January 12, 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 of SR305 and SR307
Poulsbo, Washington
Project No. 180242-05

Dear Ms. Powers:

At your request, Aspect Consulting, LLC (Aspect) has reviewed the 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 Site covers 55.2 acres and encompasses seven Kitsap County Parcel Numbers: 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.

The Project includes the construction of 13 apartment buildings, a clubhouse, a senior care center, and associated infrastructure across the seven parcels, which include two wetlands, a Type F stream, the main stem of Dogfish Creek, steep slopes, critical aquifer recharge areas, and flood hazard areas.

The purpose of our review was to provide comments as to whether the Project complied with the City of Poulsbo's (City) various critical area, grading, and construction provisions as documented in the Poulsbo Municipal Code (PMC). Specifically, the documents we received for our review are:

- "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.

Review Comments and Recommendations

Aspect reviewed the above listed documents on behalf of the City to determine if the proposed Project is in compliance with the various critical area, grading, and construction provisions from the PMC. We offer the following review comments and questions:

Critical Aquifer Recharge Area Report

1. *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) 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.

2. 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.

3. Under the "Stormwater" heading on page 2 of the report, it is implied that stormwater will be retained but not discharged or infiltrated. Please include discussion of what will happen to the stormwater after it is treated. The report as is implies stormwater will not be infiltrated. The report recommends, "Because of the relatively large impervious surface proposed to the Property, stormwater runoff management should identify practices to reduce uncontrolled runoff." The CARA report should describe or reference the stormwater management practices that will be employed to mitigate any reduction in groundwater discharge (perched or upwelling discharge from deeper aquifers) to Dogfish Creek and wetlands.

4. Depending on stormwater management practices, the results of the recharge analysis described in comment 2 should address potential contaminant pathways and impacts to groundwater quality in both the perched groundwater and deeper aquifers. It is our opinion that with a weathered layer, sand lenses, and vertical cracks that are typical in glacial till deposits, potential

contaminants could be transmitted through the deposit. Discussion of this risk should be added to the report, as appropriate, in conjunction with the analyses described in comments 1 and 2.

5. Under the "Surficial Soil and Geologic Setting" heading on page 5 of the report, it is stated that the thickness of the sea level aquifer is unknown. The Welch 2014 map indicates thickness as 6 to 100 feet on a regional map; this should be mentioned in the report.

6. Under the "Groundwater Conditions" heading on page 5 of the report, please clarify whether the groundwater noted at 40 feet below ground surface at the Site is perched or not.

7. City of Poulsbo 16.20.765 – Hydrogeologic report requires location and identification of wells within 1,000 feet of the Site. It does not appear all wells within 1000 feet were located. Figure 5 shows the locations of water supply wells located from Ecology's well database that apparently had associated addresses. The report acknowledges "there are likely additional wells associated with other properties" since not all well logs had addresses, implying additional wells with quarter-quarter section locations were identified within 1000 feet; however, these wells are not located on Figure 5 or tabulated. See related detail in comment 8, below.

8. Under the "Wells Within 1,000 Feet of Property" heading on page 6, two wells are noted that are approximately 50 feet deep. These wells are within 1,000 feet of the critical recharge area for the shallow aquifer. In the "Conclusions" section, these wells are not mentioned in the discussion of wells within 1,000 feet. Further discussion of the potential impacts of these wells in the shallow aquifer recharge is required.

9. Under Protection Standards During Construction heading on page 11 of the report, the first bullet references Clallam County Code. This reference should be for Kitsap County and any applicable City of Poulsbo code.

10. 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 report so there is consistency in the discussion of this aquifer.

Geotechnical Engineering Report Oslo Bay Apartments

11. The report mentions slopes steeper than 40 percent on the southwest portion of the Site near Dogfish Creek with no further discussion. Please include a discussion and any appropriate analysis and setback recommendations to confirm the Project will not impact these steep slope critical areas.

12. Given the scope of this Project, it is unreasonable to assume it can be constructed entirely in dry seasons. The Site soils will prove challenging during all seasons, with dust control during the dry season and moisture sensitivity during the wet season. The Contractor should be prepared to manage these conditions per the recommendations of the geotechnical engineer, the City guidelines, and the grading, TESC, and SWPPP plans.

13. The report and the accompanying wall exhibits indicate there will be 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.

14. Structural fill recommendations are not sufficient for this Site. Glacial till will be very difficult for reuse based on the fines content and the standard structural fill specifications for various uses around the Site, particularly as wall backfill. Structural fill meeting standard WSDOT and City requirements should be imported for wall backfill, foundation subgrade, pavement subgrade, and utility trench backfill.

15. Perched groundwater is common on Sites underlain by glacial till and, based on the one piezometer nearby the Project indicating groundwater at 5 feet below ground surface, is likely at this Site. Encountering perched water during excavation for foundations and floor slabs should be expected and discussed in this report, particularly because there may be perched water impacting the moisture-sensitive soils at the subgrade.

16. The slope stability sections do not incorporate groundwater. As previously mentioned, perched groundwater is typical at Sites with this subsurface profile. We recommend the slope stability model include a perched groundwater table to confirm stability.

17. There is a typo in the report. Section 3.9.6 references a Section 2.9.4 which does not exist; we believe the correct reference is to Section 3.9.4.

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

Erick Miller, LHG
Principal Hydrogeologist
emiller@aspectconsulting.com

Alison Dennison, LEG
Senior Geologist
adennison@aspectconsulting.com

Matthew Lewis, LHG
Project Hydrogeologist
mlewis@aspectconsulting.com

Attachments: Appendix A – Report Limitations and Guidelines for Use

V:\180242 Poulsbo On-Call Services 2018\Deliverables\Oslo Bay\Review Letter_01122021.docx

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.