LAKE SHAMINEAU LAKE IMPROVEMENT DISTRICT

RESPONSES TO Agency and Public COMMENTS on the EAW

In the matter of the Determination of The Need for an Environmental Impact Statement for the Lake Shamineau High-Water Control Project

April/May 2020

Lake Shamineau Lake Improvement District
Environmental Assessment Worksheet
Responses to Comments
Received February 24, 2020 through March 25, 2020

	Date	Person(s) or Entity
1	March 2	Ron Carlson
2	March 5	Lisa and Ryan Dahl
3	March 14	Don Anderson
4	March 17	Crookneck Lake Improvement District Board of Directors, Dan Seanger, David Gurney
5	March 19	Dan Whitney, Norm Krause, Sharda and Morris Powell
6	March 21	Debra Nelson, Arlo Rohl, Wanda Bell, Bonita Sarazin, Roy Rohl, Sharon Rohl, Norman Rohl, Betty Rohl
7	March 24	Rohl Family Trust, Ellen Noreen, Laural Park, Gwentha Lumsden
8	March 25	Eugene Rohl
9	March 25	Dave and Nancy Deedrick
10	March 25	Bill Peterson
11	March 25	Shannon Wettstein, Morrison County Soil and Water
12	March 25	Melissa Collins, MN Department of Natural Resouces
13	March 23	Sarah J. Beimers, Minnesota State Historic Preservation Office

Note – The comments received for the EAW dated February 24, 2020 are provided in a separate document. **Following are the responses to the EAW comments.**

Please also note that on May 16, 2020, the Board of the Lake Shamineau Lake Improvement District approved a motion to withdraw the EAW dated February 24, 2020.

RESPONSES TO EAW Comments:

1. **Response to March 2nd Comment from Ron Carlson:** Thank you for your support.

2. **Response to March 5th Comment from Lisa and Ryan Dahl:** Thank you for your support.

3. **Response to March 14th Comment from Don Anderson:** The LSLID appreciates the comment. Prior to the permitting phase of the project, a survey of shallow wells in the pumping area will be completed. However, in general, if your well is in the basement of your house, your well would be over 250 feet from the dewatering area and will not be affected by it. Generally, construction dewatering will only lower the water table within 100 feet of the dewatering area. If your well is a shallow well, it likely receives its recharge from the lake and is likely much closer to the lake than the dewatering area, so again, it will not be affected.

   A survey will be completed for property in the pumping and corridor area.

   Mitigation efforts will be made to reduce damage to mature trees outside of the project area.

4. Response to March 17th Comment from Crookneck Lake Improvement District Board of Directors, Dan Seanger, David Gurney:

Natural Outlet for Crookneck Lake: Determining the existence of a natural outlet from Crookneck Lake into Lake Shamineau was not part of the research for the Lake Shamineau High Water Project. If such an outlet did exist, Crookneck would be at an elevation similar to Lake Shamineau's, but this is not the case as the water levels in Crookneck Lake have tracked 0.8 to 1.7 feet higher than Lake Shamineau. The purpose of the project is to lower Lake Shamineau back to its ordinary high water (OHW) level to reduce the damage caused by the flooding. As Lake Shamineau is lowered, it is likely that the groundwater levels around the lake will drop as well and with it, the level of Crookneck Lake, which is almost four feet above its OHW. It is reported that there is damage to homes and property from the flooding around Crookneck Lake, but this has not been addressed by the Crookneck LID Board.

Lake level goal/target for Crookneck: The Crookneck LID Board comments states that a lake level of six inches above the OHW provides a buffer for periods of drought. The EAW did not address the water levels on Crookneck because the Lake Shamineau High Water Project will not cause Crookneck Lake to drop below the six-inch above OHW that the Crookneck LID Board desires (see more detailed discussion below).

Discharge/drawdown rate: The rates indicated in the Crookneck EAW comments are erroneous and do not correspond with the rates proposed for the Lake Shamineau high water project. The LSLID has been consistent in that the daily rate of 4.6 million gallons or greater depending on the DNR-allowed infiltration rate and that the drawdown to the target elevation will take 2 to 3 years. This time period will allow time to observe the water levels on Crookneck Lake, but again the Lake Shamineau High Water Project will not draw Crookneck Lake below the six-inch above OHW desired by the Crookneck LID Board. The impact of drought is something that was not considered because drought is a natural phenomenon that, although is an inconvenience, it does not cause loss of residences and damage to shorelines and wildlife habitat.

Route: The LSLID appreciates the support of the Crookneck LID Board in choosing an easterly outlet route. The EAW did not address the Scandia Valley Transfer Station because it is not within the EAW project area. The Crookneck LID Board EAW comment is vague regarding the Transfer Station but implies that contamination from an "open burn pit" may have some effect on the project. The Transfer Station is not listed as a contamination site on the MPCA "What's in my Neighborhood?" website, but it does list the nearby Scandia Valley Dump which was closed in 1972. The MPCA has conducted a Site Assessment and has determined the Scandia Valley Dump does not pose a risk to human health or the environment.

Effects of other major drawdown project: The other drawdown referred to in Crookneck LID Board comments is the ditch cleanout work south of County Road 203. The ditch cleanout is an attempt to lower the high watertable levels south of Crookneck Lake and it is hard to characterize it as a large drawdown project as the project is just restoring the historical drainage of that area. The ditch cleanout project will not solve the high water on Lake Shamineau as it does not have the capability of lowering the groundwater levels by three feet.

Cumulative potential impacts: The cumulative potential impacts refer to other similar lake drawdown projects in the area and there are known to be in the planning. Again, the Lake Shamineau High Water Project will not lower Crookneck Lake below the six inch above OHW that the Crookneck LID Board desires.

Alternatives analysis: It is unclear what the alternative surface water diversion project the Crookneck LID Board is referring to in this comment. The EAW document is to describe the proposed project and the potential environmental impacts of the project.

4410.4400, Subpart 20. Public Waters and Public Water Wetlands: The project will not drain any wetlands, as wetlands that existed when the Lake Shamineau was at its OHW will still exist; therefore, this subpart does not apply.

4410.4400, Subpart 23. Water Diversions: This subpart is for diversion of water across state lines. The Lake Shamineau High Water Project does not divert water outside of the state; therefore, this subpart does not apply.

Area Wetlands Drainage Project: The "area wetlands drainage project" is an attempt to lower the high watertable levels south of Crookneck Lake. It is a limited project to reduce local groundwater levels to the southwest and does not address the surface and groundwater flow from the southeast into Lake Shamineau. The ditch cleanout project will not solve the high water on Lake Shamineau and it is not reasonable to expect the LSLID to wait to find a solution to the dozens of homes and properties being flooded on Lake Shamineau, as well as the shoreline erosion, loss of trees and wildlife habitat.

Background: The background information provides a good summary of the history of the formation of the Crookneck LID and its fight against invasive species, including curly leaf pondweed, Eurasian milfoil and now zebra mussels. It also provides information on the high water problems in the area and concludes the high water is from higher than normal precipitation. The background summary, however, incorrectly concludes the groundwater levels are recharged by surface water, when in actuality the groundwater is recharged by precipitation from the high infiltration rates of the surficial sand soils. The surface waters are then recharged by groundwater and the elevations of the surface water reflect the high groundwater levels surrounding the lakes. In addition, the high precipitation and infiltration rates have likely caused localized mounding that blocked the flow of groundwater from leaving the lakes in some areas.

The background information also provides a good summary of the record high water conditions around the lakes and other surface water in the area but neglects to mention the millions of dollars of damage being caused by the high water on Lake Shamineau. Not only is the high water flooding the road areas listed in the Crookneck LID Board comments, it is flooding over 80 homes and cabins.

The graphical display included in the Crookneck LID Board comments shows that the lakes mirror each over time and that Crookneck Lake Delta from OHWL is higher than Lake Shamineau. The Crookneck Lake OHW is 1275.6 feet, which is 0.5 feet or six inches higher that the Lake Shamineau OHW of 1275.1 feet. Houston Engineering's study for the LSLID of the relationship between the water elevations of Crookneck Lake and Lake Shamineau found that the level of Crookneck Lake ranged from 0.8 to 1.7 feet above Lake Shamineau with an average of 1.12 feet above Lake

Shamineau. If Lake Shamineau was pumped down to its OHW, it would be at 1275.1 feet and Crookneck Lake would be at 1276.22 feet, 0.62 feet (7.44 inches) over its OHW level. The Lake Shamineau High Water Project will work at lowering high water on Lake Shamineau and keep Crookneck Lake at more than six inches above its OHW that the Crookneck LID Board desires.

High Water Mitigation Projects: The Crookneck LID Board comments provide a lot of information about the Emergency High Water Project completed by Scandia Valley Township, with the cooperation of the Morrison County Highway Department. The LSLID Board has been very supportive of the Emergency High Water Project and two LSLID Board Members on the Emergency Task Force initiated the formation of this project team. The project consists of cleaning existing ditches so they will move excess water to the west under Highway 10 and to Fish Trap Creek. This ditch cleaning project is designed to reduce the high groundwater and wetland water levels south of Crookneck Lake and is endorsed by the Crookneck LID Board. It will not "drain" the wetlands out of existence, just like the original ditch did not drain the wetlands into tillable land because the ditch depth is too shallow and the gradient of the land is too flat. The wetlands will continue to exist as they are a local groundwater discharge area. The ditch cleanout project will not alleviate the flow into Lake Shamineau from the southeast as that is a different subwatershed that is at a lower elevation than the ditch being cleaned out.

The ditch cleanout project will not solve the high water on Lake Shamineau, and it is not reasonable to expect the LSLID to wait to find a solution to the dozens of homes and properties being flooded on Lake Shamineau. This is seen by the increasing water levels this spring (2020), even after the ditch cleaning effort. The goal of the LSLID High Water Project is to reduce the water levels of Lake Shamineau, which is a product of the high groundwater levels not the other way around. If the trend in higher amounts of precipitation continues, the groundwater levels will continue to be high and that is why the only way to reduce the water level of Lake Shamineau is to design an outlet that can pump the excess water above the OHW away. Again, the primary source of groundwater recharge in the area is not the lakes; to the contrary, the lakes are groundwater discharge areas as evidenced by the many springs and groundwater seeps into the lakes.

The LSLID Board and their consultant, Widseth, have not indicated that Crookneck Lake will not go down as Lake Shamineau and the high groundwater levels go lower, rather the have said that there is no direct connection between the lakes. If there was a direct connection, the lakes would be at similar levels, within an inch or two of each other. It is understood that the reduction in groundwater levels around Lake Shamineau will result in a lowering of Crookneck Lake, which will help alleviate the flooding problems around Crookneck Lake. As discussed above, reducing the water level of Lake Shamineau to its OHW will not lower Crookneck Lake to less than six inches above its OHW that the Crookneck LID Board desires. Therefore, it is unreasonable to not expect the LSLID to remove the floodwater on the Lake Shamineau, which is the excess water above the OHW. State Law clearly allows the removal of water above the OHW, which is a legal level that many laws, rules, and ordinances are based. Having Lake Shamineau at its OHW will allow the LSLID to respond to high rainfall events (greater than four inches), such that severe flooding now occurring will not occur in the future.

5. Response to March 19th Comment from Dan Whitney, Norm Krause, Sharda and Morris Powell:

Introduction: The Lake Shamineau Lake Improvement District (LSLID) appreciates the detailed general and technical comments on the project described in the Lake Shamineau High Water Project EAW. The project is designed to help with the safety and welfare of the public, namely the residents, property owners, and township taxpayers around Lake Shamineau, who are experiencing huge financial and personal disruptions to their lives as well as the loss of trees, native vegetation, wildlife habitat and shoreline erosion. The project is designed as a cost-effective approach to remove excess water above the ordinary high-water level (OHWL) from Lake Shamineau. The northeast outlet alternative was preferred by the regulatory agencies and the infiltration method was the most cost-effective option because it did not require filtering of the water for invasive species. The wetlands located downgradient of the infiltration basins have no residents or infrastructure around them and the higher water levels will not significantly affect the wetlands, as water levels in wetlands naturally rise and fall based on the precipitation amounts in the area around them. The LSLID has been in communication with many of the landowners in the area to hear and address their concerns. The LSLID takes its responsibility for this project very seriously and is willing to work with nearby landowners to obtain flowage easements for the higher water in their wetlands. The LSLID is also willing to obtain additional hydrogeologic data during the EAW process or during the DNR permitting process, which was the plan as the project moved forward.

General Response: The LSLID understands that the infiltration of millions of gallons of lake water into the proposed infiltration basins is dependent on the ability of the subsurface sand and gravels to handle the infiltration, as well as the ability of the downgradient surface water to handle increased flows. As noted above, an outlet to the northeast was preferred by the regulatory agencies, namely the Minnesota Department of Natural Resources (DNR), and Morrison Soil and Water Conservation District (SWCD). Infiltration of the lake water is an option that is available for the project due to the primary groundwater flow direction from Lake Shamineau being to the north and northeast. The infiltration option is preferred by many lake residents and the regulatory agencies agreed it could work. The DNR has provided funding and Morrison County approved the LSLID budget which included the design of a northeast outlet using infiltration which is a cost-effective approach because the sands and gravels appear to be able to handle the infiltration of millions of gallons of water.

The amount of hydrogeologic investigation was limited by the LSLID budget approved for this phase of the project. The amount of site data collected including borings and observation wells is identified in the EAW. The hydrogeologic investigation also used available geologic and water well data from the Minnesota Geological Survey (MGS) and the Minnesota Department of Health (MDH). Additional data on the geologic and hydrogeologic characteristics of the area between the proposed infiltration basins and Stanchfield Lake would be very useful to the project. It is expected that the additional data would be collected as part of the DNR permitting process when additional project funding becomes available. The LSLID plans to obtain the additional data through aquifer analysis, data modeling and additional drilling as part of the permitting process and/or during any subsequent EAW process.

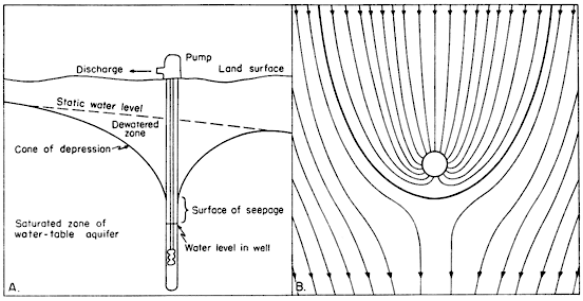
The groundwater flow system is fairly well understood, but as noted above, the project could benefit from additional hydrogeologic investigation. The geochemical changes to the groundwater from infiltrating the lake water are insignificant because the lake water is already flowing through the

groundwater system from Lake Shamineau and the aquifer is not the sole source of drinking water for nearby residents as more is fully discussed in the LSLID's response to the Technical Comment 7 later in this document. Finally, most people would agree that the intensive agricultural practices being utilized east of Lake Shamineau provide more risk to the quality of the groundwater resource than infiltrating lake water.

Technical Comments:

Comment 1) Reference to: EAW page 4 – groundwater mounding and the potential for groundwater to flow back to Lake Shamineau.

Summary Finding: The LSLID believes the groundwater mounding beneath the proposed infiltration basins will change the direction of groundwater flow around the basins and downgradient of the basins toward the downgradient surface waters. The regional gradient of the area indicates a strong northeasterly gradient from Lake Shamineau to Stanchfield Lake and so the mounding caused by the infiltration will not cause the water to flow back to Lake Shamineau. The effect of the mounding is similar to effect of a pumping withdrawal well, where the downgradient side of the pumping cone is much closer to the well than the upgradient portion of the cone (see figure below showing the flow paths for the pumping cone).



In the case of groundwater mounding, the effect is just the opposite with the upgradient side of the mound being much closer to the infiltration area than the downgradient side. Even if the groundwater mound rose to a level higher than Lake Shamineau, the groundwater flow moving east from Lake Shamineau will flow around the mound and follow the regional gradient to the east. In addition, the infiltration basins are far enough away from Lake Shamineau that the area between the groundwater mounding and the lake will have groundwater levels lower than Lake Shamineau. The proposed infiltration basins are nearly one mile from the lake with a wetland basin (locally called the ravine) located between Lake Shamineau and the proposed infiltration basins. This wetland basin would have to fill with 10 feet of water before the water level in the wetland would equal the water level of Lake Shamineau.

Comment 2) Reference to: Appendix B (Hydrogeologic Investigation Report) and Appendix C (New Infiltration Area Characteristics Memo).

Summary Finding: The LSLID realizes the thickness of the aquifer has not been fully defined at this time, even though the latest boring went down to 130 feet below the surface. The geologic borings, observation wells, and the MGS surficial sand maps all indicate the surficial aquifer is unconfined around

the infiltration basins and to the northeast and east as discussed in Section 11a of the EAW. A pumping test of the unconfined surficial aquifer would provide additional hydrogeologic characteristic data about the surficial water table unit and the LSLID is planning to obtain more data downgradient of the current proposed area.

Comment 3) Reference to the statement on Page 4 of EAW, "As water is infiltrated, it will cause groundwater mounding of 10 to 20 feet above the water table surface in the immediate area of the infiltration basins".

Summary Finding: The mounding estimate was based on a groundwater modeling using MODFLOW, the standard groundwater model of the U.S. Geological Survey. MODFLOW is a complex finite-difference model that utilized the available data gathered from the hydrogeologic investigation and data from the MGS Morrison County Geologic Atlas. The detailed background and model results are planned to be reported to the DNR as part of the project permitting. Per input from the Minnesota DNR, the model is being expanded with more surface water units and model packages to make the model more refined and rigorous.

The Hantush spreadsheet application method is a good "cross-check" to use for estimating the potential mounding affect of the infiltration basins, but 40 feet of mounding appears to be a little high. One reason it may be high is the hydraulic conductivity may be a little low because much of the aquifer thickness is coarse sand and gravel with an estimated horizontal hydraulic conductivity of 130 feet per day, which is 45 feet per day higher than the estimated rate used by the commenter. In addition, based on the drilling of the gravel pit area and the geologic conditions forming the sand and gravel kame-like ridge, it is likely that the silty sand layer pinches out to the north. The geologic conditions forming the silty sand layer are related to the low energy lacustrine conditions of the valley area south of the kame-like ridge; whereby, the ridge deposits were formed in a more high energy, flowing water environment that carried away the silt and fine sand. The pinching out of the silty sand layer into the coarser sand and gravel material would make the infiltrated water preferentially follow the easier flow path to the north.

Using the Hantush equation application and increasing the horizontal hydraulic conductivity to 130 feet per day, gives an estimated groundwater mound height of just below 30 feet, slightly higher than the MODFLOW program estimate. A mound of this height, however, will be at least eight feet below the bottom of the lower infiltration basin. The highest part of the mound will be at the center of the infiltration basin, whereas, the mound height will have dropped off by two feet at the margin of the basin. In addition, the infiltration rate can be reduced by reducing the amount of pumping to reduce the mounding height. Reducing the infiltration rate to 2.0 feet per day results in the maximum groundwater mound height dropping to 27 feet in height, which alleviates the concern about the mounding getting to close to the ground surface even if one considers the under prediction of the maximum height of the groundwater mound by 15 percent.

Comment 4) Reference to: Appendix C (New Infiltration Area Characteristics Memo) and Figure 6 of Appendix B (Hydrogeologic Investigation Report).

Summary Finding: The groundwater contour on Figure 6 at the infiltration basins was extrapolated from measured water levels in existing observation wells and surface water features. It would have

been preferable to have an observation well at the location of the infiltration basins, but the budget for this stage of the project only included funding for a soil boring to be completed at that location. The groundwater level in the soil boring is an approximation of the water level at that location because the water level was measured with steel casing present in the borehole to a depth of 135 feet, such that the actual groundwater level would be somewhat higher if the water was allowed to stabilize. An observation well at that location would provide a more definitive result. The bottom of the lower basin is designed at 1302 feet above the National Geodetic Vertical Datum of 1929 (NGVD 29), which will add about four feet of elevation above the boring level; the western basin has a bottom elevation of 1306 feet above the NGVD 29, so is even higher above the elevation of the surface at boring NS-B3.

The groundwater contour map was completed from extrapolated measurements in the observation wells and of surface water features. It was augmented by the MODFLOW model of baseline waters levels which gave a similar result. As Brian Ross discussed with Dan Whitney when he called with questions about the groundwater contour map; to conserve funds the surface water elevations were used as proxy measurements for the groundwater levels in many areas in lieu of additional observation wells; this resulted in contour lines bunching up in the area just west of Stanchfield Lake. The closeness of the contour lines implies a finer soil type than the sands and gravels seen in the area. The explanation is there is a decoupling of the surface water elevation from the groundwater elevation due to the high rates of infiltration around the wetland features. This is similar to what occurred at Lake Belle Taine, where Rosenberry (2000) found a wedge of unsaturated conditions beneath the lakebed along the south side of the lake where groundwater infiltration was taking place. The solution to understanding the groundwater elevations in that area would be to install additional observation wells around the wetlands west of Stanchfield Lake.

It is agreed that groundwater flow directions are perpendicular to groundwater elevation contours and the “flow arrow that occurs on the east of the wetland that is just north of Round Lake” is not perpendicular to the groundwater contours. This is the result of two things: 1) the groundwater contours are extrapolated from the measured surface water elevations in that area and the lack of measurements east of the wetland result in groundwater contours that indicate a more easterly flow than what probably exists because Stanchfield Lake is a local discharge boundary where water flows toward the lake from the east, south and west; and 2) the flow arrow was drawn by a junior staff member who did not understand this relationship and it was missed during senior staff review. The flow arrow was corrected for the EAW as it was changed by senior staff.

Comment 5) Reference to: Page 11 statement that “An updated Groundwater Contour Map that includes water level readings from last summer is included as Appendix K (Update Groundwater Contour Map) and Figure 6 of Appendix B (Hydrogeologic Investigation Report).

Summary Finding: The presentation of different groundwater elevations beneath the infiltration basins can be explained, but it is important to understand that the groundwater elevations do vary beneath the basins for a couple of natural reasons. First, the groundwater level elevations are seasonal and are constantly changing. Secondly, the groundwater surface level varies beneath the basins, being higher to the west and lower to the east.

The groundwater contours are indeed computer generated to speed up the time it takes to make the map rather than hand draw 30 different contours lines. As far as the reading in PZ-3, the reading should be at or around the 1273.27 as indicated in Figure 6. PZ-3 was installed in an area with surficial clayey soils from ponding and subsequent slumping of the sediments during deposition in the glacial terrain, so the water level represents a localized perched condition and the water level was not used in the groundwater contour map of Figure 6. The groundwater contours on Figure 6 in the area of the infiltration basins represents the regional water table elevation within the surficial sands and gravels. These extrapolated groundwater contours beneath the basins agree well with other water wells in the area, including an elevation of 1268 above NGVD 29 at unique well number 528964 (ground elevation of 1298 minus static water level depth of 30 feet), 1264 above NGVD 29 at unique well number 769083 (ground elevation of 1289 minus static water level depth of 25 feet, and 1260 above NGVD 29 at unique well number 779365 (ground elevation of 1290 minus static water level of 30 feet) (See Appendix L of the EAW for water well locations and well records). These elevations also agree with the MODFLOW Model results that show a similar contour elevation beneath the proposed infiltration basins. The reason the elevation in PZ-3 was changed was due to junior staff changing the value on the map to correspond to the groundwater contours, which represents an error on the map in Appendix K of the EAW.

The hydrogeologic conceptualization of the geology and aquifer system has changed over time as more information on the hydrogeologic characteristics was gathered. The statement regarding the ubiquitous sand and gravels in the area and the lack of large areas of perched water tables with no springs or seeps, except along the edges of lakes and wetlands in the area, is still valid as several site reconnaissance observations completed by Widseth staff found no seeps on the sides of hills, even in the hillsides around PZ-3. The presence of many natural depressions in the area of the project with no water or wetland vegetation in the bottom of the basins further supports the conclusion that the entire area around the proposed infiltration basins is underlain by sands and gravels.

The elevation of 1255.53 at the infiltration basin is not one listed in the EAW, but rather the commenters assumption that it is a definitive elevation in the boring NS-B3. Measured elevations in borings are not representative of the exact groundwater elevation at the drilled location because the drilling techniques do not allow the water levels to stabilize in the borehole, especially when there is steel casing present down to 135 feet. Measuring the water level elevation in the soil boring is a standard geotechnical procedure to obtain an approximate groundwater elevation; however, it is not a stabilized water level such as those found in an observation well. As indicated above, the groundwater contour elevation of 1264 at the east end of the infiltration basins represents the regional water table elevation and is supported by water wells and surface water elevations around the proposed infiltration basins area as well as MODFLOW Model results.

Comment 6) Reference to: Appendix C (New Infiltration Area Characteristics Memo).

Summary Finding: A clay layer was not found in any of the borings completed for the Lake Shamineau High Water project even for one boring completed less than 200 feet from unique well number 528964, which is identified as having 34 feet of clay from the surface to a depth of 34 feet and then from 37 feet in depth to 100 feet in the well record. The boring at the proposed infiltration basins, NS-B3, did not

find any clay layers, but a silty sand layer at 48 feet to 65 feet of depth. This result prompted the statement on page 1 of the memo, as follows:

> "The geologic boring results in some reinterpretation of the geology of the area as many of the drilling logs in the area indicate clay near the surface and as a confining layer at 30 to 60 feet below the surface. Based on the geologic boring and geotechnical borings in and near the infiltration area, the clay layer was misidentified by the well drillers and is actually a silty sand layer. This misidentification can easily happen when well drillers are using mud rotary drilling in unsaturated materials. The lack of clay layers means there is more groundwater flow and communication between the deeper groundwater and the surficial groundwater, which has implications for the groundwater modeling and flow characteristics from the infiltration."

This statement still stands as it is difficult for well drillers to clearly identify soil types when drilling a well using the mud rotary technique and it is not uncommon for these soil identifications to be inaccurate. Although good well drillers can generally make an educated guess about the type of soil materials they are drilling through by how the drilling rig is responding, without obtaining clean, undisturbed samples of the material, which is impossible with mud rotary drilling techniques, it is not possible to confidently differentiate between silty sand and clay. The drillers statement "that he believes the groundwater flows to the south in the direction of Round Lake" is without any factual basis and the commenter does not explain why they believe that when all the data, including the Morrison County Geologic Atlas, indicates the groundwater flows in the opposite direction.

The LSLID agrees that more hydrogeologic study could benefit the project; however, there are no near surface or middle depth clay layers beneath the proposed infiltration basins and beneath the large ridge north of the proposed infiltration basins.

Comment 7) Reference to Item 10a of the EAW: 10a). Geology – Describe the geology underlying the project area and identify and map any susceptible geologic features. Discuss any limitations of these features for the project and any effects the project could have on these features. Identify any project designs or mitigation measures to address effects to the geologic features.

Summary Finding: The water from Lake Shamineau does not have the potential to negatively impact drinking water quality and irrigation water of nearby landowners. It is abundantly clear that water from Lake Shamineau already naturally infiltrates into groundwater and moves northeast toward Stanchfield Lake and the large fen wetland north of Stanchfield Lake. The high (three feet above the OHWL) water levels in Lake Shamineau have resulted in higher groundwater flows that are affecting water levels in downgradient lakes and wetlands. The water quality of the lake is good, but the flooding has resulted in the level of nutrients increasing some in the lake such that Secchi disk readings have dropped some in the last few years. Based on these facts, the lake water does not have the potential to negatively affect the unconfined surficial aquifer.

Minnesota's "Degradation Prevention Goal" was implemented to prevent degradation of groundwater from industrial, commercial, and agricultural practices. It is more likely that the groundwater quality of the surficial aquifer is impacted by the intensive agricultural operations occurring in the area of the infiltration basins in the form of nutrients, insecticides, and herbicides applied to the highly irrigated fields near the proposed infiltration basins. The quality of the groundwater will not be impacted by infiltrating water that is already flowing underground from Lake Shamineau.

The statement that the "the aquifer is the sole source of drinking water for many of the domestic residents in the area" misleads and distracts from the groundwater quality issue. Even though the project will not affect the groundwater quality in the area, this point needs to be addressed. The U.S. Environmental Protection Agency (EPA) has not identified the area as being an area with a sole source aquifer. The only such area in central Minnesota is the Mille Lacs Sole Source Aquifer, shown on the following map found at: https://www.epa.gov/dwssa/map-sole-source-aquifer-locations.

The Mille Lacs SSA is due to shallow crystalline bedrock around the Mille Lacs Lake area resulting in limited surficial glacial material and more limited outwash aquifers. This is not the case around the east side of Lake Shamineau, where numerous aquifers in the 250 feet thick glacial sediments are available to domestic residents in the area. As noted above, those aquifers are much more at risk from the intensive farming operations being conducted east of Lake Shamineau than from infiltration clean lake water.

The reference to U.S. EPA aquifer recharge and aquifer storage guidance is another red herring, as EPA's guidance is directed toward projects with reclaimed water from sewage or industrial use and toward storage in bedrock aquifers, neither of which apply to the Lake Shamineau High Water Project. To clearly address the statements listed by the commenter, we provide the following:

a) Regarding introducing contaminants to the aquifer, the water from Lake Shamineau contains minimal contaminants and certainly does not contain any contaminants that would exceed a primary drinking water threshold as the water is soft water with a neutral pH and a minimum amount of dissolved geologic materials such as calcium, sodium, magnesium, iron, etc.
b) Regarding metals and radionuclides from rock, the infiltrated water is not being injected into a bedrock aquifer where arsenic, iron, manganese, or radionuclides maybe be found and dissolved, so this is not an issue.
c) Regarding pathogens entering aquifers, naturally occurring pathogens within the lake are minimal and will not enter the aquifer because the sands and gravels will effectively filter out these constituents.
d) Regarding aquifer storage operations, this is not an aquifer storage project and the water is not being introduced into a bedrock aquifer.

Infiltration of lake water is not in the category of aquifer recharge and storage projects.

The reference to the Minnesota Pollution Control Agency's stormwater infiltration guidance distracts the reader from the more likely aquifer impacts due to the intensive farming operations near the proposed infiltration basins. As indicated in the EAW, the infiltration basins will have the near surface topsoil and silty sands scrapped off to be used on the berms around the infiltration basins so that contaminants found in the soil will not be mobilized. If there are already contaminants from the agricultural operations in the groundwater, the infiltration of water from Lake Shamineau will improve the water quality by diluting the concentration of the contaminants. Additionally, the water inflow into the infiltration basins, unlike stormwater basins, can be controlled such that mounding will not be allowed to rise high enough to saturate the soils in the adjacent farm fields.

A geochemical analysis of the soils, basin sediments, groundwater, and lake water is unwarranted because the lake water is already naturally infiltrating into the surficial groundwater system. The "drainage basins" referred to by the commenter from the U.S. Geological Survey's (USGS's) natural processes of groundwater are not infiltration basins, but watershed basins. A detailed assessment of groundwater quality for infiltrating the lake water would be a waste of public funds being utilized for this project.

Similarly, studying the impact to water quality of the wetlands is unneeded because the wetlands currently receive groundwater from seepage and the groundwater seeping into the wetlands comes from other lakes and wetlands. The Lake Shamineau High Water Project is trying to mimic the natural process of infiltration to remove the excess water from Lake Shamineau.

6. Response to March 21st Comment from Debra Nelson, Arlo Rohl, Wanda Bell, Bonita Sarazin, Roy Rohl, Sharon Rohl, Norman Rohl, Betty Rohl:

Thank you for your comments. We understand that you have concerns regarding your properties. As you know, Rick Rosar and Cindy Kevern met with you on April 1, 2020 through a Zoom meeting to better understand your concerns. One of the concerns that was raised included the cleaning of Ditch 6. We have subsequently contacted the County regarding this ditch cleaning and a determination of possible cleaning is being made. Another concern voiced was regarding the stream out of Stanchfield. The LSLID understands that further analysis of this stream will be required. We are committed to continue communications, both in-person and in writing, as the high-water outlet project progresses. We also invite you to find further documentation on our website at https://minnesotawaters.org/lakeshamineau/lid/ . In addition, if at any time, you have questions, please send us an email at LSLIDBD@gmail.com.

7. **Response to March 24th Comment from Rohl Family Trust, Ellen Noreen, Laural Park, Gwentha Lumsden:**

   Thank you for your comments. We understand that you have concerns regarding your property. As you know, Rick Rosar and Cindy Kevern met with you on April 1, 2020 through a Zoom meeting to better understand your concerns. We are committed to continue communications, both in-person and in writing, as the high-water outlet project progresses. We also invite you to find further documentation on our website at https://minnesotawaters.org/lakeshamineau/lid/ . In addition, if at any time, you have questions, please send us an email at LSLIDBD@gmail.com.

8. **Response to March 25th Comment from Eugene Rohl:**

   Thank you for your comments. We understand that you are have concerns with your property. Your comment raises some technical questions regarding Stanchfield Lake, the dam, and wetland fen. These issues will be researched and analyzed during the permitting process and/or any subsequent EAW process. We also invite you to see our response to the March 19th Comment from Dan Whitney, Norm Krause, Sharda and Morris Powell in Number 5 above.

   As you know, Rick Rosar and Cindy Kevern met with you on April 1, 2020 through a Zoom meeting to better understand your concerns. One of the concerns that was raised included the cleaning of Ditch 6. We have subsequently contacted the County regarding this ditch cleaning and a determination of possible cleaning is being made. Another concern voiced was regarding the stream out of Stanchfield. The LSLID understands that further analysis of this stream will be required. We are committed to continue communications, both in-person and in writing, as the high-water outlet project progresses. We also invite you to find further documentation on our website at https://minnesotawaters.org/lakeshamineau/lid/. In addition, if at any time, you have questions, please send us an email at LSLIDBD@gmail.com.

9. **Response to March 25th Comment from Dave and Nancy Deedrick:**
   Thank you for your comments. We understand that you are have concerns with your property. Your comment raises some technical questions regarding Stanchfield Lake, the dam, and wetland fen. These issues will be researched and analyzed during the permitting process and/or any subsequent EAW process.

   As you know, Rick Rosar and Cindy Kevern met with you on April 1, 2020 through a Zoom meeting to better understand your concerns. One of the concerns that was raised included the cleaning of Ditch 6. We have subsequently contacted the County regarding this ditch cleaning and a determination of possible cleaning is being made. Another concern voiced was regarding the stream out of Stanchfield. The LSLID understands that further analysis of this stream will be required. We are committed to continue communications, both in-person and in writing, as the high-water outlet project progresses. We also invite you to find further documentation on our website at https://minnesotawaters.org/lakeshamineau/lid/. In addition, if at any time, you have questions, please send us an email at LSLIDBD@gmail.com.

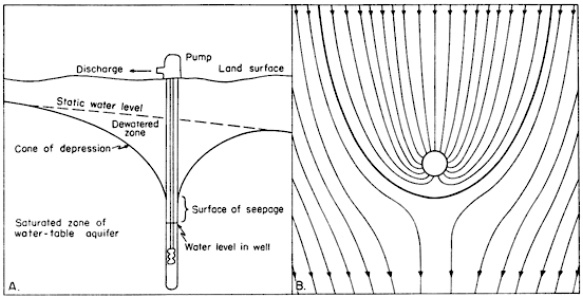
10. **Response to March 25th Comment from Bill Peterson:**
    Thank you for your comments. We understand that you are have concerns with your property. Your comment raises some technical questions regarding Stanchfield Lake, the dam, the creek to the north and the wetland fen. These issues will be researched and analyzed during the permitting process and/or any subsequent EAW process. In addition, we understand your concern for the Blanding's turtles and we plan to take this into consideration in any future plans.

    As you know, Rick Rosar and Cindy Kevern met with you on April 1, 2020 through a Zoom meeting to better understand your concerns. One of the concerns that was raised included the cleaning of Ditch 6. We have subsequently contacted the County regarding this ditch cleaning and a determination of possible cleaning is being made. Another concern voiced was regarding the stream out of Stanchfield. The LSLID understands that further analysis of this stream will be required. We are committed to continue communications, both in-person and in writing, as the high-water outlet project progresses. We also invite you to find further documentation on our website at https://minnesotawaters.org/lakeshamineau/lid/. In addition, if at any time, you have questions, please send us an email at LSLIDBD@gmail.com.

11. Response to March 25th Comment from Shannon Wettstein, Morrison County Soil and Water:

Groundwater Mounding

The regional gradient of area indicates a strong easterly gradient from Lake Shamineau to Stanchfield Lake and so the mounding caused by the infiltration will not cause the water to flow back to Lake Shamineau. The effect of the mounding is similar to effect of a pumping withdrawal well, where the downgradient side of the pumping cone is much closer to the well than the upgradient portion of the cone (see figure below showing the flow paths for the pumping cone).



In the case of groundwater mounding, the effect is just the opposite with the upgradient side of the mound being much closer to the infiltration area than the downgradient side. Even if the groundwater mound rose to a level higher than Lake Shamineau, the groundwater will flow around the mound and follow the regional gradient to the east. The infiltration basins are far enough away from Lake Shamineau that the area between the groundwater mounding and the lake will have groundwater levels lower than Lake Shamineau. The proposed infiltration basins are nearly one mile from the lake with a wetland basin (locally called the ravine) located between Lake Shamineau and the proposed infiltration basins. This wetland basin would have to fill with 10 feet of water before the water level in the wetland would equal the water level of Lake Shamineau.

Hydrogeologic Investigation Report (HIR)

The HIR was for the gravel pit area and most of the data was obtained from there, but some of the additional soil borings were completed on and adjacent to the current proposed site. The groundwater mounding was calculated for an infiltration site adjacent to and overlapping the current proposed site using the USGS Modflow model. There were four design areas for the infiltration basins and it is incorrect for the SWCD to state that the old basins and the new basins are “almost half mile apart”, when in fact the third basin design overlaps with the current basin design. With that said, more data downgradient of the current proposed area would be helpful.

New Infiltration Area Characteristics Memo

It is clear from the data gathered in the EAW that the well drillers misidentified near surface soils in the area by calling it clay. The well drillers used mud rotary drilling techniques to install the residential and irrigation wells in the area and it is difficult to identify geologic materials using mud rotary techniques because of the thick bentonite mud that is used to move the cuttings out of the drill hole and keep the hole from collapsing. The data for the EAW was obtained by geotechnical and rotosonic drilling

techniques which do not use drilling fluid except for potable water for deeper portions of the rotosonic borings. The soil boring and well drilling work for the EAW was supervised by licensed professional engineers and geologists who have much greater experience understanding geologic materials than most well drillers. The geologic samples for the EAW show the soils are sands rather than clays in the near surface areas of the infiltration basin area; however, as indicated above, more data is usually helpful.

No Comments Regarding Water Quality in the Adjacent Areas to the East

The SWCD noted that the EAW included a statement regarding "rotting" homes and the flooded septic systems are adding nutrients to Lake Shamineau which is reducing the water quality of the lake. Note that some of these comments are a bit exaggerated due to the homeowner's frustration with their flooded homes. The water pumped from Lake Shamineau is still of good quality that will not affect wells or the water quality to the east. The water from Lake Shamineau is already flowing to the east via the groundwater flow from the lake. For the proposed project, the water that is pumped from the lake will be infiltrated through the soil before it reaches the groundwater. It is more likely that the groundwater quality of the surficial aquifer is impacted by the intensive agricultural operations occurring in the area of the infiltration basins in the form of nutrients, insecticides, and herbicides applied to the highly irrigated fields near the proposed infiltration basins. The quality of the groundwater will not be impacted by infiltrating water that is already flowing underground from Lake Shamineau.

O & M Manual – IV Operations

The pumping from the lake will stop when the lake gets down to the OHWL. There will not be any pumping if the lake goes below the OHWL.

The LSLID is surprised with the SWCD's statement recommending an Environmental Impact Statement (EIS) since they did not express any strong concerns in the last two meetings held at the SWCDs offices. It would have been helpful to have heard of these concerns prior to the issuance of the EAW. An EIS can take up to $200,000 and over a year to complete, which would result in the project likely being delayed two years. There have been other lake pumping projects in the state, some much larger and more intrusive than this project and none that we are aware of required an EIS. If an EIS is determined to be needed, one will certainly be done regardless of cost and time.

12. Response to March 25th Comment from Melissa Collins, MN Department of Natural Resources:

I. General Remarks

A. Project Scope: The Lake Shamineau Lake Improvement District (LSLID) appreciates the DNR's concern for the Lake Shamineau residents, who are our families and friends, and who are experiencing huge financial and personal disruptions to their lives from the flooding. The LSLID Board also appreciates the financial support that the DNR has provided to solve this horrendous problem.

The LSLID realizes that the water levels in downstream wetlands are elevated above normal water levels. Downstream wetlands, however, do not have homes and cabins around them and can handle higher water levels without destruction of buildings and property.

The project has been designed as a two to three year solution to the flooding problem. The LID has been working for five years on the high-water problems that shows no sign of relenting in the foreseeable future. Once the water level of the lake is down to its ordinary high-water level (OHWL), it will require much less pumping to keep it at that level. The ecologic impacts of the high water on downstream wetlands will be temporary in nature resulting in more water moving through the lakes and wetlands. We believe that the DNR understands that ecologic impacts whether from high water levels or low water levels are part of the natural environment and are necessary for the diversity of the floral and fauna of Minnesota. The hydrologic changes will increase wetland habitat and, with it, wetland wildlife and will push back the encroaching forest on Type 2 and Type 3 wetlands. The DNR typically encourages increases in wetland habitat and it should be viewed as a positive for this project.

B. Project Size: The LSLID realizes the lake will likely take longer than two years to drop back to the OHWL. The 7.1 cfs rate is the design rate for the basins and it is possible that the maximum rate of 10 cfs could be infiltrated depending on the performance of the infiltration basins and the resulting mounding of groundwater. The LSLID knows there will be additional water that will flow into the Lake Shamineau from the adjacent wetlands and from groundwater around the lake as discussed in the Operation and Maintenance Plan included as Appendix F of the EAW. The amount of additional water is very difficult to estimate, but the statement in the EAW that it would take "at least" two years to lower the lake to the OWHL recognizes that the two year time frame is conservative.

C. Pumping Rate: The DNR website lists the Lake Shamineau surface area as 1434 acres. The 1.7 feet of rise on Lake Shamineau in a given year is a worst-case scenario based on the history of the lake. In all other years, the lake has not risen close to that amount so it is likely that the proposed pumping rate will lower the lake over one foot per year. As noted above, the LSLID is aware that a greater volume will need to be pumped than just the 2.5 feet of lake level over the 1,434 acres and that the pumping needs to exceed the rate of water entering the lake. The 7.1 cfs rate for 150 days would lower the lake 1.5 feet and accounts for downtime as the minimum pumping season would be at least 180 days.

The pumping rate is designed at 7.1 cfs because of the estimate of the infiltration rate at the basins. The maximum design rate is 10 cfs as is identified in the EAW and the Operations and Maintenance Plan. The actual rate over a period of a year will depend on many variables, such as the duration of the pumping season, the amount of downtime, and the efficiency of the infiltration basins. For instance, the pumping duration is planned at 150 days, which is only five months; it is conceivable that pumping could start in early April and go through the end of November for a period of 240 days. In addition, downtime is not planned, but is sometimes needed to maintain the equipment or because of unplanned circumstances like a weather-related power outage.

II. EAW Comments

A. Page 4. The project does intend to avoid negative impacts to natural resources.

B. Page 4. The survey datum used throughout the EAW is not inconsistent as most of the elevations were surveyed in by licensed surveyors. The problem is due to the interpretation of the elevations by the DNR. Firstly, the ground level topography at the proposed infiltration basins varies by 20 feet from the northwest corner to the southeast corner; in addition, the proposed infiltration basin bottoms are at different elevations. Additionally, as DNR points out in their comments, the groundwater elevations are seasonal and are constantly changing. Finally, the groundwater surface level varies beneath the basins, being higher to the west and lower to the east. The depth to groundwater at the infiltration basins vary for these reasons and is not one specific depth.

C. Page 6. Flow meters are planned for the project to record volume, rate, and times the water has been pumped from the lake.

D. Page 9. There are three soil borings in or immediately adjacent to the infiltration basin area and other borings in other parts of the project area so this statement is not misleading. In addition, the map in Appendix I which the DNR referenced in their comments clearly illustrates the locations of these borings as not to mislead anyone or their perceived interpretation of the project area.

E. Page 13. The LSLID realizes that flowage easements will need to be obtained and has had discussions with downgradient property owners regarding the easements. This information is not critical to the EIS need decision, flowage easements are not needed to make the EIS decision, and it should be noted that the EQB states in its published EAW guidelines-Preparing Environmental Assessment Worksheets that the information can be developed later as part of an appropriate permitting process.

F. Page 13. The Lake Shamineau High Water project will not result in impacts to groundwater and surface water resources that are not already occurring.

G. Page 18. The LSLID agrees that flowage easements be required from downstream property owners, including the DNR. Our consultant, Widseth, has been involved in obtaining a flowage

easement on a large DNR Wildlife Management Area as part of another flood mitigation project. The LSLID understands that the DNR has a process set up to acquire these easements.

H. Pages 13 and 14. Surface Waters:

1. The LSLID is well aware that the wetlands in the area, including Ramdown Slough, are above normal levels; however, the areas around these wetlands do not have any homes or cabins that are being flooded as there are on Lake Shamineau. Regarding Stanchfield Lake, the lake levels have been much higher in the past, so it is a surprise that the DNR's water control structure is allowing flooding to occur being the structure has the capacity to handle much higher flows. The LSLID would like to visit the areas on Stanchfield Lake "experiencing flooding of shoreland and private roads" and asks that the DNR please set up a tour of these areas for LSLID representatives.

2. The increased flow to the non-public water wetlands on the WMA has occurred even without the project, which has resulted in naturally-occurring increases in the hydrology of the shallower wetlands. This often occurs in natural wetland environments with the concomitant changes to the ecology and aquatic communities, just as drought causes other changes to the ecology and aquatic communities. The DNR often does the same thing when they control water elevations to increase fish habitat or to rejuvenate wetlands. The wetland changes will not be permanent.

3. The increases in water depth are already occurring and have increased wetland depths by two feet over the last year. If the DNR staff had visited the wetlands in the last year, they would have seen that waterfowl, including wood ducks, mallards, and ring-necked ducks are using the expanded wetland areas, creating more waterfowl hunting opportunities. In addition, the DNR staff could see that there is no wild rice in the wetlands and that the higher water levels are killing back the trees encroaching on the emergent marsh vegetation. The emergent vegetation habitat can handle the higher water levels and will return when water levels go lower. The changes in the food web are part of the natural environment and will not be permanent. The High Water Project will result in higher wetland water levels, which will temporarily change the hydrology of the wetlands resulting in expanded wetland habitat and increased waterfowl use. There are many sites in Minnesota where the DNR has raised water levels on wetlands and have done a good job of creating more waterfowl habitat.

4. The higher water levels are already affecting trees and the adjacent upland areas, but the affect on forest management activities will be minimal. The wetlands in the WMA and adjacent areas have steep slopes and the affected forest area make up a very small portion of the large woodland complex on and around the WMA.

5. The DNR public access was built on wetland areas so it is understandable why it is difficult to access Stanchfield Lake. The DNR could consider building the access in an upland area. The project will not affect the lake to the water levels seen in the past because the outlet has more than adequate capacity to handle the project amount.

6. The additional drainage into the WMA wetlands will provide additional benefits in the form of more wetland habitat for waterfowl and hunting opportunities, which are consistent with the purpose of the WMA. As the hydrology of the wetlands is already high as indicated in the DNR's comments, the additional hydrology possibly resulting from the project would be an extension to what is already occurring. The DNR has allowed flowage easements on other WMAs for flood relief, so it is unclear what conditions would need to be met for DNR to issue an easement for this flood relief project.

7. The LSLID is willing to conduct more research on the outlet stream from Stanchfield Lake. The outlet stream only flows for three-quarters miles, largely through wetland areas, before disappearing into a large spruce and tamarack wetland area and so the research will be limited to the area where there is a channel. The project is designed with a maximum capacity of 10 cfs. As time goes on, pumping will decrease significantly and could possibly be discontinued indefinitely.

I. Pages 15 and 17. Rare Features

1. Red-shouldered hawks and Blanding's turtles are vertebrate animals.

2. An avoidance plan for Blanding's turtles will be prepared for the project.

3. Trees to be removed will be checked for red-shouldered hawk nests.

4. The specifications will state Category 3N and 4N erosion control meshes in the 2016 and 2018 MnDOT Standard Specifications for Construction.

5. Native seed mixes that are "noxious weed-free" will be required in the specifications.

J. Page 20. Noise

1. The actual decibel level of the submerged pump will be provided.

III. Hydrogeologic Investigation Report

A. Site Evaluation

The project budget for the hydrogeologic investigation was limited and resulted in most of the work being completed at the gravel pit, where the infiltration basins were originally to be located. Because of the change to the current infiltration area and the need to get the EAW document completed, the cross-sections were not updated to reflect the improved information from the drilling of last fall and this winter. It was also intended that additional borings would be completed prior to permitting. DNR should know that Unique Well Numbers 528964 and 769083 are not DNR observation wells, but are a private residential well and a private irrigation well, respectively. The reference to mottling at 35 feet below the surface in the new boring (NS-B3) does not necessarily mean that there are consistently saturated conditions at that depth and, in fact, the groundwater level seen in the boring is deeper.

The project's soil borings and observation wells indicate no clay layer in any of the logs with many near Unique Well Number 528964. This is indicative that the water well drillers had mis-identified the near surface soils as clay in the well record for the residential well. The DNR references a groundwater level of 1278 feet in elevation observed in a boring located 700 feet south of the proposed infiltration basin, but provide no boring log or figure showing the location of this boring so it is unclear what significance this has regarding the water level information provided in the EAW.

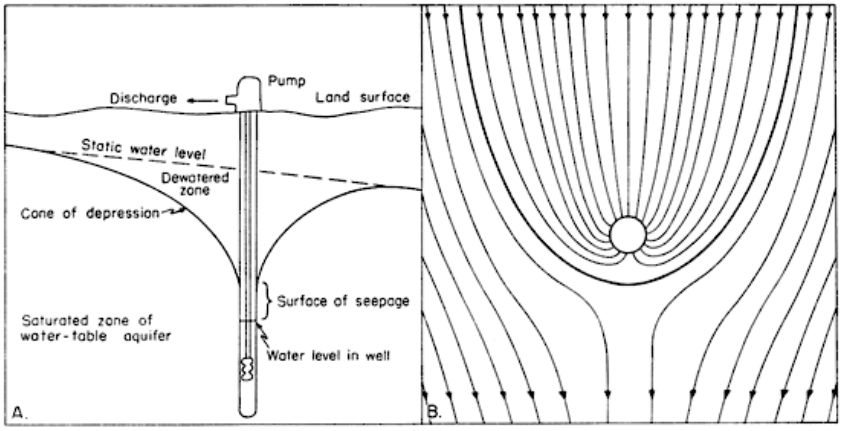
The summary made in the Hydrogeologic Investigation Report is based on both the data and geologic interpretation of the data. The assumption that the finer textured material in PZ-3 was a small sliver extending into that area was born out by the test boring in the proposed infiltration basin area, as it found no clay, but sands and gravels down to 130 below the surface. The reference to the nearest DNR observation well is in error as the nearest DNR observation well is over two miles away. More geologic data in the area of and downgradient of the infiltration basins would be useful, but the limited budget made obtaining more data problematic. The LSLID board planned on acquiring more of this data during the permitting process.

B. Groundwater Model

The LSLID appreciates the comments and information from the DNR's Groundwater Technical Unit's preliminary review of the groundwater modeling completed for the project. The LSLID's consultant has been working on a revised model that is to be submitted with the permit application.

The project budget provided for collection of geologic data resulted in using some hand borings in low topographic areas to gather additional soil and water level data. The infiltration basins were moved farther east because of difficulty gaining easements for the infiltration basins at the original location and PZ-3, one of the piezometers installed by hand borings, was near the proposed location of the infiltration basins. The degree of mounding at 7.1 cfs is expected to be about 20 feet.

The regional gradient of area indicates a strong gradient from Lake Shamineau to Stanchfield Lake and so the mounding caused by the infiltration will not cause the water to "seep" back to Lake Shamineau. To show this, the groundwater model is being refined to add more surface water features and modeling packages to provide a more robust model. The effect of the mounding is similar to effect of a pumping withdrawal well, where the downgradient side of the pumping cone is much closer to the well the upgradient portion of the cone (see figure below showing the flow paths for the pumping cone).



In the case of a mound, the effect is just the opposite with the upgradient side being much closer to the mound than the downgradient side. Even if the groundwater mound rose to a level higher than Lake Shamineau, the groundwater will flow around the mound and follow the regional gradient to the northeast. The infiltration basins are far enough away from Lake Shamineau that the area between the groundwater mounding and the lake will have groundwater levels lower than Lake Shamineau. The proposed infiltration basins are nearly one mile from the lake with a wetland basin (locally called the ravine) located between Lake Shamineau and the proposed infiltration basins. This wetland basin would have to fill with 10 feet of water before the water level in the wetland would equal the water level of Lake Shamineau.

IV. Operation and Maintenance Plan

The Operations and Maintenance Plan is a draft document that will be subject to DNR requested revisions as part of the Public Waters Permit process. The Operation and Maintenance Plan is designed to give some flexibility to the pumping rate depending on the response of the infiltration basin and groundwater. The 5 cfs rate is a proposed starting rate that is not expected to exceed a groundwater mounding of 15 feet. If the 5 cfs rate works as expected, the rate will be increased to 7.5 cfs or whatever rate DNR wanted to specify. The 7.1 cfs is not a maximum rate, but rather a design rate that would give approximately 2 feet per day infiltration rate. The LSLID desires a maximum rate of 10 cfs to remove the high water from Lake Shamineau in two to three years. The plan can add how much time should elapse between water level readings to determine the extent of mounding. While models are important tools to understand groundwater flow, they cannot replicate all the complexities of the geologic and atmospheric regimes, so the infiltration rates will need to be based on what actually occurs with the infiltration project.

The action level of one-foot is based on the understanding that water levels can rise one foot without causing significant problems around wetlands. The OHWL is the “ordinary” high water level that can be, and often is, exceeded during very wet periods. The one-foot level above OHWL is a common very high water level found on lakes and wetlands. The pumping on Lake Shamineau will stop when the water level reaches its OHWL. It is unclear why DNR states that going below the OHWL would trigger a Mandatory EAW, because it would be the same document as the discretionary EAW and we do not plan on pumping below the OHWL.

A. Monitoring

The concerns about the potential increases to the already flooding wetland basins appear to be an automatic response to higher water. As explained earlier in this response, DNR staff should understand water levels in wetlands are not static - they go up during wet periods and down during dry periods. The higher water in these wetlands are creating more wetland and waterfowl habitat, which is one of the primary reasons WMAs are purchased. There will not be any structures or roads affected by the higher water around these wetlands, yet DNR has taken the position that this will create negative impacts on these wetlands. The results of the initial modeling indicate an increase in groundwater elevations of one foot will reach the wetland areas, with a corresponding mound height of 20 feet. As indicated in the previous section of this response, the one-foot level above OHWL is a common very high water level found on lakes and wetlands. Also as noted previously, the presence of high water on the downstream wetlands does not create an adverse impact because there are no structures or roads being affected and the higher water levels are creating more wetland habitat. The contingency plan ties increases in water levels of wetlands to their water level at the start of pumping even if they are above their OHWL. A one-foot threshold above existing water levels is a reasonable level that will be similar to the high water levels that now occurring. The project would reduce pumping amounts if the waters rise more than one foot above the water level at the start of pumping no matter if it is caused by the pumping or if the water level rise occurs for other reasons. As the water levels decrease on Lake Shamineau, it is anticipated that regional groundwater levels will drop and, with it, the water levels in the area wetlands.

The Operation and Maintenance Plan discusses water levels in the wetlands downgradient of the site of which there are several and, of which, only one has an OHWL identified. A one-foot increase above the wetlands current levels provide a conservative threshold to reduce pumping into the infiltration basins. The actual elevation will be determined and stated for the large wetland basins. The small non-public water wetlands could also have an elevation stated, but then monitoring of each of the wetlands would need to be completed; whereas, the conservative level of one foot above the level when pumping is starting will result in similar elevations in the non-public water wetlands. The WMA manager will be consulted regarding acceptable wetland levels in the basins on the WMA and these can be added to the Operation and Maintenance Plan.

V. Conclusion

The Lake Shamineau High Water Project EAW was completed with initial data and in a timeframe that allowed for the project to move forward to assist with immediate flooding on Lake Shamineau. The LSLID understands that gathering additional hydrogeologic data, completing more rigorous modeling, and gaining a better understanding of the impacts to downstream surface waters may be needed. The LID board has planned for more data collection during the permitting process as identified in the EQB EAW guidelines and administrative rules.

The LSLID appreciates DNR's help and comments on the project EAW.

13. **Response to March 23rd Comment from Sarah J. Beimers, Minnesota State Historic Preservation Office:** Thank you for your comments on the archaeological properties. If any federal assistance is considered, we will seek further consultation.