West Vadnais Lake Off Season Pumping Evaluation
Presentation to RWMWD Board

Erin Anderson Wenz, Barr Engineering Company
February 5, 2020
At the January Board meeting, managers asked staff to evaluate the cost/benefit of off season pumping of West Vadnais Lake (5 cfs) during the wintertime.
West Vadnais Lake Off Season Pumping Evaluation

Question:
What effect would pumping West Vadnais Lake continuously at a rate of 5cfs until snowmelt begins?

Assumptions:
- Use current lake levels for West Vadnais Lake and Lake Wabasso.
- No more runoff will enter the lake until snowmelt begins on March 9.
- No groundwater will enter the lake at any time.
- Pumping start: February 5
- Pumping stop: March 9
- 2019 snowmelt and precipitation.
Other assumptions:

- We assume that the pump would be able to operate 80% of the time (assuming some breakdowns, freeze ups)
- We assume it will take one person 2 hrs a day, each day to check on the pump and downstream conditions, rate of $60/hr ($3,960 in labor expenses).
- We assume that it would take $30,000 to secure, set up and operate the pump for 33 days (rental + fuel) including demobilization and restoration of MnDOT ditch.
- Total pumping cost estimate: ~$34,000
West Vadnais Water Surface Elevation
2017 - 2020

Rice Street Overflow El 884.7

15” Outlet Pipe 881.8

We are here
(882.9 on Feb 4)
Based on our assumptions and calculations, after 26 effective (33 days at 80%) days of pumping the lake could drop from 882.9 to 881.9 between February 5 and March 9.

- Key assumptions:
  - No groundwater
  - No snowmelt or flow from upstream lakes during pumping period
  - Snowmelt begins March 9 (like 2019)
  - No permitting delay
Grass Lake

Assumes 2019 snowmelt and precipitation conditions. Starting elevation of 882.9 (existing) and 881.9 (pumped) Idealized condition assumptions.
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If bypass system in place, 0% reduction in overflows to Twin Lake (bypass system would take care of it).

Assumes 2019 snowmelt and precipitation conditions. Starting elevation of 882.9 (existing) and 881.9 (pumped) Idealized condition assumptions
19% reduction in overflow to areas north of Grass Lake

Assumes 2019 snowmelt and precipitation conditions. Starting elevation of 882.9 (existing) and 881.9 (pumped). Idealized condition assumptions.
Comparing snowmelt water volume to Grass Lake/West Vadnais Lake volume between 881 and 884

• 1” of water in snowmelt (435 AF): 40%
• 2” of water in snowmelt (870 AF): 80%
• 3” of water in snowmelt (1,305 AF): 120%

• 5cfs per day = 10 AF per day
West Vadnais Lake Outlet Project Presentation to Stakeholders: Project Update and Permitting Discussion

Erin Anderson Wenz, Barr Engineering Company

January 10, 2020
West Vadnais Lake Outlet Project Objectives

- Creation of additional capacity in Grass and West Vadnais Lakes
- Reduction in frequency and duration of flooding of Twin Lake, West Vadnais Lake and parkland areas north of Grass Lake.
West Vadnais Lake

- **Rainfall Depth (in)**

**WSEL (feet, NAVD88):**
- West Vadnais Lake
- Existing

**WVO: 881**
- W Vadnais Overflow
- 15in Invert
- Outlet at 881
- Grass Overflow
- Rainfall
West Vadnais Lake

Rainfall Depth (in)

WSEL (feet, NAVD88)

West Vadnais Lake

Existing

W Vadnais Overflow

15in Invert

Outlet at 881

Grass Overflow

Top of Existing Pipe = 883.05
West Vadnais Lake

Rainfall Depth (in)

WSEL (feet, NAVD88)

West Vadnais Lake

WVO: 881

W Vadnais Overflow

15in Invert

Outlet at 881

Grass Overflow

Top of Proposed Pipe = 882.25

1/1/08

12/31/08

12/31/09

12/31/10

12/31/11

12/30/12

12/30/13

12/30/14

12/30/15

12/29/16

12/29/17

12/29/18

12/29/19

Rainfall Depth (in)

WSEL (feet, NAVD88)
Volumes through the 15-in outlet, Grass Lake Overflow to the North and from the triangle wetland to Twin Lake under existing WVL outlet (881.8) and proposed (881.0) conditions.

- Existing Volume through 15-in outlet
- Existing Overflow Vol from Grass Lake
- Existing Volume to Twin Lake
- Proposed Flow through 15-in outlet
- Proposed Overflow Vol from Grass Lake
- Proposed Volume to Twin Lake

20% reduction
Permits and Access Agreements

- City of Little Canada- Right of Way Permit
- St. Paul Regional Water Service- Access Permission
- VLAWMO- Wetland Conservation Act Approval
- US Army Corps of Engineers- Section 404 Permit
- MnDOT- Access Permission
- MnDNR- Work in Public Waters Permit