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INTERESTS

Restoration Ecology, Geographic and Spatial Analyses, Wetland Functions and Values Analyses. Fluvial Processes, Natural Resource Economics, Microbial Ecology

EDUCATION

Master's in Environmental Studies

June 2004 – The Evergreen State College. Thesis: *Should We Restore the Deschutes Estuary: An Estuary Restoration Protocol*

B.A. Economics

June 1987 – Indiana University Bloomington, IN

TEACHING EXPERIENCE

Coastal Training Program

- Using the Wetland Rating System for Western Washington
- Designing and Installing Mitigation and Restoration Projects
- Determining the Ordinary High-Water Mark for Shoreline Permitting

Law Seminars International

- Wetland Mitigation Banking

WA Department of Ecology

- *Using the Supplement to the Corps of Engineers Wetland Delineation Manual - Western Mountain Valleys and Coast*

Washington State University Cooperative Extension Realtor Continuing Education Courses

- Critical Areas and Regulations

EMPLOYMENT

LSNW, Inc (dba Land Services Northwest)

2017- Present Co-Owner, Principal, Environmental Consulting for Critical Areas Permits, Shoreline Permits, Biological Evaluations, Endangered Species Act Permitting, 404/401 Clean Water Act Permitting, Feasibility Studies, GIS Analyses, Mapping and Planning.

Pierce County Planning and Public Works

May 2017 – June 2018

Biologist 3

Wetland and Shoreline Critical Areas and Shoreline Review for the purpose of local permits.
Responsible for aligning projects with environmental standards in local permits.

WA Department of Ecology

August 2008 – July 2015, Wetland Shoreland Specialist for Pierce, Thurston and Lewis Counties and other Counties as assigned.

Technical assistance to local jurisdictions for SMA/GMA permit issues. Critical Areas Ordinance Review, Shoreline Master Program Review, 401/404 permit assistance, Other projects as assigned.

Lands Services Northwest LLC

August 2006– July 2008, Principal Owner

Environmental Consulting and Permitting for Building Critical Areas Permits.

Pacific Environmental Consultants LLC

August 2004 – August 2006, Principal / Co-owner

Environment firm providing solutions to Governments, Surveyors, Realtors, and private land owners.

MEMBERSHIPS / AFFILIATIONS

Society of Wetland Scientists

Association of State Wetland Managers

Environmental Workgroups

- Thurston County Voluntary Stewardship Program Committee
- Mt St Helens Sediment Retention Structure and Ecosystem Restoration Group
- Chehalis Basin Flood Authority Workgroup
- White River Barrier Dam Improvement Group
- Capital Lake Management Committee
- Pierce County Surface Water Management Permitting Group

Biography

Luke McCann, L.E.G. - Principal Engineering Geologist

Mr. McCann is a multi-disciplined geologist with over a decade's worth of experience performing geotechnical consultations of all kinds across the Pacific Northwest. He also has background in special inspection and is able to interpret those reports if there are any questions. He specializes in designing pilings, retaining walls, infiltration, pavement, foundations, and setback delineation. He also specializes in slope stability, liquefaction analysis, setback delineation, subsurface drilling, test pits, and dynamic cone penetrometer testing.



10/14/2022

Ean Joyner
1420 Marvin Rd NE
Ste C, #103
Lacey, WA

Subject: Joyner Slope Consultation
2603 Carpenter Rd SE, Lacey, WA
QG Project No.: QG21-007

Dear Mr. Joyner:

At your request, Quality Geo NW, PLLC (QG) has completed a limited evaluation of the existing developed slope face on your property. We understand the general quality of the slope, surface, and waterside improvements is in question. Further information has been requested by the permitting authority to inform if it is acceptable for the site to remain in its current condition, and if there may be any additional improvements.

LITERATURE REVIEW

The Washington Geologic Information Portal (WGIP) maintained by the Department of Natural Resources Division of Geology and Earth Resources provides 1:24,000-scale geologic mapping of the region. The subject site is mapped as Quaternary Glacial Outwash Sands (Qgos), Described as: “Moderately well-sorted, moderately to well-rounded, fine- to medium-grained sand with minor silt; noncohesive and highly permeable; thickness inferred from wells reaches up to 100 ft; deposited in and around the margins of glacial lakes; surrounds numerous steep-walled lakes and depressions (kettles), evidence that this unit was largely deposited during deglaciation when there was stagnant ice occupying much of the southern Puget Lowland.”

According to the regional-scale interactive map, **no deep-seated landslides are known to exist within the site or adjacent vicinity**. Available LiDAR imagery of the site did not reveal any obvious or prominent landslide features within the site or immediate vicinity.

Quality Geo NW, PLLC

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Phone: 360-878-9705 | Web: qualitygeonw.com | Mail: 4631 Whitman Ln SE, Ste D, Lacey, WA 98513

SITE INVESTIGATION METHODOLOGY

On 1/4/2021, a QG senior geologist visited the site to perform visual reconnaissance of surface and topographic features. Salient slope features and existing vegetation were observed to assess general site and wall condition. This included looking for signs of recent or past erosion or subsurface instability. The slope area was observed and photographed from within the site. Direct observations of soils where exposed by localized surface erosion or outcropping, were used to classify stratigraphy and interpret site geology. Inferences from observations are described herein. A site map is included in Appendix A. Site photos are included in Appendix B.

SURFACE OBSERVATION

QG performed general site reconnaissance to observe and document any indications of localized surface degradation or slope instability. The site is a recently developed residential parcel with a large home adjacent to the subject slope crest. Portions of the upland have been resurfaced with concrete, and landscape stabilizations. The slope face is partly terraced, with a pathway down to the waterfront portion of the property. A concrete patio exists at the interface between the slope toe and the water, connected to the floating boat dock. The slope face is moderately vegetated with new plantings, some landscape and wall features, and occasional mature trees.

No indications of impending or historic deep-seated movement were observed along the slopes. Topography was generally consistent, lacking features such as: significantly oversteepened native slopes, apparent scarps, channelized runout zones, or hummocky zones. No obvious evidence of rotational or translational failures or toppling hazards was observed. No significant failure features were observed on adjacent slope areas visible from the subject property during the visit. No massive downslope accumulation, or tension cracks were observed. No significant areas of scouring from natural stormwater channelization were observed.

Areas of bare soil were identified across portions of the slope face. These appear related to mild stormwater erosion, and a lack of vegetation development. Where soils were exposed, they appeared to resemble a sand and closely resemble the mapped glacial outwash deposits. Many of the established trees appeared to grow with tilted or arched tree trunks.

DISCUSSION & RECOMMENDATIONS

The findings of QG's limited reconnaissance at the subject site do not indicate that any excessively prohibitive conditions exist for the current level of slope development. In consideration of the available information, and our direct observations, at this time **QG does not consider the site to be within an active landslide hazard area**. Erosional hazards related to soil creep and loose soils may be mitigated per the following development and site-specific recommendations.

Dockside Patio Considerations:

Considering the generally satisfactory condition of the concrete slab, and lack of evidence regarding any movement or degradation of the feature, QG does not expect that the patio will need to be removed. The patio generally serves to limit storm and wave interactions against the toe of the slope, and additionally offers protection by confining the toe soils, limiting their potential for erosion or destabilization. Overall, the patio is anticipated to improve slope conditions by reducing erosion and stabilizing the lower soil surfaces. As the patio is considered a minor structure with no dwelling unit, and its location being at the toe of a slope, no required slope setback is anticipated.

The satisfactory condition of the patio and adjacent slope toe suggest that it's removal may only serve to reduce the slopes existing erosion protections. Further, its removal would then necessitate some new form of toe stabilization, as re-exposing unsupported soils may put the property in eminent danger of continuous erosion, degrading the existing slope safety factors. Any time that the toe remains exposed would further destabilize the soils. While vegetation and rockery may offer a temporary reduction to erosive forces, an engineered structure, such as a patio or wall, is anticipated to offer a long-term solution which will further protect the property and increase its longevity.

Retaining Wall Considerations:

Based on our observations of native soil and slope conditions, further erosion can be expected over time. QG understands the client desires to utilize retaining walls in some locations. In our opinion, properly engineered and constructed walls (by others) are anticipated to offer significant additional stabilization to the slope and will help limit erosive forces if appropriately developed. The following recommendations pertain to the design (by others) of laterally loaded wall structures founded on compacted existing (or fill) soils as specified by the engineer. These recommendations are not applicable to: exceedingly sloping backfills, backfills composed of non-granular soil materials, braced or tied-back walls, or for walls greater than 10 feet in height.

• **Excavations:**

New and existing walls shall their base embedded or "keyed in" a minimum of 6 inches, but not less that the depth specified by the engineer and the plans/specifications.

The duration of time that excavations behind walls remain open should be limited to only as necessary to prepare the base pad and placement of the wall features, backfilling with drain rock and approved fill immediately. Temporary worker protections such as trench boxes or temporary shoring may be required for entering excavations deeper than 4 feet, and all OSHA

safety regulations should be observed. Extended open cut periods or work proceeding in wet weather may require surface coverings, lesser cut angles, and/or temporary bracing be applied.

Wall Drainage:

QG recommends the designer account for the potential effects of hydrostatic pressure, and head pressure/uplift on any new wall features. To preclude build-up of hydrostatic pressure, we recommend a minimum width of 1 foot of clean, granular, free-draining material extend from the footing drain at the base of the wall to the ground surface immediately behind the wall. Native soils are not considered suitable as drainage material. Imported wall drain aggregate should conform to WSDOT Standard Specification 9-03.12(4) Gravel Backfill for Drains or 9-03.12(5) Gravel Backfill for Drywells. A filter fabric suitable for use in soil separation and water transmission is recommended to be placed against retained soil cuts behind the wall (if present) to limit migration of fines into the drain corridor. Final parameters shall be determined by the wall designer.

Drainage Controls:

QG recommends proper drainage controls for stormwater runoff during and after site development to protect the site. The ground surface adjacent to structures should be sloped to drain away at a 5% minimum to prevent ponding of water adjacent to them.

QG recommends all roof, wall, and footing water sources (new or existing) be tightlined (piped) away from the upland site to an existing catch basin, stormwater system, established channel, or down the slope to be released beyond the base using appropriate energy-dissipating features at the outfall to minimize point erosion. Roof and footing drains should be tightlined separately or should be gathered in an appropriately sized catch basin structure and redistributed collectively. If storm drains are incorporated for impervious flatworks (driveways, patios, etc.), collected waters should also be discharged according to these recommendations. All drainage tightlines should be composed of appropriately sturdy material (such as rigid PVC), sized adequately according to anticipated flow, and anchored sufficiently. QG recommends slope tightlines be inspected by the owner periodically to look for signs of damage or displacement requiring repair.

With county/city approval, an outfall at the lake may be considered for reasonable quantities of stormwater, so long as appropriate energy reducing features are established at the outfall, such as fabric and quarry spalls, or other approved methods, to prevent erosion.

Vegetation Improvements:

Across the site, some mature trees were noted to be tilted beyond 10 degrees, likely due to shallow soil creep, which is a common condition for slopes composed of granular soils where weathered soil slowly creep downslope inches over years, allowing trees to tilt over time. The added soil pressure from the leaning weight of the tree is expected lead to further erosion and minor block topples over time. Any trees showing the potential to fall should be considered for removal, if possible. Where revegetation is not possible, stumps should be left in the ground to offer some stabilization of shallow surface soils. QG ultimately recommends the client consult the local code and permit requirements when determining which trees may be removed.

Following construction and for long-term site use, maintaining existing downslope vegetation and installing additional beneficial deep rooting ground plantings within the vicinity of the improvements and over the slopes is encouraged assuming installation is done in a manner that minimizes slope face disturbance and erosional hazard in the long term. Adding vegetation will increase the erosional and hydrologic resistance of the slope and assist in retaining cover soils. Further information and recommendations for erosion control including typical beneficial native plantings for sloping areas are provided herein.

Erosion Controls:

Erosion is one of the most common driving forces leading to slope instability. In addition to the above commentary, the following general recommendations should be implemented in general to reduce long-term erosion potential of the slope below the project site and maintain slope stability:

- Stability of exposed and newly graded slope faces are to be improved by planting and maintaining deep rooting vegetation coverage. Installing beneficial ground plantings is encouraged. Alternatives to vegetation may include erosion control measures such as a staked geotextile fabric and 6 to 8-inch rockery (quarry spall or rip rap) cover. This may be considered suitable for slopes at or greater than 3H:1V, but no steeper than 1H:1V. It may be preferable to incorporate rolled erosion control products (RECPs) on an as needed basis during replanting activities to increase the likelihood of successful vegetation or replace areas not receptive to vegetation.
- Adding vegetation will encourage rooting stabilization and in turn increase the erosional and hydrologic resistance of the slope. The slope inclination calls for careful plant selection, planning, and execution, to best achieve establishment and long-term surface stability.
- Minimize the volume and velocity of water that travels toward and down the slope face (via proper choice of site development features including stormwater controls discussed above).
- Avoid accelerating slope erosion and mass wasting due to human activity such as:
 - ✓ Adding side-cast such as dumping landscape debris or fallen trees on or above the slopes.

- ✓ Using heavy construction equipment on or near steep slopes.
- ✓ Excavating near adjacent steep slopes toe or on slope face.
- ✓ Placing excavated soil near the steep slope crest.
- Prior to construction, a silt fence and/or a continuous line of straw bales should be placed on the slopeward edge of the construction area. Heavy construction equipment, construction materials, or native and imported soils should not be placed behind the erosion control devices. Suitable temporary erosion and sediment control measures should be implemented at the construction site during and immediately after ground disturbance occurs. Temporary areas bare of vegetation should be protected from erosion via a blanket of straw or rolled erosion control product (RECP) during prolonged breaks in site work and prior to reseeding or revegetation.
- At the end of the project, all bare surfaces and areas of disturbed vegetation should be replanted and maintained until fully reestablished. Concentrated surface water should not be allowed to traverse the slope during or after the construction phase of the project. Roof downspouts and footing drains should be routed into closed separate pipes which outfall into appropriate drainages. Outlets for these pipes should be protected from erosion through the use of rip-rap (quarry spalls) or some other energy dissipating device. Similarly, concentrated drainages should be captured in closed pipe systems and routed down slope to appropriate outfalls.
- Clearing of existing vegetation outside the proposed building area on and adjacent to the existing slopes should be avoided except as approved by a qualified professional. This provides additional stability to the loose topsoil and minimizes the effects of down-slope water movement. This is excepting removal of problem, dead, or dying, trees if posing a direct hazard to site installations or adjacent roadways.
- Grading or excavation of soils during construction should be accompanied by grass reseeding and re-vegetation as the project is completed.

CLOSING REMARKS

We trust this letter satisfies your project needs currently and greatly thank you for the opportunity to be of service. QG wishes you the best while completing the project.

Respectfully Submitted,
Quality Geo NW, PLLC



10/14/2022

Luke Preston McCann, L.E.G.
Principal Licensed Engineering Geologist

LIMITATIONS

Upon acceptance and use of this report, and its interpretations and recommendations, the user shall agree to indemnify and hold harmless QG, including its owners, employees and subcontractors, from any adverse effects resulting from development and occupation of the subject site. Ultimately, it is the owner's choice to develop and live in such an area of possible geohazards (which exist in perpetuity across the earth in one form or another), and therefore the future consequences, both anticipated and unknown, are solely the responsibility of the owner. By using this report for development of the subject property, the owner must accept and understand that it is not possible to fully anticipate all inherent risks of development. The recommendations provided above are intended to reduce (but may not eliminate) such risks.

This report does not represent a construction specification or engineered plan and shall not be used or referenced as such. The information included in this report should be considered supplemental to the requirements contained in the project plans & specifications and should be read in conjunction with the above referenced information. The selected recommendations presented in this report are intended to inform only the specific corresponding subjects. All other requirements of the above-mentioned items remain valid, unless otherwise specified.

Recommendations contained in this report are based on our understanding of the proposed development and construction activities, field observations and explorations, and laboratory test results. It is possible that soil and groundwater conditions could vary and differ between or beyond the points explored. If soil or groundwater conditions are encountered during construction that differ from those described herein, or if the scope of the proposed construction changes from that described in this report, QG should be notified immediately in order to review and provide supplemental recommendations.

The findings of this study are limited by the level of scope applied. We have prepared this report in substantial accordance with the generally accepted geotechnical engineering practice as it exists in the subject region. No warranty, expressed or implied, is made. The recommendations provided in this report assume that an adequate program of tests and observations will be conducted by a WABO approved special inspection firm during the construction phase in order to evaluate compliance with our recommendations.

This report may be used only by the Client and their design consultants and only for the purposes stated within a reasonable time from its issuance, but in no event later than 18 months from the date of the report. It is the Client's responsibility to ensure that the Designer, Contractor, Subcontractors, etc. are made aware of this report in its entirety. Note that if another firm assumes Geotechnical Engineer of Record responsibilities, they need to review this report and either concur with the findings, conclusions, and recommendations or provide alternate findings, conclusions and recommendation.

Land or facility use, on- and off-site conditions, regulations, or other factors may change over time, and additional work may be required. Based on the intended use of the report, QG may recommend that additional work be performed and that an updated report be issued. Non-compliance with any of these requirements by the Client or anyone else will release QG from any liability resulting from the use of this report. The Client, the design consultants, and any unauthorized party, agree to defend, indemnify, and hold harmless QG from any claim or liability associated with such unauthorized use or non-compliance. We recommend that QG be given the opportunity to review the final project plans and specifications to evaluate if our recommendations have been properly interpreted. We assume no responsibility for misinterpretation of our recommendations.

Appendix A. Site Map



Quality Geo
NW, PLLC

Site Map
Joyner Consult

Source: Google Imagery
Scale & Locations are approx.
Not for Construction

Figure 1

Appendix B. Site Photos



Photo 1. Typical slope profile conditions.



Photo 2. Slope toe conditions.

















From: [Michelle Gusta](#)
To: [Heather Burgess](#); [Deanna Gonzalez](#)
Cc: [Ean Joyner](#)
Subject: Fwd: bulkhead
Date: Monday, October 17, 2022 10:19:22 AM

Sent from my iPhone

Begin forwarded message:

From: Deanna Joyner <djoyner@smoothtransitions.com>
Date: October 17, 2022 at 1:12:27 PM EDT
To: Michelle Gusta <michelle@balancedaccountants.com>
Subject: Fwd: bulkhead

----- Forwarded message -----

From: **Deanna Joyner** <djoyner@smoothtransitions.com>
Date: Sun, Oct 16, 2022 at 1:32 PM
Subject: bulkhead
To: Michelle Gusta <michelle.gusta26@gmail.com>

To whom it might concern,
I have owned the property next to 2603
Carpenter Rd SE since 1979. The path to
the lake has been in the same place in all
that time. There has always been a
bulkhead. Before the 1990's it was
concrete. Sometime in the 90's the big
rock bulkhead was installed.

Deanna Joyner

2511 Carpenter Rd SE