

February 9, 2018

Mr. Jim Dull
Barry County Drain Commissioner
220 West State Street
Hastings, MI 49058

RE: Shallow Lake Drain Proposed Improvements

Dear Mr. Dull:

This letter is in regards to the proposed improvements on the east end of Shallow Lake and the potential benefit to the upstream waterbodies of Wall Lake and Shallow Lake, both located in Hope Township, Barry County, Michigan.

This letter is a summary of my professional opinion on hydraulic impacts and relationships of these stormwater systems and connected lakes. This opinion is based on very limited surveyed information in the area and observations derived using my experience as a stormwater drainage engineer, having practiced under this discipline for 18 years, and having been a licensed civil engineer for twelve years to date.

The function of the Shallow Lake Drain, which was established in 1899, is to drain from the lake level structure on Wall Lake downstream into Shallow Lake, which is at a lower elevation. However, due to the existing condition of the open channel portion of the Shallow Lake Drain, along with a series of improperly sized and perched culverts on the east end of Shallow Lake and downstream of the County Drain portion, the Drain is not functioning properly.

This condition of undersized and perched culverts on the private watercourse downstream of Shallow Lake is causing water to continually back up upstream in Shallow Lake for sometimes several feet over many days after a rain event, and is also raising the level of Wall Lake when water is above the lake level control structure. This direct relationship can be seen in Table 1 following, which lists elevations surveyed on May 1, 2017 and February 2, 2018 by Eng. Inc.

Table 1: Elevations pertaining to Shallow Lake Drain function

| Location | Elevation | Date |
|---|-----------|----------------------|
| Wall Lake - Water Elevation | 927.39' | 5/1/2017 |
| Wall Lake - Water Elevation | 927.14' | 2/2/2018 |
| West of Wall Lake Dam - Water Elevation | 927.08' | 2/3/2018 |
| West of Wall Lake Dam - Water Elevation | 927.39' | 5/1/2017 |
| Wall Lake Dam - Legal Lake Level and Water Elevation to Crest | 927.00' | Set By Court in 1953 |
| East of Wall Lake Dam - Water Elevation | 927.39' | 5/1/2017 |
| West of Kingsbury Road - Water Elevation | 927.39' | 5/1/2017 |
| West of Kingsbury Road - Water Elevation | 925.83' | 2/2/2018 |
| Kingsbury Road - Centerline of Road Elevation | 928.33' | 5/1/2017 |
| West Invert Elevation of 48" CSP Under Kingsbury Road | 922.85' | 5/1/2017 |
| East Invert Elevation of 48" CSP Under Kingsbury Road | 923.20' | 5/1/2017 |
| East of Kingsbury Road - Water Elevation | 926.70' | 5/1/2017 |
| East of Kingsbury Road - Water Elevation | 925.83' | 2/2/2018 |
| Shallow Lake - Water Elevation | 926.53' | 5/1/2017 |
| High Water Mark in 2017 on Shallow Lake | 928.73' | 5/1/2017 |
| East Side of Shallow Lake at Outlet - Water Elevation | 927.43' | 5/1/2017 |
| East Side of Shallow Lake at Outlet - Water Elevation | 925.84' | 2/2/2017 |
| West Invert Elevation of 18" CSP at Shallow Lake Outlet | 925.84' | 5/1/2017 |
| East Invert Elevation of 18" CSP at Shallow Lake Outlet | 924.49' | 5/1/2017 |
| Private Crossing Elevation at Shallow Lake Outlet | 927.43' | 5/1/2017 |
| West Invert Elevation of 24" Crossing Under W. Dowling Road | 923.97' | 5/1/2017 |
| East Invert Elevation of 24" Crossing Under W. Dowling Road | 923.92' | 5/1/2017 |
| Water Elevation Just West of W. Dowling Road | 924.85' | 5/1/2017 |

The locations in the above Table 1 are generally listed from upstream to downstream starting with Wall Lake and ending in the private watercourse downstream of Shallow Lake on the east side. The red highlighted elevation is denoting a flooded area at the time it was surveyed. Not by coincidence, this is also the location of the first aforementioned undersized and perched culvert along the watercourse, demonstrating that the stormwater infrastructure is failing to function properly and carry enough flow downstream without backing water upstream in the system.

The yellow highlighted elevation shown in Table 1 is denoting the highest elevation that the water level has reached throughout this section in the recent past. This elevation was taken from the high water marks on trees adjacent to the shoreline along Shallow Lake. Note that when the water level is at the elevation indicated in yellow, the Kingsbury Road crossing would also be completely submerged.

Another observation from Table 1 is that the water level of Wall Lake is the same as the water level upstream of the Kingsbury Road crossing if the Wall Lake Dam is crested. This point indicates that during periods where the water level of Shallow Lake is at the high water mark, the Wall Lake water level will also rise as Kingsbury Road will be flooded, raising the water level upstream of Kingsbury Road to approximately the high water mark elevation. This in turn retards the drainage of Wall Lake and results in its water level rising.

To alleviate this drainage issue, please refer to the proposed Shallow Lake Drain improvements as outlined in the prior submitted DEQ Permit, submission number: HN5-SFPZ-KGQCY. Lowering some of the culvert inverts and increasing the size of three culverts along the downstream watercourse on the east end of Shallow Lake should significantly improve the drainage all the way to Wall Lake by eliminating choke points and improving flow at some lower culvert elevations, which will reduce backwater conditions in the system.

If you have any further questions, please do not hesitate to contact me at (517) 887-1100. Thank you.

Sincerely,

Eng., Inc.

Brian J. Cenci, PE
Vice President

cc: Wall Lake Homeowners Association