

LAKE NOKOMIS OUTLET OPERATING PLAN

1. Background of Existing Outlet Structure

The existing Lake Nokomis outlet to Minnehaha Creek is a short channel with a concrete structure incorporating an inflatable stainless steel weir that can be raised and lowered by means of compressed air and an inflatable bladder. The structure was built in 2001 by Minnehaha Creek Watershed District and incorporates controls and sensors that were intended to allow monitoring and operation from a remote location. The adjustable structure automation and intended remote monitoring/operation have never functioned satisfactorily or reliably. Operation has reverted to strictly manual adjustments from time to time in reaction to heavy flow conditions on Minnehaha Creek and/or lake level elevations on Lake Nokomis.



View of Inflated Weir from the "Creek" Side of the Structure

The purpose of the structure designed and built by Minnehaha Creek Watershed District in 2001 was primarily to protect water quality in Lake Nokomis from flashy peak flows in Minnehaha Creek from entering the lake. Water quality in peak storm water flows entering Minnehaha Creek from upstream storm sewer discharges was shown to be many times more polluted than the water in Lake Nokomis and an order of magnitude more polluted than water discharged to Minnehaha Creek from Lake Minnetonka, the primary source of creek flow during normal/dry weather conditions. Thus the inflatable weir was intended to inflate automatically and block flow from the creek to the lake if an abrupt rise in the creek level was detected by sensors installed to measure water depths on both the lake side and the creek side. The inflated weir was also supposed to deflate after the abrupt rise in the creek level dissipated. These types of operations have never been realized on a consistent or reliable basis. This creates the need for frequent trips to the structure by staff involved in operation and high operational costs.

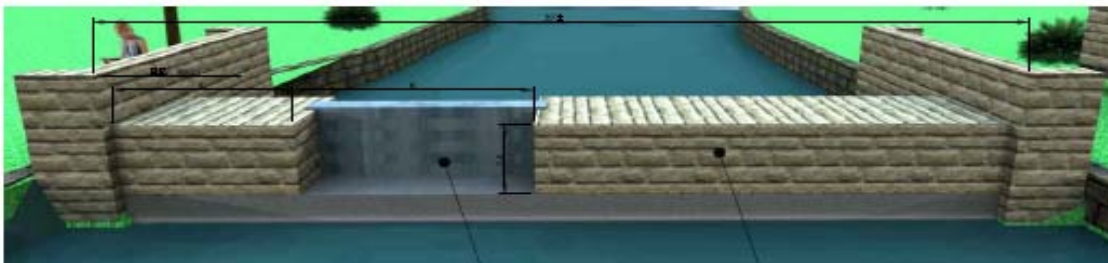
2. Minneapolis Park and Recreation Board (MPRB) and Minnehaha Creek Watershed District (MCWD) Partnership

A new water quality concern arose in 2010 when zebra mussels, an invasive species, were found on Lake Minnetonka. The mussels have spread from east to west on the Lake and are now prominent in Gray's Bay, the location of the headwaters of Minnehaha Creek. The mussels have also been found along Minnehaha Creek in the City of Minnetonka and are expected to invade bodies of water downstream, possibly Lake Nokomis. This new threat along with operational problems with the existing structure have resulted in a new proposal by Minneapolis Park and Recreation Board and Minnehaha Creek Watershed District to replace the structure with a more rigorous and reliable protection for Lake Nokomis water quality and prevent as much as possible the introduction of invasive species.

3. New Outlet Concept Design

A concept for a new outlet structure was developed mutually by MPRB and MCWD. A new fixed crest weir will replace the existing inflatable weir in 2012. The objectives of the new fixed structure are:

- To simplify operation and significantly reduce operational costs to the public.
- To increase protection of Lake Nokomis from polluted storm sewer discharges and from movement of zebra mussels from Minnehaha Creek to the lake.
- To increase the operational reliability of protection by having a structure that is normally in a protective mode rather than the existing inflatable weir that is normally not protective, until the weir is manually raised.
- To maintain the existing management levels for Lake Nokomis including:
 - The runout elevation of 815.1 does not change
 - The Ordinary High Water level of 815.4 has not been achieved for many years.
 - The top of weir elevation of 818.0 is the same on the inflatable weir and on the new fixed weir.
 - The predicted 10-year and 100-year water levels of the lake (819 and 819.7, respectively) are not expected to change.
- To replace the existing concrete surfaces with a textured and stained concrete veneer resembling limestone similar to the Nokomis Parkway Bridge and the small compressor house next to the weir.



Rendering of the fixed concrete weir viewed from the Minnehaha Creek side

4. Nokomis Weir Operating Plan

The fixed concrete weir will incorporate three removable metal stop logs. The normal mode of operation will be a fixed crest weir at elevation 818 (with stop logs installed). The exception to this normal mode of operation would be to temporarily remove all three stop logs to allow discharge from Lake Nokomis. This exception to the normal weir operation will be dictated by the water levels in Lake Nokomis and Minnehaha Creek. The Lake Nokomis water level can be measured by reading the lake survey gauge on the lakeside of the weir on the east bank of the weir. The Minnehaha Creek water level can be measured by reading the creek gauge, which is located on the east bank of the creek, downstream of the weir on the concrete pier adjacent to the metal stand pipe.

The stop logs shall be removed and the Nokomis Weir shall be opened:

- IF the Lake Nokomis level is at or above elevation 815.4 (the OHW) for two weeks AND/OR IF there are high-water related problems effecting MPRB infrastructure AND;
- The Minnehaha Creek level is measured using the survey gauge and is found to be below 815 and is at least 1 foot below the measured level of the Lake Nokomis survey gauge (*example: If the Lake Nokomis level is at 815.82, than the Minnehaha Creek level must be at or below 814.82*) AND;
- There is no precipitation predicted for at least 48 hours AND;
- MPRB staff has notified MCWD (Project Manager, or Natural Resource Technician) of the proposed stop log removal AND;
- The MCWD has agreed to not change the discharge rate at Gray's Bay Dam until the stop logs have been reinstalled.

The stop logs shall be reinstalled and the Nokomis Weir shall be closed:

- When Lake Nokomis reaches the runout elevation of 815.1; AND
- MPRB has notified MCWD (Project Manager, or Natural Resource Technician) of the proposed stop log reinstallation.

-OR-

- Precipitation is predicted within 24 hours; AND
- MPRB has notified MCWD (Project Manager, or Natural Resource Technician) of the proposed stop log reinstallation.

The chart on page 5 graphically portrays possible combinations of lake levels and creek levels and shows the operational mode of the stop logs for those combinations.

How To Use This Chart:

1. Measure the Lake Nokomis and Minnehaha Creek water levels using the designated staff gauges (gauge locations noted on page 3)
2. Find the correlating levels on the chart (page 5) for the Lake and Creek
3. Find the point on the graph where both levels meet
4. If the point is within the blue or shaded “Stop Logs Removed” box then the stop logs can be removed IF the following requirements have been met:
 - a. The Lake Nokomis level has been measured at or above elevation 815.4 (the OHW) for two weeks AND/OR IF there are high-water related problems effecting MPRB infrastructure AND;
 - b. The Minnehaha Creek level is measured using the survey gauge and is found to be below 815 and is at least 1 foot below the measured level of the Lake Nokomis survey gauge AND;
 - c. There is no precipitation predicted for at least 48 hours AND;
 - d. MPRB staff has notified MCWD (Project Manager, or Natural Resource Technician) of the proposed stop log removal AND;
 - e. The MCWD has agreed to not change the discharge rate at Gray’s Bay Dam until the stop logs have been reinstalled.

Nokomis Weir Operation Chart

