



Memorandum

To: Bassett Creek Watershed Management Commission
From: Barr Engineering Co.
Subject: Item 5A – Consider Approval of Revised Feasibility Study for Crane Lake Improvement Project (CIP 2020 CL-3) – Minnetonka, MN
BCWMC March 21, 2019 Meeting Agenda
Date: March 14, 2019
Project: 23270051 2019 640

5A Consider Approval of Revised Feasibility Study for Crane Lake Improvement Project (CIP 2020 CL-3) – Minnetonka, MN

Summary:

Proposed Work: Crane Lake Improvement Project (CIP 2020 CL-3) as part of Ridgedale Drive Reconstruction

Basis for Review at Commission Meeting: CIP Project Feasibility Study Review

Recommendations:

- 1) Approve the revised feasibility study.
- 2) Select Option 3 for implementation.
- 3) Provide partial BCWMC CIP funding for the project as proposed by City of Minnetonka in their letter to the BCWMC administrator.

Background

The Bassett Creek Watershed Management Commission's (BCWMC) 10-year Capital Improvement Program (CIP, Table 5-3 in the Plan, as amended) includes a project for retention of impervious area drainage in the Ridgedale Center area. The BCWMC approved the 5-year (working) CIP at their April 19, 2018 meeting, which included implementation of the Crane Lake Improvement Project (CIP #CL-3) in 2020, as part of the Ridgedale Drive reconstruction project. If approved, CIP #CL-3 will be partially funded by the BCWMC's ad valorem levy (via Hennepin County).

At their September 20, 2018 meeting, the Commission reviewed and provided comments regarding the City of Minnetonka's draft feasibility study for this project. In that study (*Stormwater Management Feasibility Analysis – 2019 Ridgedale Drive Reconstruction*), the city evaluated eight best management practice (BMP) options for providing treatment from runoff from upstream watersheds within the project area. The city preferred three of the eight options – treat currently untreated stormwater runoff to Crane Lake, alum treatment in Ridgedale Pond, and divert high chloride snowmelt runoff to the sanitary sewer.

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Subject: Item 5A – Review 2020 Crane Lake Improvement Project (Water Quality Improvements to be Incorporation into the 2019 Ridgedale Drive Reconstruction Project) – Minnetonka, MN
Date: March 14, 2019
Page: 2

The city revised the feasibility study in response to the Commission's comments and provided it to the BCWMC Engineer for review and Commission approval. The following is a summary of the revised feasibility study and the Commission Engineer's recommended actions.

Feasibility Study Summary

The City of Minnetonka's revised feasibility study (*2020 Crane Lake Improvement Project (Water Quality Improvements to be Incorporation into the 2019 Ridgedale Drive Reconstruction Project)* (WSB, February 22, 2019; updated March 14, 2019)) examines the feasibility of several water quality improvement alternatives to treat runoff from Ridgedale Drive and the Sheraton Minneapolis West Hotel parking lot before discharging to Crane Lake. The Ridgedale Pond alum treatment and diversion of high chloride runoff options proposed in the September 2018 feasibility study are no longer under consideration. The water quality improvement option selected for implementation would be constructed as part of the city's Ridgedale Drive Reconstruction project, scheduled for construction in 2019.

The revised feasibility study identifies three water quality improvement options (see Figure 4 in the feasibility study), including:

- Option 1 – Construct an underground treatment system beneath the existing Sheraton Minneapolis West hotel parking lot
- Option 2 – Construct an underground treatment system beneath a proposed park just east of Ridgedale Drive.
- Option 3 – Construct an underground treatment system beneath a proposed park just east of Ridgedale Drive to act as pre-treatment (Option 2) before being pumped to a sand infiltration/filtration system in the Crane Preserve Park.

The revised feasibility study evaluated these three options at a high level, and based on input from City of Minnetonka staff, area property owners and city residents, the city eliminated Option 1, as it would be difficult to acquire the private property. The feasibility study further recommends implementation of Option 3, based on stakeholder input, including a design charrette. The recommended option is further discussed below. Provided below is Table 1 from Table 5 in the feasibility study, edited for clarity, summarizing the features, costs, and benefits of the three options.

Option 3 – Stormwater Treatment for Untreated Runoff to Crane Lake

According to the revised feasibility study, stormwater runoff from 13.3 acres currently flows to Crane Lake without treatment. This option includes the following major design elements: 1) underground treatment area with approximately 12,250 cubic feet (0.28 ac-ft) of dead pool storage, and 2) discharge of pretreated water from the underground treatment area to a sand filtration/infiltration system.

The underground treatment system would be constructed under a proposed public park that will be constructed in conjunction with the Ridgedale Drive Project. The underground system would receive 0.45 inches of runoff from the untreated watershed. Water from the dead pool storage would then be pumped from the underground system into a shallow (3- to 6-inch deep) filtration/infiltration garden with sand

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Date: March 14, 2019
Page: 3

media. The underground system would be a network of 60-inch diameter pipes, with an 84-inch diameter header pipe, to collect and settle sediment from runoff. The 84-inch diameter pipe would include an access to allow for removal of accumulated sediment. The pump would discharge at a low rate of 0.05 to 0.07 cubic feet per second (22 to 31 gallons per minute) to prevent the recirculation of sediment within the underground system.

The presence of clayey (tight) soils around the location of the filtration/infiltration garden is likely to inhibit infiltration. Because infiltration is preferred, the proposed draitile within the sand media would include a shut-off valve that would initially be in the closed position to allow infiltration to occur. If infiltration does not occur, the valve would be opened, and the garden would act as a filtration feature, draining to Crane Lake. Because of the uncertainty of the infiltration potential, the estimated treatment for Option 3 is presented as a range. The entire system is estimated to remove 72-75% of TSS (total suspended solids) and 47-60% of TP (total phosphorus) from the untreated runoff.

This option is located entirely on City of Minnetonka property. As an added benefit, the city anticipates that educational kiosks be constructed nearby due to its location in the park area. This aligns with the city and BCWMC goals of providing education opportunities related to stormwater management.

Table 1: Features, Costs, and Benefits of Recommended Options

Recommended Options		Watershed Area (acre)	Pollutant Addressed	Raw Loading (Pound/Year)	Existing Percent Removal (%)	Proposed Percent Removal ³ (%)	Annual Pollutant Removal ³ (Pound/Year)	Total Project Capital Cost (\$)	Annualized 30-Year Life Cycle Cost (\$/Year)	Annualized Cost per Pound of Pollutant Removed (\$/Pound/Year)
Option 1	Construct an underground treatment system beneath the existing Sheraton Minneapolis West hotel parking lot	13.3	TSS	4,800	0	59	2,854	\$472,027	\$11,900 ¹	\$4.20
			TP	17.9	0	35	6.2			\$1,920
Option 2	Construct an underground treatment system beneath a proposed park just east of Ridgedale Drive	13.3	TSS	4,800	0	59	2,854	\$500,027	\$12,800 ¹	\$4.50
			TP	17.9	0	35	6.2			\$2,060
Option 3	Option 2 followed by treatment from a sand infiltration/filtration system in the Crane Preserve Park	13.3	TSS	4,800	0	72 to 75	3,434 to 3,599 ⁴	\$582,837	\$17,200 ²	\$4.80 to \$5.00
			TP	17.9	0	47 to 60	8.4 to 10.7 ⁴			\$1,600 to \$2,050

1 Assumes a 30-year maintenance cost of \$150,000 (annual maintenance cost of \$5,000 to clean the underground structure) – estimated costs are in 2019 dollars

2 Assumes a 30-year maintenance cost of \$200,000 (annual maintenance cost of \$5,000 to clean the underground structure and full replacement of filtration media twice at \$25,000 per replacement) – estimated costs are in 2019 dollars

3 Treating the 13.3 acre, untreated drainage area (7.28 acres of impervious, 6.02 acres of pervious). The watershed's P8 model was provided and used by WSB to model and evaluate the BMP improvement options. The estimates shown were derived from P8.

4 Based on anticipated soil conditions, filtration is more likely than infiltration, which is the lesser of the two numbers shown.

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Date: March 14, 2019
Page: 5

Recommendation

The Commission Engineer recommends the following Commission actions:

- 1) Approve the revised feasibility study.
- 2) Select Option 3 for implementation. This option has the lowest cost per pound of TP removed. The surface filtration/infiltration garden in the proposed park would also provide an educational opportunity for the watershed. The shallow depth of the garden, low pumping rate from the underground system, and the educational kiosks on site would help raise awareness for park visitors regarding BCWMC and their role in protecting and improving water quality and ecological functions within the watershed.
- 3) Provide partial BCWMC CIP funding for the project as proposed by City of Minnetonka in their letter to the BCWMC administrator.