April 16, 2021

Marla S. Powers, Associate Planner
City of Poulsbo
200 NE Moe Street
Poulsbo, WA 98370

Re: **Geotechnical and Stormwater Review**
Oslo Bay Apartment Project
Northwest intersection of SR305 and SR307
Poulsbo, Washington
Project No. 180242-05

Dear Ms. Powers:

At your request, Aspect Consulting, LLC (Aspect) has reviewed the revised geotechnical and stormwater documents for the proposed Oslo Bay Apartment development (Project) to be located northwest of the intersection of State Route 305 (SR305) and State Route 307 (Bond Road, SR307) in Poulsbo, Washington (Site). The Project includes construction of 13 apartment buildings, a clubhouse, a senior care center, and associated infrastructure.

The Site covers 55.2 acres and encompasses seven Kitsap County Parcels: 112601-3-040-2008, 112601-3-006-2000, 112601-3-008-2008, 112601-3-021-2001, 102601-4-022-2009, 102601-4-028-2003, and 112601-3-003-2003. These seven parcels include two wetlands, a Type F stream, the main stem of Dogfish Creek, steep slopes, critical aquifer recharge areas, and flood hazard areas.

In a memorandum to the City of Poulsbo (City) dated January 12, 2021, Aspect provided comments as to whether the Project complied with the City's various critical area, grading, and construction provisions as documented in the Poulsbo Municipal Code (PMC). The documents we received for that initial review were:

- "Oslo Bay Apartments Site Plan Review Narrative," dated December 2020, by Edward Rose Millennial Development, LLC, and the Project Consultant team.
- "Critical Aquifer Recharge Area Report for the Proposed Oslo Bay Apartment Project Poulsbo, Washington," dated April 24, 2020, by Richard Martin Groundwater, LLC.
- "Oslo Bay Apartments Drainage Report," dated November 23, 2020, by KPFF Consulting Engineers.
- "Oslo Bay Apartments, Poulsbo, Washington, Wetland Hydroperiod Analysis," dated August 24, 2020, by Clear Creek Solutions, Inc.
- "Limited Geotechnical Engineering Report Poulsbo Recycling Center Viking Way Poulsbo, Washington," dated June 21, 2017, by EnviroSound Consulting, Inc.
- "Geotechnical Engineering Report Oslo Bay Apartments," dated November 23, 2020, by EnviroSound Consulting, Inc.

- "Oslo Bay Apartments Plan Set," dated November 23, 2020, by Team 4 Engineering.
- "Oslo Bay Wall Exhibits," dated November 19, 2020 by KPFF Consulting Engineers.

In response to the comments in the January 12, 2021 memorandum, a call was held with Project design team, the City, and Aspect on February 12, 2021. The Project team submitted the following documents in response to the review memorandum and call.

- "Critical Aquifer Recharge Area Report for the Proposed Oslo Bay Apartment Project Poulsbo, Washington," report dated February 26, 2021, by Richard Martin Groundwater, LLC. (Revised CARA Report)
- "Geotechnical Recommendations & Responses; Oslo Bay Apartments; SR 305; Poulsbo, Washington," memorandum dated March 4, 2021, by Cobalt Geosciences, LLC. (Geotechnical Memorandum)

Review Comments and Recommendations

Aspect reviewed the two documents listed above on behalf of the City to determine if earlier concerns had been addressed. The following sections present our comments from the January 12, 2021 memorandum and our review comments and questions on the revised documents.

Critical Aquifer Recharge Area Report

1. **January 12, 2021 Comment***:* "*City of Poulsbo 16.20.765 – Hydrogeologic Report* requires discussion of the effects of the proposed development on the groundwater resource; however, the Critical Aquifer Recharge Area Report (CARA) report does not discuss the hydrology of Dogfish Creek and its potential relationship to Site groundwater, particularly perched groundwater. The report identifies the potential for groundwater perched on top of glacial till (see comment 15 for additional discussion of perched groundwater [*sic*]) and recognizes that there is likely hydraulic connection between perched groundwater and Site wetlands (see first paragraph, top of page 6). However, the report provides no analysis of the potential impacts of reduced recharge from impervious surfaces to the perched zone, nor of the role of perched groundwater in supporting flows within Dogfish Creek and area wetlands. The relationship of Site groundwater to Dogfish Creek and area wetlands should be described, potential impacts identified, and mitigating measures implemented, as appropriate."

   Follow-up Comment on Revised CARA Report: The Revised CARA Report indicates the following with respect to the role of perched groundwater supporting wetland hydrology and Dogfish Creek flow:

   "It is likely that some perched groundwater may be present above the Till during the wet season, particularly given the presence of wetlands on and adjacent to the Property. The relationship between shallow perched groundwater and surface hydrology is not known, although it is likely that the perched groundwater provides some baseflow to the wetlands and streams."

   With respect to mitigation of wetland and Dogfish Creek base flow, the revised report indicates that:

"The stormwater management approach is provided is the Drainage Report prepared by KPFF and dated February 2021, and identified two drainage basins for the site. Stormwater runoff from newly constructed impervious surfaces will be managed on-site and has been designed to maintain existing basin hydrology and flows to the wetland and the creeks through a combination of detention and discharge to the wetlands, and a small infiltration system."

and

Stormwater runoff from newly created impervious surfaces will be managed using a treatment train consisting of wetponds and proprietary manufactured wetland systems (BioPod Underground vaults) downstream of detention ponds, prior to stormwater discharge. Because of the proposed stormwater management approach, impacts to surface water quantity and quality are unlikely to occur.

The documentation provided in the Revised CARA Report does not estimate the timing and quantity impacts to the wetlands and Dogfish Creek from changes in Site recharge. Without estimating baseflow contribution to wetlands and Dogfish Creek from the perched groundwater, it is unclear how the stormwater design provides suitable mitigation. The Revised CARA Report should be clear in estimating the loss of recharge to the perched water zone as a result of impervious surfaces and describe the downstream impacts on the wetlands and Dogfish Creek. It should then provide a discussion of how the proposed stormwater management will mitigate for the reduction in perched water discharge to surface water bodies in both timing and magnitude of perched zone discharge.

2. **January 12, 2021 Comment**: "The CARA report does not address the effects of impermeable surfaces on groundwater recharge to deeper aquifers. The report dismisses the effects of aquifer recharge through the till by categorically stating that the glacial till does not readily transmit water and concludes that the "site currently does not contribute measurable recharge to the underlying aquifers 40 to 250 ft below ground surface." The CARA report should evaluate the recharge estimates for glacial till presented by the USGS and provide a current condition and post-development water balance to identify impacts in timing and magnitude of Site recharge (Welch, Frans, and Olsen, 2014; Frans and Olsen, 2016). See Figure 17 in Welch and others, 2014."

   Follow-up Comment on Revised Report: The Revised CARA Report states the following:

   Most of the wells are screened greater than 200 feet below ground surface below the shallow Glacial Till and underlying Lawton Clay, both of which are low permeability soil deposits and do not readily transmit water thus limiting recharge to the underlying aquifers.

   The revisions do not provide an estimate of recharge through the till. The report notes that wells at depths as shallow as 50 ft are present within 1000 ft of the Project area. The estimate of recharge through till should be quantified to evaluate the impact on these wells resulting from the Project's impervious surfaces and changes in hydrology.

3. **January 12, 2021 Comment**: "Under the 'Conclusions' heading, it is stated that the water table is likely greater than 100 feet below ground surface. In previous report sections, the shallow aquifer was described as greater than 50 feet below ground surface. Please clarify and update the report so there is consistency in the discussion of this aquifer."

Follow-up Comment on Revised Report: The Revised CARA Report indicates the following:

A review of water well logs in the area indicates that the depth to groundwater is generally greater than 50 feet below ground surface. A United States Geological Survey report for the Kitsap Peninsula (Welch et al., 2014) indicates the regional groundwater flow is likely to the south/southwest towards Liberty Bay and is greater than 50 feet below ground surface (bgs).

and

The depth to the main water table is likely greater than 100 feet below ground surface at the site. Groundwater flow is likely to the south.

The Revised CARA Report should provide a single interpretation of depth to groundwater beneath the Site.

Geotechnical Recommendations & Responses Memorandum Oslo Bay Apartments

4. **General Comment:** Please ensure all construction information from the Geotechnical Memorandum responses are incorporated into the Contract Documents.

5. **January 12, 2021 Comment**: "The report and the accompanying wall exhibits indicate there will be mechanically stabilized earth (MSE) walls as tall as 16 feet. No global or internal analysis is presented in submittals for these walls. An engineering design for these walls needs to be submitted, and the geotechnical engineer should review the design if it is completed by others. In addition, the geotechnical report should include a global stability analysis of the MSE walls in critical locations to ensure the walls will provide global stability throughout the Site."

   Follow-up Comment: The Geotechnical Memorandum states the following:

   It is our understanding that final wall designs and applicable global and internal analyses will be provided during the final permitting submission. If necessary, we can provide wall design analyses and slope stability analyses for these wall systems.

   Please provide the wall design analyses and slope stability analyses for the wall systems during the final permitting submission process.

Basis of Review

The scope of work for this letter was limited to a review of the conclusions and recommendations contained in the documents provided to us and data readily available to Aspect. Our scope of work did not provide for any field verification of explorations or testing, or verification of reported exploration logs, testing results, and analyses presented in the submitted reports.

Limitations

Work for this project was performed for the City of Poulsbo (Client), and this letter was prepared in accordance with generally accepted professional practices for the nature and conditions of work completed in the same or similar localities, at the time the work was performed. This letter does not represent a legal opinion. No other warranty, expressed or implied, is made.

Please refer to Appendix A titled "Report Limitations and Guidelines for Use" for additional information governing the use of this report.

We trust this letter meets the needs of your permitting processing. If you have any questions, please contact us.

Sincerely,

Aspect**consulting, LLC**

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Attachments: Appendix A – Report Limitations and Guidelines for Use

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APPENDIX A

Report Limitations and Guidelines for Use

REPORT LIMITATIONS AND GUIDELINES FOR USE

This Report and Project-Specific Factors

Aspect Consulting, LLC (Aspect) considered a number of unique, project-specific factors when establishing the Scope of Work for this project and report. You should not rely on this report if it was:

- Not prepared for you
- Not prepared for the specific purpose identified in the Agreement
- Not prepared for the specific real property assessed
- Completed before important changes occurred concerning the subject property, project or governmental regulatory actions

Geoscience Interpretations

The geoscience practices (geotechnical engineering, geology, and environmental science) require interpretation of spatial information that can make them less exact than other engineering and natural science disciplines. It is important to recognize this limitation in evaluating the content of the report. If you are unclear how these "Report Limitations and Use Guidelines" apply to your project or site, you should contact Aspect.

Reliance Conditions for Third Parties

This report was prepared for the exclusive use of the Client. No other party may rely on the product of our services unless we agree in advance to such reliance in writing. This is to provide our firm with reasonable protection against liability claims by third parties with whom there would otherwise be no contractual limitations. Within the limitations of scope, schedule, and budget, our services have been executed in accordance with our Agreement with the Client and recognized geoscience practices in the same locality and involving similar conditions at the time this report was prepared.

Property Conditions Change Over Time

This report is based on conditions that existed at the time the study was performed. The findings and conclusions of this report may be affected by the passage of time, by events such as a change in property use or occupancy, or by natural events, such as floods, earthquakes, slope instability, or groundwater fluctuations. If any of the described events may have occurred following the issuance of the report, you should contact Aspect so that we may evaluate whether changed conditions affect the continued reliability or applicability of our conclusions and recommendations.

Discipline-Specific Reports Are Not Interchangeable

The equipment, techniques, and personnel used to perform a geotechnical or geologic study differ significantly from those used to perform an environmental study and vice versa. For that reason, a geotechnical engineering or geologic report does not usually address any environmental findings, conclusions, or recommendations (e.g., about the likelihood of encountering underground storage tanks or regulated contaminants). Similarly, environmental reports are not used to address geotechnical or geologic concerns regarding the subject property.

We appreciate the opportunity to perform these services. If you have any questions please contact the Aspect Project Manager for this project.