predominantly aquatic to predominantly terrestrial." The MnDNR determined that the OHWL for Medicine Lake is 889.3 ft MSL (NAVD88). Based on conversations with MnDNR staff and the hydraulic connection between Jevne Park and Medicine Lake, the Jevne Park area is considered part of Medicine Lake and therefore has the same OHWL.

4.0 Stakeholder Input

4.1 Medicine Lake Representatives

Unlike the other cities within the BCWMC, the City of Medicine Lake does not have city staff (e.g. city engineer, etc.). Therefore, four resident representatives were selected to participate in the feasibility study process. These representatives included the following:

- Clint Carlson – BCWMC Commissioner
- Gary Holter – BCWMC Alternative Commissioner
- Susan Wiese – BCWMC Technical Advisory Committee (TAC) Representative
- Chris Klar – City of Medicine Lake Public Works Representative

4.2 Public Stakeholder Meetings

4.2.1 Project Kick-off Meeting with BCWMC staff and Medicine Lake Representatives

A project kick-off meeting was held in Medicine Lake City Hall with BCWMC staff and Medicine Lake representatives on August 13, 2018. At this meeting, BCWMC staff, the city representatives, and Barr staff shared their respective information regarding the Jevne Park area, which included the historic ownership agreement and existing flood situation.

The city representatives expressed their request to maintain Jevne Park's use as a scenic park, and suggested limiting the storage expansion outside of the current wetland footprint.

After the meeting, BCWMC staff drafted letters to the residents adjacent to the park, south of Peninsula Road to gather feedback on potential participation with the BCWMC on this project and to gain permission to access their property for field data collection.

Peninsula Road

Jevne Park

Peninsula Road

Medicine Lake

Wetland Boundary
Wetland Area
Open Water
Wetland Buffer
Existing Culverts
Existing Topography
Surveyed Tree

Bassett Creek Watershed Management Commission

0 10 50 100
Feet

BARR

Jevne Park
Site Conditions
BCWMC

Figure 3-1

4.2.2 Meeting with Medicine Lake Representatives

A second meeting with the city representatives was held on December 17, 2018. Barr shared the existing conditions information collected from the surveys, and compiled from the refined models. Permitting and habitat considerations were also discussed.

Three proposed concepts were presented with the proposed site footprint, and the addition of flood storage and water quality volume for each concept. The first two concepts would be located completely within Jevne Park, while the third concept would also include expanding water quality and flood storage volume on the private property south of Peninsula Road. However, based on preliminary evaluation of the contributing watershed areas and the water quality and flood storage volumes in the wetlands south of Peninsula Road, it was determined these areas were already providing an appropriate level of treatment for the watershed. Based on this conversation, the city representatives expressed their preference for continuing with the evaluation of the first two concepts for the feasibility study, and eliminating the evaluation of the work on the private property south of Peninsula Road.

The city representatives expressed concerns about the operations and maintenance costs of managing sediments and the wetland buffer and requested that the concepts be discussed with the Medicine Lake City Council before holding a public meeting.

4.2.3 City Council Meeting

The BCWMC Administrator and Engineer attended the February 4, 2019 City of Medicine Lake City Council meeting held in Medicine Lake City Hall. The BCWMC CIP program was presented to the Council, along with an overview of the Jevne Park stormwater improvement project. The two refined concepts were presented during the meeting, along with the estimated flood level reduction and pollutant removal for each concept. Project capital costs and operations and maintenance costs were presented as well.

The City Council asked questions regarding the project and the concepts and expressed support for the project to move forward, noting a preference for Concept 1. The operation and maintenance costs of each concept were further refined prior to the public open house based on the questions from the City Council.

4.2.4 Public Open House

The public open house was held on February 28, 2019 in Medicine Lake City Hall to give residents the opportunity to discuss the concepts and ask questions related to the project. Approximately 15 residents attended the open house. Concepts 1 and 2 were presented to the public, including a detailed description, the estimated flood level reduction and water quality improvement performance, the estimated costs (capital and operations and maintenance), and benefits.

Conversations with most residents at the open house did not indicate that they were concerned about the temporary inundation of Peninsula Road during smaller, more frequent events and all attendees recognized that this project would not impact the standing water on the roadway during the larger events due to high water levels on Medicine Lake.

Some residents indicated their concerns about the safety of children playing in the park adjacent to an open water area and the safety of the sheet pile weir diversion (intended to extend the runoff flow path). Each conceptual design includes a 10:1 safety bench. We also discussed that during final design, plantings in the buffer and along the edge of the pond can be used to prevent access to the wetland. However, safety should be considered during final design. We also discussed that the final design can consider any known future park plans, such as trails, etc. if this plan/direction can be provided by the city in advance of the final design. This park planning effort would need to be completed by the city and is not part of the BCWMC CIP project scope.

Additionally, one resident indicated that the existing culvert outlet from the wetland in Jevne Park to the ditch on the south side of Peninsula Road is in poor condition and may be partially collapsed. This should be further evaluated during final design.

After discussing the concepts with BCWMC staff, residents were asked to provide a response regarding which concept they preferred or if they preferred to do nothing, based on their understanding of each concept and the anticipated impact on their perceived drainage and water quality concerns.

Based on the response received, the following were the public input results in relation to the preferred concept:

- Do nothing: 8%
- Concept 1: 75%
- Concept 2: 17%

4.3 Technical Stakeholder Meeting

An agency meeting was held with technical stakeholders to solicit feedback on and discuss permitting requirements for the proposed project on November 7, 2018.

Attendees included representatives from the BCWMC, the City of Medicine Lake, the MnDNR, and the MPCA. Information regarding the existing conditions, the general goals, and design concept for the project were presented, which was followed by discussion related to technical feedback and permitting input. The items discussed included:

- Review of project background and history
- Review of site information compiled to date and site investigation work completed
- Review of potential design concepts
- Discussion of regulatory issues, potential permit requirements and other considerations
- Discussion of next steps

Section 6.4 of this feasibility study summarizes the anticipated permitting requirements, based on the discussion at the agency meeting and follow-up correspondence.

5.0 Project Concepts

This section provides a summary of the two conceptual designs developed and evaluated for the Jevne Park stormwater improvement project feasibility study.

5.1 Analyzed Alternatives for Jevne Park Stormwater Improvement Project

When selecting a conceptual design alternative for detailed design and construction, the BCWMC and the City of Medicine Lake may decide to select one of the alternatives, but further discussions and suggestions are encouraged to best meet the overall project budget and goals.

As previously mentioned, a third concept was initially considered, which also included expansion of flood and water quality treatment volume in the wetlands and low areas on the private property south of Peninsula Road. However, after preliminary evaluation of the topographic information and evaluation of the watershed and discussion with the Medicine Lake representatives, it was determined that these wetlands are already providing an appropriate amount of treatment and storage for the contributing area. As a result, this concept was eliminated from further consideration and evaluation.

The following sections outline the components of the two remaining concepts. Section 6.0 summarizes the impacts of the conceptual designs. Although not explicitly included in the cost estimate, an education kiosk could be included in either concept design, and the relatively modest cost (about $5,000) could be covered by the construction contingency.

5.1.1 Concept 1— Water Quality and Flood Storage in Existing Wetland Footprint

The primary focus of the Concept 1 design is developing water quality and flood storage volume primarily in the existing wetland footprint. Figure 5-1 shows a visual representation of the proposed features of Concept 1. This alternative includes the following design components:

- Expanding the flood mitigation volume in Jevne Park by 0.38 acre-feet to reduce peak flood elevations during smaller, more frequent events.
- Increasing the permanent pool volume for Jevne Park Pond by 0.69 acre-feet from existing conditions through excavation primarily within the existing wetland footprint. This includes creating 0.33 acres of additional open water area and lowering the bottom of the existing wetland to elevation 884 feet MSL, creating a maximum pond depth of 3.7 feet. Ponding depths greater than 3 feet provide more water quality improvement benefits, and ponding depths less than 4 feet create better habitat. The proposed expansion will change the average depth from 0.6 feet to 1.9 feet.
- Maximizing water quality improvement performance by installing a sheetpile diversion wall between the main inflow locations and the existing pond outlet to increase the flow path through the wetland.

- Slightly modifying the bituminous surface on Peninsula Road east of Jevne Park to redirect runoff from the south side of Peninsula Road to the expanded pond in Jevne Park; this modification will allow more runoff to be treated before draining into Medicine Lake.

- Restoring the wetland and establishing a 25-foot wetland buffer (as space allows) around the proposed wetland area. Concept 1 results in a total wetland area of 0.92 acre, including open water and 0.47 acres of wetland buffer, an increase of 0.06 acres from existing conditions. This restoration will allow for the creation of habitat for wildlife, waterfowl, fish, macroinvertebrates, and macrophytes, and installation of habitat features, such as turtle logs and waterfowl nesting boxes.

- Removing and replacing an estimated 8 trees.

5.1.2 Concept 2— Water Quality and Flood Storage in Expanded Footprint

Conceptual design 2 includes the development of more water quality and flood storage volume in an expanded footprint within Jevne Park. Figure 5-2 shows a visual representation of the proposed features of Concept 2. This alternative includes the following design components:

- Expanding the flood mitigation volume in Jevne Park by 0.93 acre-ft to reduce peak flood elevations during smaller, more frequent events.

- Increasing the permanent pool volume for Jevne Park Pond by 1.6 acre-feet from existing conditions through excavation primarily within the existing wetland footprint. This includes creation of 0.62 acres of additional open water area and lowering the bottom of the existing wetland to elevation 884 ft MSL (NAVD88), creating a maximum pond depth of 3.7 feet. Ponding depths greater than 3 feet provide more water quality improvement benefits, and ponding depths less than 4 feet create better habitat. The proposed expansion will change the average depth from 0.6 feet to 1.6 feet.

- Maximizing the water quality improvement performance by installing a sheetpile diversion wall between the main inflow locations and the existing outlet of the pond to increase the flow path through the wetland.

- Slightly modifying the bituminous surface on Peninsula Road east of Jevne Park to redirect runoff from the south side of Peninsula Road to the expanded pond in Jevne Park; this modification will allow more runoff to be treated before draining into the Medicine Lake.

- Restoring the wetland and establishing a 25-feet wetland buffer (as space allows) around the proposed wetland area. Concept 2 results in a total wetland area of 1.16 acres, including open water and 0.53 acres of wetland buffer, an increase of 0.3 acres from existing conditions. This restoration will allow for the creation of habitat for wildlife, water fowl, fish, macroinvertebrates, and macrophytes, and installation of habitat features, such as turtle logs and water fowl nesting boxes.

- Removing and replacing an estimated 24 trees.

Install 25’ wetland buffer, where appropriate.

Include habitat features such as turtle logs, water fowl nesting boxes, etc.

Install sheetpile weir to increase flow path through wetland

Modify bituminous to direct runoff toward and improve drainage to wetland

Peninsula Road

Peninsula Road

Jevne Park

Medicine Lake

Approximate Wetland Boundary
Wetland Area
Open Water
Wetland Buffer
Existing Culverts
Sheet Pile Weir
Existing Topography
Proposed Topography
Surveyed Tree

Bassett Creek Watershed Management Commission

0 10 50 100
Feet

BARR

Jevne Park Concept Design 1- Water Quality and Flood Storage in Existing Wetland Footprint

BCWMC

Figure 5-1

Install 25’ wetland buffer, where appropriate.

Include habitat features such as turtle logs, water fowl nesting boxes, etc.

Install sheetpile weir to increase flow path through wetland

Modify bituminous to direct runoff toward and improve drainage to wetland

Peninsula Road

Peninsula Road

Jevne Park

Medicine Lake

Approximate Wetland Boundary
Wetland Area
Open Water
Wetland Buffer
Existing Culverts
Sheet Pile Weir
Existing Topography
Proposed Topography
Surveyed Tree

0 10 50 100
Feet

Bassett Creek Watershed Management Commission

BARR

Jevne Park
Concept Design 2-
Water Quality and Flood Storage in Exanded Wetland Footprint

BCWMC

Figure 5-2

6.0 Project Modeling Results and Potential Impacts

This section discusses the results of the hydrologic, hydraulic, and water quality modeling and provides information on potential project impacts of each concept, including permitting requirements. Table 6-1 summarizes the design features and potential impacts of the concepts, in comparison to the project area's existing conditions.

6.1 Hydrologic, Hydraulic, and Water Quality Modeling

Hydrologic and hydraulic information and water quality information are available for the project area in the form of a XP-SWMM hydrologic and hydraulic model and a P8 water quality model. The BCWMC completed the Phase 2 XP-SWMM model in 2017 for Bassett Creek and its contributing watersheds. The BCWMC developed the P8 model in 2012 for Bassett Creek and its contributing watersheds, and updates the model annually. These tools were used to evaluate the impact of each concept.

Final design efforts should include additional refinements to the XP-SWMM and P8 water quality modeling. The improvements that will ultimately be constructed should also be incorporated into the BCWMC XP-SWMM model and the P8 model after completion of the project.

6.1.1 XP-SWMM Modeling Results

The 2017 BCWMC Phase 2 XP-SWMM model was utilized for hydrologic and hydraulic modeling efforts for this project. This existing BCWMC Phase 2 model subwatersheds around Jevne Park were refined by subdividing the area into seven subwatersheds. This updated model was used to evaluate existing conditions for the project area and the flood elevation results were used as a basis of comparison for the proposed conceptual designs. Additionally, the surveyed culvert information (inverts, diameters, materials) were incorporated into the model.

The updated existing conditions BCWMC Phase 2 XP-SWMM model was hydraulically modified to model each of the two conceptual designs. Storage curves were revised to represent the proposed grading contours for the two concepts. Maximum flood elevations for the Atlas 14 1-, 2-, 10-, and 100-year recurrence intervals were analyzed and compared for the conceptual designs.

Table 6-1 (the comparative matrix) provides the maximum 1-, 2-, 10-year and 100-year flood elevations for existing conditions and the two conceptual designs for the Jevne Park wetland/pond. Placeholder for:

Figure 6-1 and Placeholder for:

Figure 6-2 show the proposed 2- and 10-year inundation maps of Concept 1 and Concept 2, respectively.

The primary goal of the Jevne Park stormwater improvement project is to develop water quality volume; another purpose is to reduce flood elevations on the Jevne Park wetland/pond for the smaller, more frequent events.

For the 1-year event and 2-year event, the expansion of flood storage reduces the flood elevations on the Jevne Park wetland/pond by 0.2 feet (Concept 1) and 0.5 feet (Concept 2). Concept 1 reduces the inundation on Peninsula Road during the 2-year event, while Concept 2 eliminates the inundation on Peninsula Road during the 2-year event.

For the two concepts, Concept 1 will not change the 10-year flood elevations, having minimal impact on inundation on Peninsula Road, while Concept 2 reduces the 10-year flood elevations on the Jevne Park wetland/pond by 0.2 feet, having a slight impact on the inundation on Peninsula Road.

For the 100-year event, the flood elevations on the Jevne Park wetland/pond are impacted by the backup of Medicine Lake. Because the proposed concepts will not impact the peak flood elevation of Medicine Lake, the 100-year event flood elevation would be maintained in both concepts, compared to the existing condition.

The proposed minor modification of the road surface of Peninsula Road will improve drainage to the pond in Jevne Park and will redirect the watershed area on the south side of Peninsula Road, east of the park, to the park, to the pond for additional storage/treatment.

The results of the XP-SWMM modeling indicate that both concepts will achieve this goal.

6.1.2 P8 Water Quality Modeling Results

This study also included updating the BCWMC P8 model with current site conditions for the Jevne Park wetland/pond area, and using the P8 water quality model to estimate the water quality improvement expected from each proposed concept.

The pollutant (total phosphorus) removals for the Jevne Park wetland/pond for each conceptual design alternative were estimated using the BCWMC P8 model. The model was first refined to reflect existing conditions, using the bathymetric survey data collected during this feasibility study. The model was then updated to reflect the additional permanent pool and flood pool volumes provided by each of the concepts, including the lowered pond bottom, the expansion of the volume in the Jevne Park wetland/pond, and the rerouting of additional drainage area to the expanded pond footprints.

Under current conditions, the P8 model estimates that the Jevne Park wetland/pond removes approximately 2.9 pounds per year of total phosphorus. With implementation of Concept 1, the total phosphorus removal rate would increase to approximately 7.0 pounds per year (additional removals of 4.1 pounds of total phosphorus per year). The implementation of Concept 2 would increase the total phosphorus removal rate to around 7.7 pounds per year (additional removal of 4.9 pounds of total phosphorus removal per year). The performance of the Jevne Park stormwater improvement project on pollutant removals is summarized in Table 6-1.

Table 6.1: Jevne Park Stormwater Improvement Project Concept Matrix Summary

Category	Item	Existing Conditions	Concept 1: Water Quality and Flood Storage in Existing Wetland Footprint	Concept 2: Water Quality and Flood Storage in Expanded Footprint
Outlet	Normal Water Level (NWL)	887.7	887.7	887.7
	Overflow Elevation (Over Peninsula Road)	890.5	890.5	890.5
	Ordinary High Water Level (OHWL)	889.3	889.3	889.3
Flood Storage	Total Flood Volume (ac-ft)	2.52	2.90	3.45
	Increase in Flood Mitigation Volume (ac-ft)	N/A	0.38	0.93
	1-Year Flood Elevation	889.3	889.1	888.8
	1-Year Total Water Depth	2.7	5.1	4.8
	2-Year Flood Elevation	889.6	889.4	889.1
	2-Year Total Water Depth	3.0	5.4	5.1
	10-Year Flood Elevation	890.0	890.0	889.8
	10-Year Total Water Depth	3.4	6.0	5.8
	100-Year Flood Elevation	890.4	890.4	890.4
	100-Year Total Water Depth	3.8	6.4	6.4
Water Quality	Open Water Surface Area (ac) - In Jevne Park	0.06	0.39	0.72
	Increase in Open Water Surface Area (ac)	N/A	0.33	0.67
	Water Quality Treatment Volume (ac-ft)	0.03	0.72	1.63
	Increase in Water Quality Treatment Volume (acre-ft)	N/A	0.69	1.60
	Maximum depth (ft)	1.1	3.7	3.7
	Average Depth (ft)	0.6	1.9	1.6
	Total Phosphorus Removal (lbs/yr)	2.9	7.0	7.7
	Increase in Total Phosphorus Removal (lbs/yr)	N/A	4.1	4.9
	Total Phosphorus Removal rate (%)	25%	60%	66%
	Total Suspended Solids Removal (lbs/yr)	1600.8	2658.6	2804.1
	Increase in Total Suspended Solids Removal (lbs/yr)	N/A	1057.8	1203.2
	Total Suspended Solids Removal rate (%)	50%	84%	88%
Other Habitat	Estimated Tree Removal	N/A	8	24
	Wetland Area (including open water) (ac)	0.86	0.92	1.16
	Wetland Buffer Area (ac)	0.15	0.47	0.53
	Other Habitat Features	N/A	Opportunity to incorporate	Opportunity to incorporate
Project Costs	Feasibility Level Opinion of Cost	N/A	$404,000	$562,000
	Feasibility Level Opinion of Cost Range (-20% to +30%)	N/A	$324,000-526,000	$450,000-731,000
	30-Year Annualized Cost Estimate	N/A	$24,000	$32,000
	Cost per Acre-Ft of Flood Mitigation Volume	N/A	$585,600	$351,300
	Annualized Cost per Pound of Total Phosphorus Removed	N/A	$5,800	$6,700

Culverts

Existing Inundation
2-year, 24-hour Event

Existing Inundation
10-year, 24-hour Event

Concept 1 Inundation
2-year, 24-hour Event

Concept 1 Inundation
10-year, 24-hour Event

Subwatersheds

Contour Type

10-Foot Contour

2-Foot Contour

Jevne Park Boundary
and Project Area

Parcels

0 100 200
Feet

Jevne Park
Concept 1
Inundation Area
BCWMC

FIGURE 6-1

BARR

Culverts

Existing Inundation
2-year, 24-hour Event

Existing Inundation
10-year, 24-hour Event

Concept 2 Inundation
2-year, 24-hour Event

Concept 2 Inundation
10-year, 24-hour Event

Subwatersheds

Contour Type

10-Foot Contour

2-Foot Contour

Jevne Park Boundary
and Project Area

Parcels

Bassett Creek Watershed Management Commission

0 100 200
Feet

Jevne Park
Concept 2
Inundation Area
BCWMC

FIGURE 6-2

BARR

6.2 Wetland and Upland Creation and Restoration

Because the Jevne Park wetland area will be disturbed during the construction, wetland and upland habitat creation and/or restoration is a major component of this project. The final restoration approach will consider water level fluctuations, a variety of habitat restoration, as well as the park user experience, based on direction to be provided by the City of Medicine Lake at the time of final design.

Based on guidance from the MnDNR in relation to aquatic wildlife habitat creation (MnDNR, 2002), important considerations include:

- A complex of wetland types interspersed with upland provides optimum habitat
- Shallow water (no more than 4 feet deep)
- Flatter slopes
- Variable/undulating depths
- Larger, irregular shape
- Floating logs, nest boxes, etc.
- Seeding and planting of more diverse species
- Inclusion of a wetland buffer

For both concepts, there will be ample opportunity for the creation of additional upland and aquatic habitat. Enhanced wetland areas should allow for increased water quality treatment and enriched wetland fringe communities for animal and plant species. The total wetland areas for each concept are summarized in Table 6-1.

For both conceptual designs, tree removal will be required within the disturbance limits to develop the additional flood storage and water quality volume. However, replanting will be considered in the upland areas, which will be restored with native plants, shrubs, and trees, with specific details to be determined during final design. Existing trees will be preserved in areas outside the disturbance/grading limits.

6.3 Easement Acquisition

All of the proposed work is located on public property, so no additional easement acquisition is anticipated. Also, no temporary construction easements are anticipated to be needed, as all access to the site, construction staging, and grading efforts should all be possible from the roadway or park area. Therefore, the feasibility planning level opinions of cost do not include the estimated cost of permanent or temporary easement acquisition in this area.

6.4 Required Project Permits

The proposed project is expected to require the following permits/approvals, regardless of the selected concept:

- Clean Water Act Section 404 Permit (USACOE)
- Public Waters Work Permit (MnDNR) – much of the proposed work is below the OHWL of Medicine Lake and falls within the jurisdiction of the MnDNR. A permit will be required for impacts below the OHWL, as well as for any temporary water level drawdown activities below the OHWL.
- Section 401 Water Quality Certification (MPCA)
- Construction Stormwater General Permit (MPCA) – required for disturbance areas greater than 1 acre
- Compliance with the Minnesota Wetland Conservation Act (WCA) – There are small portions of the delineated wetland that will be disturbed that are above the OHWL (not within the MnDNR jurisdiction). Correspondence to date suggests that MnDNR will not take jurisdiction over these areas and the WCA will apply.
- City of Medicine Lake permits – the city does not have specific regulations for trees, but in the event the project would trigger a variance or conditional use permit (CUP), the city may want to review loss of trees larger than 12 inches in diameter.

Although both concepts propose work below the OHWL of a public water and will change the public water cross section, because the anticipated disturbance footprints for the two concepts within the Jevne Park wetland area are less than one acre, the project should not trigger the Minnesota Environmental Quality Board (EQB) Environmental Assessment Worksheet (EAW) process.

6.5 Temporary Closure

A portion of Jevne Park will need to be closed to the public during the construction. Additionally, depending on construction access, there may be temporary closures of Peninsula Road, or a lane of Peninsula Road, adjacent to Jevne Park.

7.0 Project Cost Considerations

This section presents the feasibility-level opinion of cost of the evaluated alternatives, discusses funding sources, and provides an approximate project schedule.

7.1 Opinion of Cost

The opinion of cost is a Class 4 feasibility-level cost estimate as defined by the American Association of Cost Engineers International (AACI International) and uses the assumptions listed below and detailed in the following sections.

1. The cost estimate assumes a 30% construction contingency.
2. Costs associated with design, permitting, and construction observation (collectively "engineering") is assumed to be 30% of the estimated construction costs.

The Class 4 level cost estimates have an acceptable range of between -15% to -30% on the low range and +20% to +50% on the high range. Based on the development of concepts and initial vetting of the concepts by the City of Medicine Lake, it is not necessary to utilize the full range of the acceptable range for the cost estimate; and we assume the final project costs may be between -20% and +30% of the estimated project budget.

Table 7-1summarizes the feasibility-level total construction cost estimates, the cost per acre-foot of flood control volume, the 30-year annualized total construction cost estimates, and the annualized costs per pound of total phosphorus removed for each recommended concept. Appendix B provides the detailed cost-estimate tables for both concepts.

Table 7-1 Jevne Park Stormwater Improvement Project Concept Cost Summary

Item	Concept 1: Water Quality and Flood Storage in Existing Wetland Footprint	Concept 2: Water Quality and Flood Storage in Expanded Footprint
Construction Subtotal	$239,000	$332,000
Construction Contingency (30%)	$72,000	$100,000
Engineering, Design, Permitting, and Construction Observation (30%)	$93,000	$130,000
Feasibility Level Opinion of Cost	$404,000	$562,000
Feasibility Level Opinion of Cost Range (-20% to +30%)	$324,000-526,000	$450,000-731,000
Cost per Acre-Foot of Flood Mitigation Volume	$585,600	$351,300
30-Year Annualized Cost Estimate	$24,000	$32,000
Annualized Cost per Pound of Total Phosphorus Removed	$5,800	$6,700

7.1.1 Temporary Easements

The entire project is located on property owned by the City of Medicine Lake and therefore, no temporary easements are anticipated for project construction.

7.1.2 Wetland Mitigation

Although the existing wetland will be disturbed or converted into open water for the proposed project, the concept designs also incorporate wetland restoration and increases to the wetland buffer areas from existing conditions. The overall area of wetland will be increased with the project.

One of the goals of the proposed alternatives is to minimize the amount of wetland impacts, restore the impacted wetland areas to the existing wetland type, and develop new wetland habitat and wetland buffers in the disturbed extents. Therefore, it is not anticipated that the projects will require additional costs for wetland mitigation.

7.1.3 30-year Cost

The 30-year cost for each concept is calculated as the future worth of the initial capital cost (including contingency and engineering costs) plus the future worth of anticipated annual maintenance and significant maintenance at the end of the concept's estimated useful life. A 3% rate of inflation is assumed. The annualized cost for each concept is calculated as the value of 30 equal, annual payments of the same future worth as the 30-year cost. Table 6-1 presents the 30-year annualized costs for each concept.

The operation and maintenance (O&M) costs are based on the anticipated needed annual maintenance for the wetland and wetland buffer, and the potential future sediment removal required when the sediment accumulation impacts the water quality improvement performance of the proposed pond. We estimated the frequency of sediment removal based on the annual total suspended sediment load to the pond from the P8 model and an assumed sediment density. For concept 1, the estimated time until the sediment would need to be removed was approximately 60 years and for concept 2, the time was greater than 100 years. The annual O&M cost for each concept is listed in Table 7-2.

Table 7-2 Annual O&M Cost Summary

Concept	Wetland/ Buffer Area (ac)	Annual Maintenance Cost for Wetland/ Buffer ($/acre)	Annual Wetland/Buffer Maintenance Cost	Annual Sediment Maintenance	Total Annual O&M
Existing Condition	0.96	$3,000	$2,870	0	$2,900
1	1.00	$3,000	$3,000	$320	$3,300
2	0.97	$3,000	$2,900	$860	$3,800

7.1.4 Annualized Pollutant Reduction Cost

Section 6.1.3 and Table 6-1 provide the estimated annual total phosphorus loading reductions for each recommended conceptual design alternative. The total phosphorus load reductions were found by

modifying the BCWMC P8 model to include the proposed alternatives. The annualized pollutant-reduction cost for each alternative is the estimated annualized 30-year project cost divided by the annual load reduction.

The cost per pound of phosphorus removed for this project using the current P8 model analysis ($5,800 for Concept 1 and $6,700 for Concept 2) is high when compared to other BCWMC CIP projects, but within the range of other costly projects. For example, the Northwood Lake Improvement Project's annualized cost per pound of phosphorus removal was $5,900. The higher cost is due to the relatively small tributary area for this project, which does not generate a large amount of phosphorus load. There may also be opportunities to optimize the design during final design to reduce overall project costs.

7.2 Funding Sources

The planning level estimated cost for the recommended Concept 1 is $404,000 (-20%/+30%) (see Section 8.0). If the BCWMC orders the project, the BCWMC would use its CIP funds to pay for the Jevne Park Stormwater Improvement Project. However, other sources of funding could be considered, such as the Hennepin County Natural Resource Opportunity grant for the creation of habitat, etc.

7.3 Project Schedule

For project construction to occur in 2020, project design would be scheduled to begin in fall 2019. The BCWMC will hold a public hearing at the September 19, 2019 BCWMC meeting on this project. Pending the outcome of the hearing, the project will be officially ordered by the BCWMC, the BCWMC will enter into an agreement with the City of Medicine Lake to design and construct the project, and the BCWMC will certify to Hennepin County a final 2020 tax levy for this project. Following this meeting, the City of Medicine Lake will need to approve and execute the agreement. Final design should not begin prior to the execution of the agreement between the BCWMC and the City of Medicine Lake. The construction work would likely begin in the fall of 2020 with final restoration complete in 2021.

Some dewatering of the Jevne Park wetland will likely be necessary for construction, which will require a MnDNR permit (the work area is considered part of Medicine Lake). To meet the likely MnDNR permit requirements regarding turtle mortality, dewatering will need to be completed by September 15 to provide any turtles an opportunity to relocate to other ponds and wetlands for winter hibernation. Also, because of northern long-eared bat concerns, tree removal (greater than 3 inches in diameter) should occur in the period from November 1 through April 15, outside of the northern long-eared bat's active season. Additionally, excavation during the winter would be appropriate to complete the major earthwork during periods with less frequent runoff events.

If project construction is scheduled to begin in the fall of 2020, late spring or early summer 2020 bidding is recommended. This will give contractors adequate scheduling time to complete the project at a reasonable price. In the intervening time, the city would gather public input, prepare the final design, and obtain necessary permits.

8.0 Alternatives Assessment and Recommendations

The existing wetland in Jevne Park provides limited treatment of runoff before discharging to Medicine Lake and has limited wetland buffer. Concept 1 and Concept 2 expand the flood storage and water quality treatment volume in the area while providing opportunities to create/restore/improve habitat and provide public education opportunities.

The point opinions of cost for Concept 1 and Concept 2 are $404,000 and $562,000, respectively. The estimated O& M costs are similar for both concepts.

With a larger footprint, Concept 2 develops more flood storage and water quality treatment volume than Concept 1. This results in more significant reductions in the peak flood elevations for the smaller, more frequent storm events and temporary inundation of Peninsula Road. However, as mentioned above, most residents who attended the public open house did not indicate they had significant concern about the inundation of Peninsula Road.

Although Concept 2 provides slightly more pollutant removal than Concept 1 (an increase in total phosphorus removal of 4.9 lbs per year versus 4.1 lbs per year), the cost-benefit for pollutant removal is better for Concept 1, suggesting that Concept 1 is a more cost-effective project. The difference in the increase in total phosphorus removal between Concept 1 and Concept 2 (10%) is not equivalent to the 40% difference in cost.

The estimated tree removal for Concept 1 is less than the removal estimated for Concept 2. Additionally, the concept results in the establishment of more total wetland and wetland buffer area than for existing conditions, and provides an opportunity to incorporate additional wildlife habitat such as turtle logs and water fowl nesting structures.

Based on review of the project impacts; feedback from the Medicine Lake City Council, public, and the Medicine Lake representatives; and the overall project costs and benefits, the Commission Engineer recommends constructing Concept 1, which provides the necessary volume to achieve the goals of the project.

Concept 1, the recommended concept, includes the following design components:

- Expanding the flood mitigation volume in Jevne Park by 0.38 acre-ft to reduce peak flood elevations during smaller, more frequent events.
- Increasing the permanent pooling volume for Jevne Park by 0.69 acre-feet from existing conditions, through excavation primarily within the existing wetland footprint. This includes creation of 0.33 acres of additional open water area and lowering the bottom of the existing wetland to elevation 884 ft MSL (NAVD88), creating a maximum wetland depth of 3.7 feet. Ponding depths greater than 3 feet provide more water quality improvement benefits, and ponding depths less than 4 feet create better habitat. The proposed expansion will change the average depth from 0.6 feet to 1.9 feet.

- Maximizing the maximize water quality improvement performance by installing a sheetpile diversion wall between the main inflow locations and the existing outlet of the wetland to increase the flow path through the wetland.
- Slightly modifying the bituminous surface on Peninsula Road east of Jevne Park to redirect runoff from the south side of Peninsula Road to the expanded wetland in Jevne Park, allowing for more runoff to be treated before draining into the Medicine Lake.
- Restoring the wetland and establishing a 25-foot wetland buffer (as space allows) around the proposed wetland area. Concept 1 results in a total wetland area of 0.92 acre, including open water and 0.47 acres of wetland buffer, an increase of 0.06 acres from existing conditions. This restoration will allow for the creation of habitat for wildlife, waterfowl, fish, macroinvertebrates, and macrophytes, and installation of habitat features, such as turtle logs and water fowl nesting boxes.
- Removing and replacing an estimated 8 trees.

The planning level cost for Concept 1 is $404,000 (-20%/+30%) and the annual O&M cost is $3,300.

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Appendices

Appendix A

Wetland Delineation Report (October 2018)

Appendix B

Feasibility Study Engineer's Opinion of Probable Cost

Appendix C

Topographic, Utility and Tree Survey