Lake Shamineau Lake Improvement District
High-Water Outlet Project Plan, Cost and Timeline
2019 Annual Meeting

Background

A gravel pit located to the northeast of Lake Shamineau was investigated by WSN in cooperation with the landowners. WSN completed a detailed hydrogeologic investigation report using data obtained by three deep borings to depths of 65 to 80 feet utilizing state of the art rotosonic boring equipment. In addition, they performed infiltration testing, grain size analysis, percolation tests and installation of one observation well and three shallow piezometers to measure ground water elevations. The test results provided data showing soils in the gravel pit are very permeable and conducive to infiltration. The DNR has indicated this is a preferred option for permitting.

Infiltrating into the gravel pit provides a cost-effective method to eliminate the transfer of Aquatic Invasive species (AIS) such as Eurasian Water Milfoil and Zebra Mussels. Utilizing natural sands is an eco-friendly way to filter out the AIS which is more cost effective than more expensive mechanical filters.

Engineering Report Update

Following is an updated project description from WSN, the engineering firm hired by the LID to determine a High-Water solution. Note that additional work has been done in July with the design and route to better determine the required components and costs. This information is provided as of July 30, 2019. Also refer to the Preliminary Engineering Report completed on June 3, 2019 which is available on the LID website.

The Lake Shamineau Lake Improvement District (LID) intends to construct an Outlet for Lake Shamineau, Morrison County, Minnesota. The outlet will consist of pumping to an infiltration system as described below.

A water intake screen would be installed in the lake in water with the top of the screen approximately six feet below the current water level so that the intake pipe remains submerged even at lower lake levels. The screen proposed is a cylindrical shape installed horizontally. The screen will be sized so that the intake flow velocity is low enough so that swimmers, fish, or objects do not get pulled into it. A set of buoys and warning signs is also planned to keep people and boats away.

The intake pipe will extend to a pump station on land near the lake shore. The station will be located on the north side of Cantleberry Bay of the lake as shown on the attached figure. The pump station will have two vertical turbine pumps. Two pumps provide more flexibility and efficiency of operation than a single pump and may allow for a reduced long-term cost to control the lake level as compared to a single larger pump. The pumps will utilize electric motors and be surrounded by sound proofing walls to minimize noise during operation.

The wet well of the pump structure will be underground while the pump motors and discharge piping, valves and fittings, are proposed to be located above the concrete structure slab inside sound mitigation walls. The water will be pumped through a buried pipeline to the infiltration basins located to the northeast of the lake. The proposed design calls for an 18-inch diameter pipeline in order to efficiently pump up to 4,500 gallons per minute. The pipe would be sited along Cantleberry Road up to its intersection with Bugle Road. From there, the pipe will cross Bugle Road using a jack and bore casing installation as required by the County Engineer and north to the proposed infiltration basins at the gravel pit to the northeast of Lake Shamineau. The water velocity would be about 5.6 feet per second through the forcemain pipe. The proposed infiltration basin will be divided into three cells and flow can be split between them or can be directed to a specific cell(s).

As discussed in the Hydrogeologic Investigation Report, the groundwater flow direction is to the northeast. Water which is infiltrated at the basins is expected to flow as groundwater into a series of lakes and wetlands to the northeast, eventually reaching the Crow Wing River. Infiltration was chosen as the preferred option as it eliminates transfer of invasive species concerns and utilizes the natural processes occurring with groundwater flow.

High-Water Outlet Plan Considerations

- The plan includes installing two, energy efficient 75 hp pumps which can be operated independently for even more cost savings when both pumps are not needed. The two pumps would have a maximum capacity of 4,500 GPM (gallons per minute) with both pumps running at design capacity.

- Installation of the system requires temporary dewatering of groundwater near the lake around the pumping structure and directional boring to install piping, some of which may be high density polyethylene pipe. These processes are necessary because of the close proximity to the lake and the shallow groundwater at Cantleberry Road. Most of the pipe will be sectional PVC and will be buried by conventional methods approximately 7 feet underground from the lake to Bugle Road. The final boring under Bugle Road will require a steel casing per discussions with the Morrison County Highway Engineer.

- The plan includes the ability to pump 6.5 million gallons per day. Pumping at this rate for 155 days per year equates to over 1 billion gallons per year (season). Pumping will only occur during non-freezing periods.

- The pumps included in the plan are electric motor pumps and from a distance of 50 feet will be comparable in sound to a shower running or flushing a toilet. The plan includes additionally reducing the sound level by installing a sound barrier around the pumping platform, as well as planting native trees and shrubs surrounding the structure.

- The system is designed to remove 1.7 feet of lake water during the 5-6 months while the ground is not frozen.

- It should be noted that in 2013-2014 the lake rose 1.7 feet in one year with another similar rise recorded in the last ten years. Using 1.7 feet per year, assists with reducing the current high water level of the lake as well managing future large rainfalls.

- It should also be noted that removing 1.7 feet of water in one year assumes no rainfall, inflows or surrounding ground water recharging the lake and additionally does not take into account any evaporation. It is expected that the lake could be reduced in 2 to 3 years to near the ordinary high-water level (OHWL), Evaporation due to summer heat and winds could help speed this process.

- ***With a <u>yes vote on all 5 budget items</u> construction could begin as early as the spring of 2020 with pumping to begin as early as September 2020.*** See the 2020 Budget and Voting Information Attachment (yellow) for detail information on the 5 voting items.

<u>Costs</u>

The estimated cost of construction is based on the lowest cost route alternative in WSN's Preliminary Opinion of Probable Construction Cost dated July 18, 2019. The estimated Construction Costs included on the 2020 Budget attachment and included in Vote 4 includes the following major items:

- Dewatering groundwater around the pump station
- Earth moving in the gravel pit to build the infiltration basins.
- Excavation, borings, and laying of the pipe from the lake to the infiltration basins
- Pumps with intake screen and filters, electrical controls and wet well.

The LID operations budget will need to include costs for maintenance and operations (including electrical costs) for the 2 to 3 year period that the pumping will occur. There has been a review of other lake outlet projects including their electric rates and operational costs for an outlet system appear to be reasonable. We are also working with Crow Wing Power to determine the lowest cost electric rate for the system. The 2020 High-Water Lake Shamineau Outlet Project Budget for Pre-Construction and Operations (Vote 3) includes an initial operations and maintenance budget with the assumption that pumping operations will begin in September 2020.

Timeline

Note that the following schedule is tentative. This schedule assumes that financing of the project occurs prior to construction.

Complete Detailed Design Drawings and Updated Cost Estimate	August 2019
Complete Environmental Assessment Worksheet (EAW) Document	September 2019
Complete EAW Process and Permit Applications	November 2019
Complete Final Engineering Plans and Specifications	January 2020
Obtain Bids from Contractors and Financing of the Project	February 2020
Construction Begins	May 2020
Construction Complete	September 2020

Following is a drawing of the proposed route that begins at the north side of Cantleberry Bay and would flow to the infiltration basins northeast of Bugle Road.