

Questions for Wade-Trim
Responses to Lake Louise Christian Community

1. Could you help me understand how a 24-inch diameter pipe bored at 0.5% slope, which would introduce 16 cubic feet per second (CFS) to the downstream outlet, would lower the lake elevation of Thumb Lake by 4 feet in approximately 16 days. By my calculations, it would take 64.3 days.

My calculations:

a) 16 cu. ft. of water /second = 1,382,400 cu. ft. per day and = 10,340,352 gallons/per day (1 cu. ft. = 7.48 gallons)

b) 1 acre-foot (an acre of water 1 foot deep) = 325,851 gallons of water. Therefore 510 acre-feet = 166,184,010 gallons

c) Removal of 1 foot of water from 510 acres = Removal of 166,184,010 gallons at a rate of 10,340,352 gallons per day = 16.07 days.

d) Therefore, the removal of 4 feet of water from 510 acres would take 4×16.07 days = 64.3 days. Where are these calculations inaccurate?

Your calculations are correct. Prior to report revisions, the original sentence from the report indicated that it would take 16 days to draw the lake down by 1 foot. I rewrote this sentence to state how long it would take to drawdown the lake level by 4 feet without changing the calculation.

2. The water level elevation of Thumb Lake is 1038 and Standard Lake is 972. With a rise of 66 feet and a run of 1,690 feet, wouldn't the % slope be $66/1690 \times 100 = 3.9\%$. If so, how would it be possible to create a % slope of 0.5% or less over that distance?

The slope of 0.5% was selected based on analysis to limit the exit velocity to approximately 5 fps at the outlet. Attaining a 0.5% slope at the outlet of the pipe would likely involve a combination of manhole drop structures with some open trench construction to properly design the drain. A length of pipe would be constructed for as long as practical before it flowed into a manhole structure and dropped 5-10 feet (estimated example) into another pipe. Even so, the pipe would likely be steeper than 0.5% in many areas.

3. Similarly, the water level elevation of Standard Lake is 972 and the West Branch of the Sturgeon is 950. With a rise of 22 feet and a run of 3150 feet, the % slope would be $22/3150 = 0.70\%$, again greater than a % slope of 0.5% or less.

This pipe layout could be designed to achieve a slope of 0.5% at the outlet as well. Again, there would need to be intermittent elevation changes between pipe inverts at manhole junctions, but this could be accomplished.

4. The proposed A-1 plan shows 4 storm manholes between Thumb Lake and Standard Lake, at a 500-foot spacing. The elevation profile approximately 500 feet from Thumb Lake shows an elevation of 1091, which would be 53 feet above lake level and approximately 73 feet above the level of the bored pipe. Also, at 1000 feet from Thumb Lake, given the elevation profile, the bored pipe would be approximately 55 feet below the ground. Is it possible to establish a manhole for clean out of a pipe at those below-ground levels?

We would not anticipate installation of a manhole reaching a depth of 55 feet. The layout of the manholes in the plan A-1 was more for developing a quantity of manhole structures and a budgetary cost estimate. The deepest manhole we would expect be constructed would be 15-20 feet deep. Placement of manholes along the pipe alignment would consider constructability constraints and could possibly exceed spacings of 500 feet.

5. Given that the lake level is at the water table, by reducing the lake by 4 feet, would you expect that subsequent inflow to the lake from underground springs, et. al. would increase, thus replacing a substantial portion of the water being removed and thereby reducing the net rate of water loss? How likely are we to find that the lake

would maintain the current level, no matter which solution we explored? Please expand further for our understanding of the local hydrology.

Without performing a hydrogeological survey, this information is presently difficult to determine. We would want to have a better understanding of the groundwater patterns and activity very early on in the study process as this factor could make water exiting the lake impractical. Wade Trim does not perform hydrogeological studies, but we would recommend that we consult one as part of this study if further investigation is desired.

6. Can you make any estimates regarding the effect of water flow at a rate of 16 cu. ft./sec on the resultant water levels of Standard Lake and the downstream portions of the West and Main Branches of the Sturgeon River?

Based on existing estimating flood flows (see attached flows provided by EGLE) an increase of 16 cfs wouldn't significantly increase the flow of the river, but in conjunction with other factors like the increase in lake levels of Thumb Lake, Standard Lake and/or Reardon Lake during heavier rain events, it could potentially contribute to harmful effects downstream. EGLE's hydraulic and floodplain division would be heavily involved in determining the maximum flow that could enter the lakes/river without causing adverse effects.

7. Per the Van Buren County Drain Code, an established drainage district encompasses that area of land that benefits from the drain. In LLCC's case, the area that benefits would only include LLCC and the residents of Thumb Lake. According to the permitting process, a new drain petition would require an application signed by five property owners who own land in the proposed drainage district. Would you know whether the fact that there is only one property owner (LLCC) in that proposed drainage district would preclude the ability to obtain a permit?

I am looking into what the formal process would be for just one property owner, but I do not believe only one landowner would preclude the ability to obtain a permit.

From: EGLE-wrd-qreq <EGLE-wrd-qreq@michigan.gov>
Sent: Wednesday, July 29, 2020 2:59 PM
To:
Subject: RE: flood or low flow discharge request (ContentID - 168812)

We have estimated the flood frequency discharges requested in your email of July 3, 2020 (Process No. 20200309), as follows:

West Branch Sturgeon River at West Ashley Road, Section 32, T33N, R3W, Wilmot Township, Cheboygan County, has a total drainage area of 49.5 square miles and a contributing drainage area of 41.2 square miles. The 50%, 20%, 10%, 4%, 2%, 1%, 0.5%, and 0.2% chance peak flows are estimated to be 210 cubic feet per second (cfs), 260 cfs, 280 cfs, 320 cfs, 350 cfs, 370 cfs, 400 cfs, and 600 cfs, respectively. (Watershed Basin No. 11 Cheboygan).

Please include a copy of this letter with your application for permit and indicate whether or not the project is funded under Act 51. These estimates should be confirmed by our office if an application is not submitted within one year. If you have any questions concerning the discharge estimates, please contact Ms. Susan Greiner, Hydrologic Studies and Dam Safety Unit, at 517-927-3838 or by email to GreinerS@michigan.gov. Any questions concerning hydraulic and/or environmental permit issues should be directed to Mr. Jim Watling, Water Resources Division, Transportation Review Unit, at 517-284-5504 or by email to WatlingJ@michigan.gov.

-----Original Message-----

From: DoNotReply@michigan.gov <DoNotReply@michigan.gov>
Sent: Friday, July 3, 2020 7:54 PM
To: EGLE-wrd-qreq <EGLE-wrd-qreq@michigan.gov>
Subject: flood or low flow discharge request (ContentID - 168812)

Requestor:
Company: Wade Trim
Address: 3540 Victor Drive
City: Indian River
Zip: 49749
Phone: 2314203306
Date: 2020-07-03
F50percent: Yes
F20percent: Yes
F10percent: Yes
F4percent: Yes
F2percent: Yes
F1percent: Yes
F0.5percent: Yes
F0.2percent: Yes
ContactAgency: None Selected
ContactPerson:
Watercourse: West Branch Sturgeon River
LocalName: West Branch Sturgeon River
CountyLocation: Cheboygan

CityorTownship: Wilmot Township

Section: 32

Town: 33N

Range: 3W

Location: West Ashley Road over West Branch Sturgeon River near West Perry Road

FFR1: County-owned road

fpReqEmailAddr: