

Memorandum

To: Bassett Creek Watershed Management Commission
From: Barr Engineering Co.
Subject: Item 5G. Consider Approval of 50% Plans for Northwood Lake Improvement Project (NL-1), New Hope
BCWMC September 17, 2015 Meeting Agenda
Date: September 9, 2015
Project: 23270051 2015 633

5G. Consider Approval of 50% Plans for Northwood Lake Improvement Project (NL-1), New Hope

Summary:

Proposed Work: Northwood Lake Improvement Project

Basis for Commission Review: 50% Design Review

Change in Impervious Surface: N.A

Recommendations:

- 1) Conditional approval of 50% drawings
- 2) Authorize the City of New Hope to proceed with final plans and contract documents

The 2016 Northwood Lake Improvement project (NL-1) will be funded by the BCWMC's ad valorem levy (via Hennepin County). The City of New Hope provided the 50% design plans to the BCWMC for review and comment, as set forth in the BCWMC CIP project flow chart.

Feasibility Study Summary

The City of New Hope's *Feasibility Report for Northwood Lake Storm Water Improvements* (Stantec, November, 2014) examined the feasibility of constructing several stormwater improvements at Northwood Lake. The city's consultant (Stantec) identified three conceptual stormwater best management practices (BMPs) at two locations in the Northwood Lake watershed to reduce the phosphorus and sediment loads to Northwood Lake. Northwood Lake is currently on the Minnesota Pollution Control Agency's (MPCA) 303(d) Impaired Waters List for excess nutrients.

The three potential BMPs included:

- 1) Concept A – A stormwater reuse system (160,000 gallon capacity) located in Northwood Park (on northeast side of Northwood Lake) that would be used to irrigate baseball and soccer fields (6.4 acres) located on the east side of Boone Avenue. Additionally, bioretention basins would be

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constructed to treat overflows from the stormwater reuse system, providing approximately 0.37 acre-ft of runoff storage.

- 2) Concept B – A traditional wet retention pond located in Northwood Park (0.34 acre pond with 1.2 acre-ft of dead storage for water quality treatment).
- 3) Concept C – A traditional wet retention pond located on a City-owned parcel west of Jordan Avenue (0.23 acre pond with 0.7 acre-ft of dead storage for water quality treatment).

The feasibility report recommended the implementation of Concept A and Concept C. The feasibility report estimated that project implementation (Concepts A and C) would reduce the annual total phosphorus load to Northwood Lake by 22 pounds per year.

At their November 19, 2014 meeting, the Commission approved the City of New Hope's final feasibility study for this project, supporting implementation of Concept A and Concept C. At their June 18, 2015 meeting, the Commission discussed the results of an Envision analysis of the project options (Concepts A, B, and C) and approved the BCWMC's maximum financial contribution to implementing Concept A and Concept C of the project.

50% Design Review Summary

The 50% design plans include the designs for Concept A (storm sewer diversion, subsurface stormwater reuse system, and rain gardens in Northwood Park) and Concept C (wet detention basin along Jordan Avenue) from the feasibility study. Also included in this 50% design plan set are components of a larger city project that are outside the scope of the BCWMC CIP project, which will require separate review as part of the BCWMC project review program, including:

- sediment removal at the outlet of the existing storm sewer on the west side of Northwood Lake,
- playground improvements in Northwood Park,
- full reconstruction of Jordan Avenue,
- Northwood Park grading and landscaping, and
- reconstruction of trails within the park.

Concept A includes the diversion of storm sewer along Boone Avenue, south toward Northwood Park and the subsurface storage for the stormwater reuse system. Prior to discharging into the subsurface storage system, the storm sewer diversion will pass through a treatment manhole (e.g. Stormceptor) to provide sediment removal prior to discharging into the subsurface treatment system. The subsurface storage tank will include pumps and a force main that will connect with the existing irrigation system for the ball fields in Northwood Park, east of Boone Avenue. Overflows from the underground storage system will be directed to a series of rain gardens along Ensign Avenue to provide additional treatment before discharging to Northwood Lake. Concept C includes the diversion of storm sewer along Jordan Avenue into a new wet detention pond located west of Jordan Avenue, prior to discharging into Northwood Lake.

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The table below compares the water quality treatment volumes to be provided by the project, as presented in the feasibility study and the 50% design plans. Additional discussion of the proposed design is discussed below.

	Underground Storage Volume (for Stormwater Reuse)	Rain Garden Volume	Jordan Avenue Retention Pond Dead Storage Volume
Feasibility Study (November 2014)	0.5 acre-ft (160,000 gallons)	0.37 acre-ft	0.7 acre-ft
50% Design Plans	0.24 acre-ft ¹	0.34 acre-ft ²	1.55 acre-ft ³

1 – The dimension provided for the subsurface storage system (Sheet C5.03) should be able to provide storage equivalent to that presented in the feasibility study. However, based on the elevations shown in the 50% design plans, the actual storage provided for reuse is approximately half of what was presented in the feasibility study. The City’s consulting engineer will review the details of the proposed storage system and the overflow to the proposed rain gardens to maximize the amount of storage for stormwater reuse.

2 – The volume provided by the rain gardens (on Sheet C3.02) is similar to what was outlined in the feasibility study. The City’s consulting engineer is still working on various grading and design iterations for the series of rain gardens to maximize storage and improve aesthetics.

3 – Provided by City’s consulting engineer on 9/8/2015 and reflects dead storage volume based on revised pond grading since the 50% plans were submitted.

In review of the stormwater reuse system, on Sheet C5.03, the dimensions of the 160,000 gallon underground storage tank are listed as 70’ x 30’ x 14’ (approx. 218,000 gallons). Based on the details of the stormwater manhole reuse section, the invert of the base slab is 888.1 ft MSL and the tank top slab is 897.0 ft MSL. Using dimensions of 70’ x 30’ x 9’, the maximum storage volume is approximately 141,000 gallons. Additionally, the overflow from the underground tank is listed as 893.0 ft MSL, so the actual reuse storage volume provided is currently only 77,000 gallons.

The feasibility study indicated that the groundwater elevation in the area around Northwood Park is estimated to be 885 – 891.5 ft MSL. Based on the bottom elevations of the rain gardens and the subsurface storage system, these systems may be impacted by groundwater. Discussions with the city’s consulting engineer indicate they are collecting additional soil borings to better quantify the expected depth to groundwater in the area.

According to the city’s consulting engineer, a Minnesota Department of Natural Resources water appropriations permit will be required for the stormwater reuse diversion, based on the estimated annual pumping volume. The BCWMC will need to review the proposed appropriations request and the expected impact on water levels in Northwood Lake. As included in Stantec’s cover letter accompanying the final feasibility study and outlined in the Commission Engineer’s November 12, 2014 memo to the Commission, the city’s consulting engineer will utilize the existing BCWMC stormwater models to evaluate the impact of the stormwater reuse diversion on the Northwood Lake levels.

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The submitted drawings were at a 50% design stage, which means there are a number of details yet to be worked out before the design is final. Based on the review of the 50% design plan and follow-up conversations with the city's consulting engineer, the Commission Engineer expects the majority of the comments below to be addressed in the 90% design stage drawings.

Recommendations

A. Conditional approval of 50% drawings based on the following comments, recognizing that the current plans are preliminary:

- 1) Modeling or other documentation must be provided to confirm the expected water quality benefit of the design.
- 2) Sheet G0.04 – Verify the orientation of the north arrow is correct.
- 3) Sheet C3.01 – The proposed cut volume for the entire pond (7,560 CY) indicates there should be sufficient dead storage within the Jordan Avenue retention pond. The dead storage volume below the proposed control elevation must be provided.
- 4) Sheet C3.02 – Additional information must be provided regarding the expected groundwater elevations and how the proposed design addresses the potential impacts by groundwater.
- 5) Sheet C3.03 – The proposed rain garden and retention pond design must meet the criteria outlined in the BCWMC's *Requirements for Improvements and Development Proposals*.
- 6) Sheet C5.01/C5.02 – The outlet of the Jordan Avenue pond is called out as OCS-10 in the plans, but no details in relation to the outlet are provided. The details of the pond outlet structure must be included.
- 7) Sheet C5.03 – Provide the details of the storm interceptor structure proposed at MH-22.
- 8) Sheet C5.03/P8.01 – The details of the storage dimensions, elevations, and overflows must be reevaluated to maximize storage within the subsurface storage system and achieve the 160,000 gallons as outlined in the feasibility study.
- 9) Sheet C5.03/P8.01 – Additional information must be provided regarding the expected groundwater elevations and how the proposed design addresses the potential impacts by groundwater.

Given the potential for as much as 3.5 ft of groundwater above the bottom of the subsurface system, tank floatation/buoyant force calculations for the proposed storage tank must be provided.

- 10) Sheet P4.01 – There is a note to modify and connect the proposed force main to an existing irrigation box along Boone Avenue. Details related to this connection should be provided and the connection must meet current plumbing code standards to prevent cross contamination of the potable water supply.

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- 11) Sheet P8.01 – The stormwater reuse manhole section indicates an online filter for treatment of the stormwater prior to use for irrigation. The level of treatment for particulate removal should be based on the existing irrigation equipment needs and nozzle sizes. Additionally, we recommend the incorporation of an online UV treatment system sized for the expected flow rate to address any public safety concerns in relation to pathogens. Other items to consider are timing of irrigation to minimize contact with stormwater and signage indicating that the water being used to irrigate the fields is non-potable.
 - 12) The BCWMC will need to review the proposed appropriations request and the expected impact on water levels in Northwood Lake. Documentation (such as a memo) must be provided regarding the expected impact of the stormwater reuse diversion on lake levels and any associated modeling.
 - 13) The outlet velocities at FES-9 could exceed 12 feet per second when the pipe is flowing full. The pipe slope should be adjusted or other energy dissipation provided to reduce the outlet velocity.
 - 14) The contour elevations should be labeled for the existing conditions contours to determine the runoff direction and appropriate erosion control placement.
 - 15) Perimeter control should be added for the removals on Jordan Avenue.
 - 16) The construction entrance location does not appear to be shown on the plans; a construction entrance should be shown for each work area.
 - 17) The construction entrance must have a cutoff berm with a minimum height of 2 feet above the adjacent roadway and with maximum side slopes of 4:1.
 - 18) The following erosion control notes must be added to the plans:
 - a. Erosion control devices must be deployed and maintained for the duration of site construction until pavement surfaces have been installed and/or final turf establishment has been achieved.
 - b. Soils tracked from the site by motor vehicles must be cleaned daily (or more frequently, as necessary) from paved roadway surfaces throughout the duration of construction.
 - c. All exposed soil areas must be stabilized as soon as possible, but in no case later than 7 days after the construction activity has temporarily or permanently ceased.
 - d. Temporary or permanent mulch must be uniformly applied by mechanical or hydraulic means and stabilized by disc-anchoring or use of hydraulic soil stabilizers.
 - e. A temporary vegetative cover must be specified consisting of a suitable, fast-growing, dense grass seed mix spread at 1.5 times the usual rate per acre. If temporary cover is to remain in place beyond the present growing season, two-thirds of the seed mix shall be composed of perennial grasses.
- B. Authorize the City of New Hope to proceed with final plans and contract documents; note that the parts of the project outside the scope of the BCWMC CIP will require separate review as part of the BCWMC project review program.