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*By Brianna Uy at 1:16 pm, Apr 05, 2021*



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March 23, 2021

YMCA of Greater Seattle  
14230 NE Bel Red Road  
Bellevue, Washington 98007

Attention: Josh Sutton and Meredith Cambre

Subject: Comment and Review Letter  
Geotechnical and Environmental Support Services  
YMCA Mineral Lake Project Preliminary Planning  
Mineral Lake, Washington  
File No. 6565-008-00

## **INTRODUCTION AND BACKGROUND**

The YMCA of Greater Seattle is in discussions to purchase all or portions of privately owned commercial forest tract located at the north end of Mineral Lake, Washington. The overall project goal is to develop and operate a year-round youth and family camp on the property.

We have been engaged with this project since the end of 2019. As part of the due diligence phase for the project, GeoEngineers completed environmental and geotechnical assessments of the subject property and provided our preliminary opinion on the suitability of the property for the proposed camp development. Our due diligence services included reviewing published information of the property and site vicinity, completing a Phase I Environmental Site Assessment, visiting the property and performing a reconnaissance level critical areas survey, advancing 24 test pit explorations near conceptual development areas and providing preliminary geotechnical findings and opinions.

Preliminary findings and recommendations were presented in our draft reports; Phase I Environmental Site Assessment dated November 20, 2020, an Environmental Permitting and Sensitive Areas Review Report dated November 20, 2020 and a Draft Geotechnical Engineering Services Report dated November 23, 2020. These reports have recently been updated, as necessary, and finalized. These reports are available under a separate cover.

As part of the due diligence process for this project, the YMCA submitted a Comprehensive Plan and Zoning Code Amendment package to Lewis County on December 30, 2020. The YMCA has since received comments from Lewis County regarding the submittal and proposed camp development. This comment and review letter is intended to support the camp development and responses to the County's comments.



## LEWIS COUNTY COMMENTS

Lewis County provided review comments to the Comprehensive Plan and Zoning Code Amendment package in a letter dated, February 11, 2021 by Brianna Uly, Associate Planner (Uly 2021). One of the County's comments concerned on-site sewage and stormwater systems:

2. RCW 36.70A.360(4)(e) requires the designation process to ensure the Master Plan Resort will be consistent the county's critical area protection provisions under LCC 17.38. Given that the checklist states the project intends to rely on an on-site sewage system for a population of 500 people, the county **will need analysis as to how the design of this system will or will not affect Mineral Lake as a fish and wildlife habitat conservation area and any wetlands on the subject parcel. Furthermore, discussion as to how stormwater during the construction and operation phases of the proposed Master Plan Resort will protect these aquatic resources.**

Per discussions with the design team we reviewed conceptual site designs, specifically with regard to the above comment, and provide the discussion below.

## REVIEW OF CONCEPTUAL SEWAGE AND STORMWATER DESIGN

Property development is anticipated to occur in phases over a period of many decades. The proposed phases are:

- Phase 1 – Visitor Center (northwest of Mineral Lake, near Mineral Hill Road site entrance)
- Phase 2 – Camp A (northwest of Mineral Lake)
- Phase 3 – Camp B (eastern project area, between Mineral Lake and Mineral Creek)

As the project is in the early phases of conceptual planning and design, specific type, size and location of on-site sewage and stormwater systems is not available. A Due Diligence Report (Site Civil) dated December 30, 2020 was prepared for this project by SCJ Alliance and incorporates the findings and preliminary recommendations of GeoEngineers' due diligence services. The report includes an assessment and overview of sewage and drainage systems, which could be appropriate for the site. Specific type, size and location of these systems will be determined at a later date in accordance with Lewis County and other appropriate regulatory agencies.

In the following sections we review the conceptual on-site sewage and drainage/stormwater systems proposed, evaluate potential impacts to fish and wildlife habitat conservation areas (FWHCAs), and provide discussion for protecting these aquatic resources at the site.

### On-Site Sewage System

#### Conceptual Design

##### Phase 1

Sewage system design for Phase 1 is expected to be a standard pressure distribution/mound septic system with a drainfield. We understand the drainfield will be located within the proposed development area northwest of Mineral Lake, likely adjacent to existing logging roads. Septic drainfields for Phase 1 will be



abandoned during future development and flows for additional phases will be combined for treatment in one new system as site development progresses.

### **Phases 2 and 3**

Proposed sewage systems for Phases 2 and 3 consist of large on-site septic systems (LOSS). Conceptual design includes wastewater collection tanks, Sequencing Batch Reactor (SBR) for wastewater treatment, Subsurface Soil Absorption System (SSAS) drainfields, and associated conveyance consisting of pumps and piping. An SBR system uses a separate pre-treatment section to mechanically hold back solids and a biological aeration and settling tank. The final phase of the SBR treatment is infiltration of the purified wastewater via SSAS drainfield. Final locations of the LOSS elements have not been identified for this stage.

## **Environmental Review**

### **Phase 1**

Documented FWHCAs within the proposed Phase 1 development area northwest of Mineral Lake include wetlands, streams and Mineral Lake. Based on discussion with the design team, proposed Phase 1 sewage system design (as described above) has considered the location of the identified FWHCAs features to minimize impacts to FWHCAs. We reviewed potential drainfield location with the design team and observed the location is outside the boundaries of FWHCAs and associated buffers at the site.

Based on our review of the proposed Phase 1 sewage system, it is our opinion that the design will not impact FWHCAs due to the available space and lack of proximity of the Phase 1 sewage system to these habitats. It is also our opinion that if deemed infeasible, due to other factors unknown at this time, that the impacts due to proximity can be mitigated and it is the intention of the design team to mitigate these effects where necessary. As such, it is also our opinion that the presence and location of the Phase 1 sewage system to the FWHCAs should not be considered a controlling factor of concern for development of Phase 1.

### **Phases 2 and 3**

As mentioned above, future development at the site (Phases 2 and 3) could include large on-site septic systems, with final type, size and locations to be determined at a later date. We will continue to coordinate with the design team as septic design is advanced to provide recommendations and mitigate potential impacts to FWHCAs. Specifically, drainfield locations will need to consider documented FWHCAs and associated buffers.

## **Geotechnical Review**

### **Subsurface Conditions**

We explored subsurface conditions at the site by advancing 24 test pit explorations extending to depths between approximately 8 and 14½ feet below surrounding grade. Detailed descriptions of subsurface conditions and summary logs of the test pits are included in our Geotechnical Report.

We reviewed Chapter 8.40 On-Site Sewage Systems of the Lewis County Code. Specifically, we reviewed Table V - Soil Type Descriptions, which classifies soils based on the United States Department of Agriculture (USDA) soil texture. USDA soil textural classifications based on grain-size analysis for selected samples from our test pits are provided in our Geotechnical Report.

Based on our observations during the test pits, analysis of selected soil samples and site topography, we interpret two different general infiltration profiles on site.



- Residual soils generally consisting of varying amounts of clay, silt, sand and gravel. These soils were typically observed in the higher elevations of the project site. We calculate preliminary design infiltration rates on the order of 0.3 to 1.2 inches per hour for selected residual soil samples from the test pits. Based on our review, residual soils appear to be consistent with Soil Types 5 and 6 as described in Chapter 8.40 On-Site Sewage Systems of the Lewis County Code (e.g., sandy loam, sandy clay loam, loam). Residual soils were typically underlain by bedrock. Based on our observations and review of published geologic, this profile appears appropriate for preliminary assessments of upland areas of the site.
- Glacial drift soils were generally observed in the lower elevations of the site adjacent to Mineral Creek. Glacial drift soils were generally comprised of alluvial gravel with varying amounts of silt and sand, with occasional layers of silt and/or sand. We calculate preliminary design infiltration rates on the order of about 3 to 4 inches per hour for selected glacial drift samples from the test pits. Based on our review, glacial drift soils encountered in the test pits appear to be consistent with Soil Types 1 and 2 as described in Chapter 8.40 On-Site Sewage Systems of the Lewis County Code. (e.g., extremely gravelly sand, coarse sand). Test pits that encountered glacial drift also encountered relatively shallow groundwater, on the order of 5 to 11 feet below ground surface (bgs). Based on our observations and review of published geologic data, this profile appears confined to portions of the eastern site area.

#### **Preliminary Design Recommendations**

Overall, it is our opinion that the septic systems are generally feasible and can be constructed as currently envisioned with regards to geotechnical considerations. It is our opinion that soil types encountered in the test pits at the site will allow for infiltration of treated wastewater. Infiltration rates into underlying soils vary across the site and will need to be considered when determining final drainfield sizes. With appropriate engineering controls (e.g., vertical separation, horizontal separation, and/or treatment layers) it is also our opinion that sewage systems can be adequately designed so they will not impact Mineral Lake or other FWHCAs.

We anticipate that required vertical separation (e.g., depth to groundwater, bedrock, or other restrictive layer) and horizontal separations (e.g., aquifer, spring, surface water, etc.) of on-site sewage systems will need to be considered during design. Due to the presence of shallow groundwater and/or depth to bedrock observed in our test pits, it is our opinion maintaining vertical separation from these features and the bottom of facilities will be a primary factor in controlling design of infiltration facilities.

#### **Phase 1**

We understand proposed Phase 1 septic drainfield is expected to be located in relatively lower lying elevations near the property entrance and access off Mineral Hill Road (northwest of Mineral Lake). Six test pits (TP-1.01 through TP-1.06) were located near this area and encountered residual soils between about 9 and 14.5 feet thick. Weathered rock or bedrock were observed in two test pits (TP-1.03 and TP-1.04) underlying residual soils between 13.5 and 14.5 feet bgs.

We recommend residual soils consisting of Soil Types 5 and 6 (as described in Chapter 8.40 On-Site Sewage Systems of the Lewis County Code) be considered for preliminary design of Phase 1 septic system. For increased infiltration performance we recommend drainfield facilities target granular sand layers, such as observed throughout the majority of TP-1.01 and TP-1.02 (and observed in TP-1.03 through TP-1.05 below about 4.5 to 7 feet bgs). Provided adequate vertical separation is provided between the bottom of



drainfield and bedrock, we estimate preliminary design infiltration rates on the order of 0.3 inches/hour (sandy clays) to 1.2 inch/hour (granular sand layers).

### **Phase 2**

We understand proposed Phase 2 septic drainfield is expected to be located in relatively upper elevated portions of the site northwest of Mineral Lake. Two test pits (TP-1.07 through TP-1.08) were located in this upper elevated area and encountered residual soils between about 9 and 13.5 feet thick, underlain by basaltic bedrock in each test pit.

We recommend residual soils and Soil Types 5 and 6 (as described in Chapter 8.40 On-Site Sewage Systems of the Lewis County Code) be considered for preliminary design of the Phase 2 septic system. For increased infiltration performance, we recommend drainfield facilities target granular sand layers, such as observed in TP-1.07 at about 5 feet bgs and TP-1.08 at about 1.5 feet bgs. Provided adequate vertical separation is provided between the bottom of drainfield and bedrock, we estimate preliminary design infiltration rates on the order of 0.3 inches/hour (sandy clays) to 1.2 inch/hour (granular sand layers).

### **Phase 3**

Phase 3 drainfield locations have not been determined. In addition to the residual soils described above, some of the test pits completed in the eastern site area adjacent to Mineral Creek encountered glacial drift soils. What we interpret to be static groundwater was also observed within glacial drift soils below about 5 to 11 feet bgs. Depending on proposed drainfields locations, revised and/or additional recommendations to those presented above may be appropriate.

### **Final Design Considerations**

We will continue to coordinate with the design team as septic locations for each project phase are finalized to revise our recommendations, as necessary. Specifically, we anticipate final septic system design will need to consider Soil Type, vertical separation to bedrock or other impermeable layer, and depth to groundwater (if present). A septic system designer specializing in these systems should ultimately be consulted for final design criteria.

## **Stormwater Management and Drainage**

### **Conceptual Design**

Proposed camp development includes new roadways and parking lots. Stormwater runoff from these impervious surfaces will typically be routed to shallow open basins for storage, treatment and possible infiltration. Type, size and location of the storage basins has not been determined at this time. Where site conditions and grades allow, stormwater runoff will flow directly to natural vegetated areas for “natural dispersion” treatment. It is expected that final drainage design will need to address the type of stormwater runoff treatment and storage required per Lewis County stormwater standards.

### **Conceptual Design Review**

Overall, it is our opinion that the stormwater systems are generally feasible and can be constructed as envisioned with regards to geotechnical and environmental considerations. With appropriate engineering controls, it is our opinion treated stormwater will not impact Mineral Lake or other FWHCAs.

Based on our observations and soil types encountered during test pit excavations, we anticipate that required vertical separation (e.g., depth to groundwater, bedrock, or other restrictive layer) and horizontal



separations (e.g., aquifer, spring, surface water, etc.) of stormwater systems will need to be considered during design. Due to the presence of shallow groundwater and/or depth to bedrock observed in our test pits, it is our opinion maintaining vertical separation below the bottom of facilities will be a primary factor in controlling design of stormwater facilities. Other factors, such as determining location-specific and variability in soil types will also be considered when determining final sizes of infiltration facilities. Additional explorations and studies are expected to continue as the design progresses.

### **Construction Considerations**

Due to the number of FWHCAs present at the site, there is potential that construction activities may temporarily disturb habitat and buffers. Full wetland, stream and ordinary high water mark (OHWM) delineations will be performed and incorporated into site development plans in order to avoid direct impacts to FWHCAs to the greatest extent feasible. Any impacts to FWHCAs and associated buffers will be fully quantified and mitigated.

To limit impacts to FWHCAs during construction, the contractor will employ general conservation measures in the form of best practices and additional measures specific to further protect species and habitat. See below for further discussion on these measures.

### **General Conservation Measures**

The following is a list of potential general conservation measures to be employed at the site during construction as best management practices (BMPs) to protect FWHCAs.

- Any construction activities will require a Temporary Erosion and Sediment Control (TESC) plan and will be fully implemented by the contractor.
- Construction techniques will utilize BMPs such as those described in the 2020 version of Washington State Department of Transportation's (WSDOT's) *Standards and Specifications for Road, Bridge, and Municipal Construction* (WSDOT 2020) and Washington Department of Ecology's *Stormwater Management Manual for Western Washington* (Ecology 2019).
- Any site preparation and construction activities near the sensitive habitats will be conducted during periods of drier weather.
- Routine inspections of the erosion control measures will be conducted daily during construction to ensure the effectiveness of the measures and to determine the need for maintenance or additional control measures.
- Grading and construction will be phased to reduce the time that soil is exposed to the extent possible.
- Disturbance will be limited to the smallest area feasible for each phase of the project and element under construction and will stay within the limits of construction as identified on the site plans.

### **Additional Measures to Species and Habitat**

The following are additional measures to be employed specific to reduce potential impacts to FWHCAs.

- The project will obtain and comply with conditions that will be outlined in the Hydraulic Project Approval permit issued for the project by Washington State Department of Fish and Wildlife and the Permit issued by the United States Army Corps of Engineers.



- All work below the OHWM will be conducted during the approved work windows for fish species that may occur in the project area.
- All debris resulting from construction shall be removed from the project area and prevented from entering the water.
- Construction procedures have been designed to minimize the opportunity for erosion to occur or sediment-laden water to enter downstream areas.
- Depending on slope and weather conditions, silt fences will be installed along the perimeter of the work areas to help confine sediment and runoff. Straw bales or similar measures will be added if concentrated surface water flow is observed.
- Excavation equipment and other machinery will be used from the upland area (and not in the water) to avoid direct disturbance to the waters.

## CONCLUSION

Based on our review of conceptual site design and our experience at the YMCA Mineral Lake site, it is our opinion the proposed on-site septic and stormwater systems for the Master Plan Resort designation are generally feasible and can be constructed as currently envisioned with regards to environmental and geotechnical considerations. With appropriate engineering controls (e.g., horizontal and vertical separation, treatment layers, etc.) it is also our opinion the proposed septic and stormwater systems will not affect Mineral Lake or other FWHCAs at the site.

It is expected that final septic and stormwater design will need to address requirements presented in the Lewis County Code or other appropriate governing agency. We will continue to coordinate with the design team as septic and stormwater design is advanced to revise our recommendations, as necessary. We recommend we be retained during construction to confirm that soil types are as expected and verify septic/stormwater systems will perform as intended with respect to environmental and geotechnical considerations.

## REFERENCES

SJC Alliance, 2020. Site Civil, Due Diligence Report, Mineral Lake YMCA Camp, Mineral Lake, Washington. Prepared for YMCA of Seattle. December 30, 2020.

Uly 2021. Letter to Meredith Cambre of YMCA, Subject: "RE: RZ20-00002". February 11, 2021.

WSDOT 2020. *Standards and Specifications for Road, Bridge, and Municipal Construction*. Publication Number M 41-10.

## LIMITATIONS

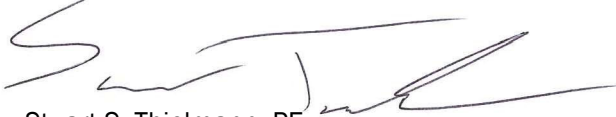
We have prepared this letter for the exclusive use of YMCA of Greater Seattle and their authorized agents for responding to Comprehensive Plan and Zoning Code Amendment package comments by Lewis County on the YMCA Mineral Lake project. Within the limitations of scope, schedule and budget, our services have been executed in accordance with generally accepted practices in the field of natural resource science and geotechnical engineering in this area at the time this letter was prepared. No warranty or other conditions,



express or implied, should be understood. The limitations presented in our Geotechnical Report dated March 16, 2021 also apply to this letter.

We trust that this meets your current needs, please contact us if you require anything further.

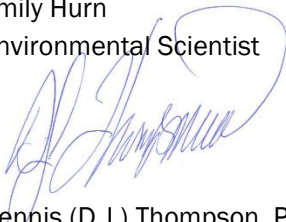
Sincerely,  
GeoEngineers, Inc.



Stuart S. Thielmann, PE  
Geotechnical Engineer



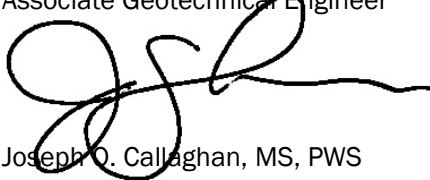
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3/23/21



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