Geologic Hazard Report Review Application

PROPERTY OWNER/CONTRACT PURCHASER (as listed on deed OR purchase contract):

Copy of purchase contract must be included with submittal for application to be accepted.

NAME:
ADDRESS:

PHONE:
E-MAIL:

PROPERTY OWNER/CONTRACT PURCHASER (as listed on deed OR purchase contract):

Copy of purchase must be included with submittal for application to be accepted.

NAME: na
ADDRESS: na
na
PHONE: na
E-MAIL: na

SITE INFORMATION:

ZONING DISTRICT: city-R-M
TAX MAP AND LOT: 07-11-15-DB-01300-00
SITE ADDRESS (Location if unaddressed): 887 sw 5th st. Lincoln City OR 97367

TOPOGRAPHIC SURVEY AND MAP INFORMATION:

NAME OF OREGON LAND SURVEYOR: Craig newton
OREGON LAND SURVEYOR LICENSE NUMBER: 89441pls
DATE OF TOPOGRAPHIC SURVEY: 9/15/22
(must be conducted within the 12 months prior to the date of the geotechnical analysis)

GEOTECHNICAL ANALYSIS INFORMATION:

NAME OF GEOLOGIST/GEOTECHNICAL ENGINEER: J.Douglas Gless of H.G.Schlicker&as.
OREGON ENGINEER LICENSE NUMBER: e-902
DATE OF REPORT: 9/24/21
(if written or last updated more than a year prior to the first building inspection, must be updated to reflect current conditions)

NOTE: THE COMPLETE GEOTECHNICAL ANALYSIS AND THE TOPOGRAPHIC MAP THAT HAS BEEN PREPARED BY AN OREGON-LICENSED LAND SURVEYOR WITHIN 12 MONTHS PRIOR TO THE DATE OF THE GEOTECHNICAL ANALYSIS MUST BE ATTACHED BEFORE THE APPLICATION CAN BE ACCEPTED FOR PROCESSING.

I (We) hereby declare under penalty of perjury under the laws of the State of Oregon that the foregoing information is true, complete, and accurate. If the applicant is a contract purchaser, the applicant must provide written authorization from the current property owner. I (We) have read and fully understand, and agree to meet, the criteria outlined in Lincoln City Municipal Code (LCMC) Section 17.47.020 and reflected in this application.

I (We) acknowledge that providing false information in the application shall be a violation and grounds to deny the application and void the approval.

SIGNATURES:

______________________	09/21/2022
Property Owner/Contract Purchaser (signature required)	Date
______________________	____________
Property Owner/Contract Purchaser (signature required)	Date
______________________	____________
Property Owner/Contract Purchaser (signature required)	Date
______________________	____________
Property Owner/Contract Purchaser (signature required)	Date

- *All property owners listed on the deed of each parcel/lot must sign the application.*
- *All contract purchasers listed on the purchase contract must sign the application.*
- *If contract purchasers are individuals other than the property owners shown on the deed, all property owners listed on the deed as well as all contract purchasers listed on the purchase contract must sign the application.*

BASIS OF BEARING:

THE BASIS OF BEARING IS NORTH ALONG THE CENTERLINE OF SW EBB AVENUE.

VERTICAL DATUM:

DATUM: NAVD88 USING GEOID 12A BASED ON MULTIPLE GEODETIC OBSERVATIONS ON CONTROL POINTS USING THE OREGON REAL–TIME GNSS NETWORK.

UTILITY STATEMENT:

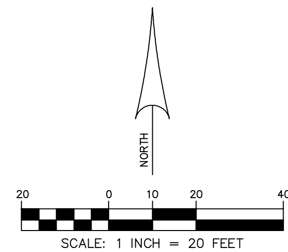
THE UNDERGROUND UTILITIES SHOWN HAVE BEEN LOCATED FROM LOCATE PAINT MARKINGS TIED IN THE FIELD SURVEY AND AS–BUILT DRAWINGS PROVIDED BY UTILITY COMPANIES. THIS SURVEY DOES NOT SHOW ANY PAINT MARKINGS PROVIDED AFTER THE FIELD SURVEY WAS COMPLETED. AS–BUILT DRAWING INFORMATION THAT WAS NOT PROVIDED IS NOT REFLECTED ON THIS SURVEY. AS–BUILT INFORMATION, IF PROVIDED, WAS USED TO IDENTIFY UNDERGROUND PIPE SIZE AND TYPE. IF NO LOCATE PAINT MARKINGS WERE PROVIDED, AS–BUILT INFORMATION WAS USED TO HORIZONTALLY LOCATE THE UNDERGROUND UTILITIES.

THIS SURVEY MAKES NO GUARANTEES THAT THE UNDERGROUND UTILITIES SHOWN COMPRISE OF ALL SUCH UTILITIES IN THE AREA. THE UNDERGROUND UTILITIES SHOWN MAY NOT BE IN THE EXACT LOCATION AS NOTED ON THIS SURVEY, BUT ARE LOCATED AS ACCURATELY AS POSSIBLE FROM THE INFORMATION PROVIDED. MANHOLES OTHER THAN SANITARY AND STORM SEWER WERE IDENTIFIED BY MANHOLE LIDS AND MAY NOT BE LABELED CORRECTLY.

UTILITY LOCATIONS SHOULD BE VERIFIED BY OREGON UTILITIES NOTIFICATION CENTER IMMEDIATELY PRIOR TO ANY EXCAVATION.

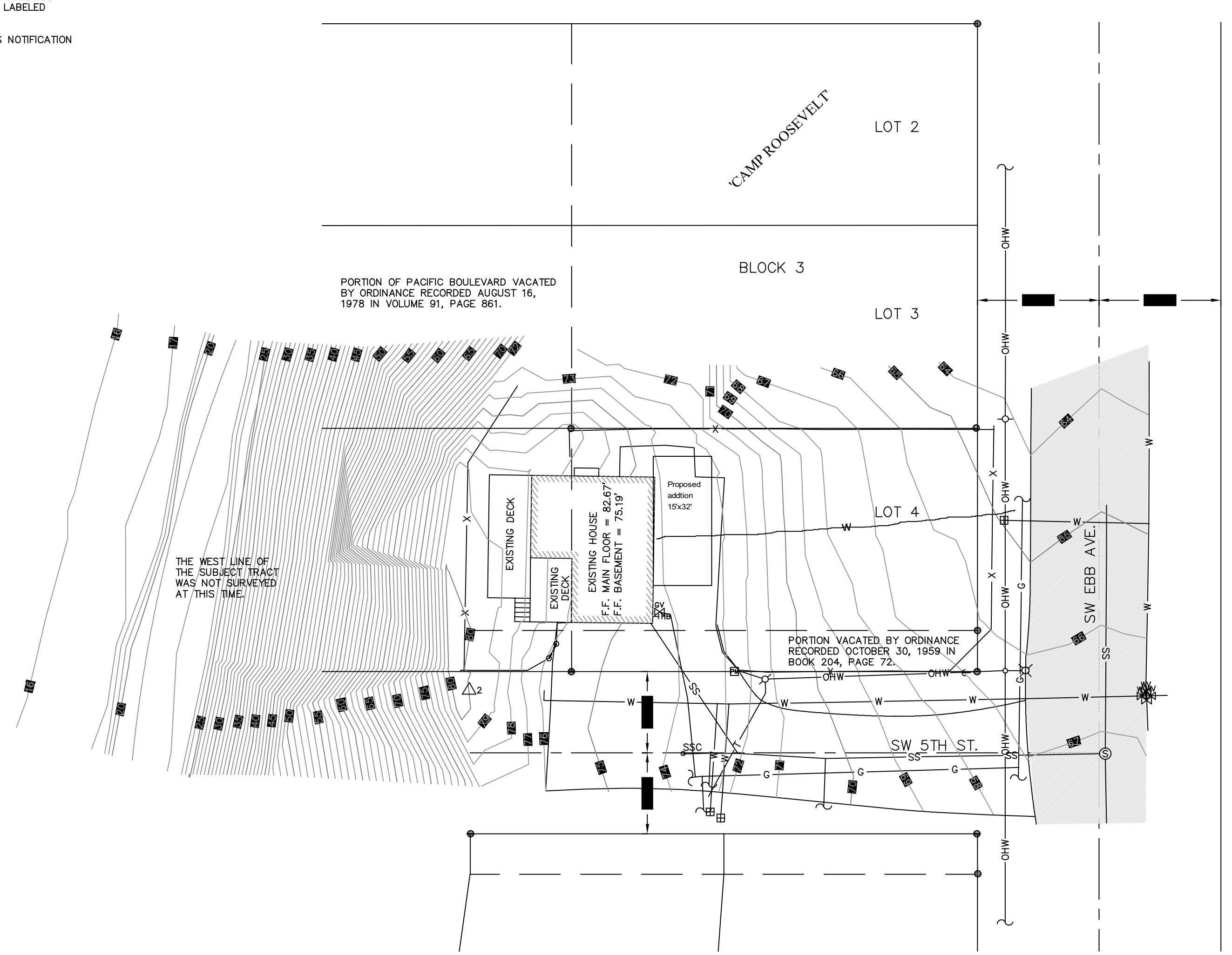
CONTROL TABLE

POINT #	NORTHING	EASTING	ELEVATION	DESCRIPTION
1	493137.67	7293010.26	67.06	CP X
2	493173.04	7292661.37	80.03	CP RPC



LEGEND:

- EXISTING ASPHALT
- EXISTING GRAVEL
- SS — SANITARY SEWER LINE
- E — UNDERGROUND ELECTRIC LINE
- W — UNDERGROUND WATER LINE
- G — UNDERGROUND GAS LINE
- OHW — OVERHEAD UTILITY LINE
- X — FENCE LINE
- SANITARY SEWER MANHOLE
- SSC — SANITARY CLEANOUT
- WATER VALVE
- WATER METER
- HB — HOSE BIB
- ELECTRICAL METER
- UTILITY POLE
- GUY ANCHOR
- STREET LIGHT POLE
- GATE POST
- FOUND SURVEY MONUMENT
- GAS VALVE
- XX — CONTROL POINT



Terra Calc Land Surveying Inc.
1615 NE Miller St.
McMinnville, OR 97128
(503) 857-0935
www.Terra-calc.com

REGISTERED PROFESSIONAL LAND SURVEYOR
OREGON
MARCH 12, 2019
CRAIG I. NEWTON
89441PLS
RENEWS 12-31-2022

887 SW 5TH STREET
TOPOGRAPHIC SURVEY

LOCATED IN THE SE 1/4 OF SEC. 15, T. 7 S., R. 11 W., W.M.
LINCOLN CITY, OREGON

DATE	9/15/22
DRAWN	CIN
SURVEYOR	CIN
CHECKED	CIN
JOB NO.	887 SW 5TH LINCOLN CITY
DRAWING NAME	TOPO
SHEET NO.	1 OF 1

Geologic Hazards and
Geotechnical Investigation
Tax Lot 1300, Map 7-11-15DB
887 SW 5th Street
Lincoln City, Oregon

Project #Y214550 September 24, 2021

H.G. Schlicker & Associates, Inc.

H.G. Schlicker & Associates, Inc.
607 Main Street, Suite 200 · Oregon City, Oregon 97045
(503) 655-8113 · FAX (503) 655-8173

Project #Y214550 September 24, 2021

Subject: Geologic Hazards and Geotechnical Investigation
Tax Lot 1300, Map 7-11-15DB
887 SW 5th Street
Lincoln City, Oregon

Dear Ms. Webb:

The accompanying report presents the results of our geologic hazards and geotechnical investigation for the above subject site.

After you have reviewed our report, we would be pleased to discuss it and answer any questions you might have.

This opportunity to be of service is sincerely appreciated. If we can be of any further assistance, please contact us.

H.G. SCHLICKER & ASSOCIATES, INC.

J. Douglas Gless, MSc, RG, CEG, LHG
President/Principal Engineering Geologist

JDG:aml

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H.G. Schlicker & Associates, Inc.
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(503) 655-8113 · FAX (503) 655-8173

Project #Y214550 September 24, 2021

Subject: Geologic Hazards and Geotechnical Investigation
Tax Lot 1300, Map 7-11-15DB
887 SW 5th Street
Lincoln City, Oregon

Dear Ms. Webb:

1.0 Introduction and General Information

At your request and authorization, a representative of H.G. Schlicker and Associates, Inc. (HGSA) visited the subject site on August 24, 2021, to complete a geologic hazards and geotechnical investigation of Tax Lot 1300, Map 7-11-15DB, 887 SW 5th Street, Lincoln City, Oregon (Figures 1 and 2; Appendix A). It is our understanding that you propose to construct a carport addition covering the existing concrete parking area east of the house (Appendix A).

This report addresses the engineering geology and geologic hazards at the site with respect to constructing an attached carport addition to the existing home. The scope of our work consisted of a site visit, site observations and measurements, hand augered borings, a slope profile, limited review of the geologic literature, interpretation of topographic maps, lidar, and aerial photographs, and preparation of this report which provides our findings, conclusions, and recommendations.

2.0 Site Description

The site lies on an elevated marine terrace adjacent to an approximately 60-foot-high bluff. The site consists of a 0.49-acre lot approximately 50 feet wide, north to south, and 350 feet wide, east to west extending from SW Ebb Avenue west to the beach (Figures 2, 3 and 4). The site is bounded by an undeveloped lot to the north, SW 5th Street to its south, SW Ebb avenue to its east, and the bluff, beach and the Pacific Ocean to its west.

According to Lincoln County records, the site currently has an existing one-story house with a finished basement, built in 1948 (Appendix A). The westernmost foundation of the house is located approximately 19 feet east of the upper bluff edge. The westernmost footings for the deck attached to the western portion of the house are approximately 9 feet east of the upper bluff edge.

The site generally slopes toward the east at approximately 5 to 10 degrees (Figures 3 and 4). Vegetation at the site consists of lawn grass, shorepine, and ornamental plants. The bluff west of the site slopes down to the west from approximately 30 to more than 60 degrees, with an average slope angle of approximately 45 degrees. The upper approximately 3 to 5 feet of the bluff is near vertical, with an overhang of organic mat and soil along the bluff edge. The bluff slope is densely vegetated with shore pine, European beach grass, and brush. There appears to be recent sloughing of the lower and mid-bluff.

2.1 Foundation Observations

At the time of our site visit, we observed the exposed foundation elements of the existing house for cracking and other signs of distress.

We did not observe any substantial cracks in the observable foundation or the poured concrete parking area on the eastern side of the house (Appendix A).

2.2 Proposed Development

Based on the information provided to us by your construction contractor, you plan to construct a carport on the eastern side of the house, enclosing the area presently occupied by the poured concrete parking area approximately 50 feet east of the bluff edge. We have provided geotechnical recommendations for design of the addition in Sections 8.1 through 8.12 below. HGSA should be contacted to review development plans for the site.

2.3 History of The Site and Surrounding Areas

According to the Oregon Coastal Atlas Ocean Shores Data Viewer (http://www.coastalatlas.net/oceanshores, accessed September 2021), an oceanfront protective structure is located along the bluff slope at the site, and the lot is identified as eligible for a beachfront protective structure on the Goal 18 Eligibility Inventory. However, the potential to receive a permit for oceanfront protection is dependent upon meeting certain regulatory requirements in addition to the Goal 18 eligibility requirement. Oceanfront protection is present on lots north of the site and approximately 1,400 feet south of the subject lot. We expect that this general stretch of coastline will have additional shore protection constructed as bluff recession continues in the future.

2.4 Site Topography, Elevations, and Slopes

The area of the subject site east of the bluff generally slopes down to the east from approximately 5 to 10 degrees. The bluff along the western part of the site slopes down to the west from approximately 30 to more than 60 degrees, with an average slope angle of approximately 45 degrees, and the upper approximately 3 to 5 feet of the bluff is near-vertical (Figures 3 and 4; Appendix A). Based on 2016 lidar data from NOAA, the upper marine terrace lies at an elevation of approximately 80 feet (NAVD 88), and the beach/dune junction is at an elevation of approximately 20 feet (Figure 3). Based on our review of historical aerial imagery and beach profile data, the elevation of the beach varies by a few feet to about 6 feet or more (NAVD 88).

2.5 Vegetation Cover

East of the bluff slope, the site is generally vegetated with landscape plants and lawn grass. The bluff slope is densely vegetated with Shore Pine, salal, English Ivy and beach grass.

2.6 Subsurface Materials

A detailed description and analysis of the geology and subsurface materials at the site are provided in Sections 3.1 and 3.3 below. Marine terrace deposits are exposed on the bluff and consist of interbedded, friable to moderately cemented, fine-grained sand, silty sand, and sandy silt (Appendix A).

2.7 Site Oceanfront Conditions

The site is located along an oceanfront bluff slope consisting primarily of marine terrace sands that have undergone recession as a result of wind and rain erosion, sloughing, and shallow landsliding. A detailed description of the fronting beach area is provided in Section 3.2, with oceanfront slope stability and erosion discussed in Section 4.0 below.

2.8 Drift Logs or Flotsam

At the time of our site visit, we observed a minor accumulation of driftwood and flotsam in the beach area at the site. Satellite imagery indicates that the accumulation of driftwood and flotsam in the vicinity is generally consistent with slightly greater amounts of accumulation in late spring.

2.9 Streams or Drainage and Influence on Beach Elevations

We did not observe streams in the vicinity of the site that would influence the beach elevation. The nearest major stream is the D River, approximately 1,700 feet north of the site. The mouth of Canyon Creek discharges onto the beach approximately 1,500 feet south of the site.

2.10 Headland Proximity and Influence on Beach Sediment Transport and Elevations

Headlands are not present in this local section of the Oregon Coast and the Lincoln City oceanfront. The site lies within the Lincoln littoral cell. The sands within the Lincoln littoral cell are believed to have little or no transport beyond Cascade Head to the north and Cape Foulweather to the south (Komar, 1997).

2.11 Shore Protection Structures

According to the Oregon Coastal Atlas Ocean Shores Data Viewer (http://www.coastalatlas.net/oceanshores, accessed September 2021), a beachfront protective structure is mapped along the bluff slope at the site; however, due to the dense vegetation on the bluff slope, we did not observe the revetment. Oceanfront protective structures are present and exposed at the base of the bluff on lots approximately 50 feet north of the subject site and approximately 1,300 feet south of the site.

2.12 Beach Access Pathways

Presently there is no direct access to the beach from the subject site. Public beach access is present at the D River State Recreation Site, approximately 1,300 feet north of the site.

2.13 Human Impacts and Influence on Site Resistance to Ocean Wave Attack

Based on our observations, direct human impacts are not contributing to alteration of the resistance of the bluff to wave attack at this site.

3.0 Geologic Mapping, Investigation and Descriptions

3.1 Geology

The site lies in an area mapped as Quaternary Marine terrace deposits, consisting of semi-consolidated, fine- to medium-grained, uplifted beach sand commonly overlain by fine-grained stabilized dune deposits (Schlicker et al., 1973; Priest and Allan, 2004). The uplifted marine terrace sediments are typically high-energy nearshore marine deposits capped by beach sand (Kelsey et al., 1996). The marine terrace deposits are exposed locally along the bluff and generally consist of interbedded, friable to moderately cemented, fine-grained sand, silty sand, and sandy silt.

The marine terrace deposits mantle wave-cut benches on westerly dipping strata of lower Eocene Nestucca Formation. The Nestucca Formation consists of thin-bedded, tuffaceous siltstone and sandstone with ash and glauconitic sandstone interbeds. Miocene intrusive basalts have been mapped along the beach and shoreline northwest and southwest of the site, forming a rocky beach zone. Sandy colluvial materials and transient low dunes mantle the lower part of the bluff but are commonly not present in the back beach area. Colluvial materials are deposited along the lower bluff as the result of past erosion, sloughing, and shallow landsliding along the middle and upper bluff (Appendix A).

3.2 Description of the Fronting Beach

3.2.1 Summer and Winter Average Beach Widths

The beach at the site has a width of approximately 100 feet to more than 300 feet in this area during the winter and summer, respectively, depending upon sand transport in any given year. The beach here is very dynamic and frequently changes, primarily due to rip current formation and El Niño and La Niña ocean conditions. Typically, the beach is broad and dissipative in summer, becoming narrower and steeper in winter, particularly during prolonged storm cycles.

3.2.2 Beach Sediment Median Grain Size

Beach sediment at the site is comprised of primarily fine-grained to lesser medium-grained sand.

3.2.3 Summer and Winter Beach Elevations and Average Slopes

The beach slopes west at approximately 7 degrees in the winter and a few degrees in the summer. Based on our review of beach morphology monitoring data available for this section of Oregon's coast from 1997 to 2002, beach elevations varied by 0 to 6 feet from minimum to maximum, with a minor change at the beach-bluff junction (Allan and Hart, 2005). The beach elevation can change substantially associated with El Niño and La Niña events, with the sand being stripped off, exposing the wave-cut platform beneath. Topographic contours derived from 2016 lidar data provided by NOAA show the elevation above mean sea level of the beach-bluff junction west of the subject property as approximately 20 feet (NAVD 88) (Figure 3), which generally agrees with data from Allan and Hart (2005).

3.2.4 Rip Currents or Embayments

Rip currents and rip current embayments have formed approximately 1300 feet north and 1500 feet south of the site, and likely elsewhere, within the last decade, as evidenced by our review of historical satellite imagery.

3.2.5 Offshore Rock Outcrops and Sea Stacks

Offshore rock outcrops are not present in the immediate vicinity of the site. Mapping by Priest and Allan (2004) identifies similar outcrops approximately 0.8 miles north of the site as possibly Tertiary Cascade Head basalt outcrops.

3.2.6 Depth of Beach Sand to Bedrock

Although not exposed at the time of our site visit, we have observed exposed bedrock approximately 250 feet west of the beach bluff junction fronting the site during previous visits to the area. We estimate sand depths along the beach at the time of our visit to be about 6 feet thick. Sand depths here can reach about 8 feet or more in some years.

3.3 Subsurface Conditions

At the time of our site visit, we explored the subsurface by advancing three hand-augered borings to depths up to approximately 5 feet below the ground surface (bgs). The approximate locations of the borings are shown on Figures 3 and 4. A geologist from our office visually classified the soils encountered using the Unified Soil Classification System (USCS) as follows:

B-1

Depth (ft.)	USCS	Description
0 – 2.5	ML(FILL)	Gravely Sandy SILT FILL; light brown, dry, loose.
2.5 – 3.5	ML	Sandy SILT; brown, moist, loose to slightly dense.
3.5 – 4.0	SP	Slightly Silty SAND; light brown/orange-brown, moist, dense. Moderately- to well-cemented dune sand.
		Refusal in dense cemented sand at approximately 4 feet bgs. Free groundwater was not encountered.

B-2

Depth (ft.)	USCS	Description
0 – 2.5	ML(FILL)	Gravely Sandy SILT FILL; light brown, dry, loose.
2.5 – 3.5	ML	Sandy SILT; brown, moist, loose to medium dense. Increasing density with depth
		Boring terminated at the extent of the auger at approximately 5 feet bgs. Free groundwater was not encountered.

B-3

Depth (ft.)	**USCS**	**Description**
0 – 2.5	ML(FILL)	Gravely Sandy SILT FILL; light brown, dry to moist, loose.
2.5 – 4.5	ML	Sandy SILT; brown, moist to wet, slightly dense to medium dense.
4.5 – 5.0	SP	Slightly Silty SAND; light brown/orange-brown, moist, dense. Moderately- to well-cemented dune sand.
		Boring terminated in dense cemented sand at approximately 5' bgs. Free groundwater was not encountered.

In general, we encountered up to 2.5 feet of loose, gravely silt fill underlain by loose to medium dense sandy silt and dense moderately- to well-cemented dune sand at depths of approximately 4 to 5 feet bgs (Appendix A).

3.4 Structures

Structural deformation and faulting along the Oregon Coast are dominated by the Cascadia Subduction zone (CSZ), which is a convergent plate boundary extending for approximately 680 miles from northern Vancouver Island to northern California. This convergent plate boundary is defined by the subduction of the Juan de Fuca plate beneath the North America Plate and forms an offshore north-south trench approximately 60 miles west of the Oregon coast shoreline. A resulting deformation front consisting of north-south oriented reverse faults is present along the western edge of an accretionary wedge east of the trench, and a zone of margin-oblique folding and faulting extends from the trench to the Oregon Coast (Geomatrix, 1995).

The nearest fault is a northeast-trending normal fault, indicated on mapping as an inferred fault, with the southwesternmost extent mapped approximately 0.5 miles east of the subject site and with its northeasternmost mapped extent at the south end of Devils Lake (Schlicker et al., 1973; Snavely et al., 1976).

The nearest mapped potentially active faults are the Yaquina Head Fault located approximately 20 miles south of the site and the Yaquina Bay Fault located approximately 22.5 miles south of the site. The Yaquina Head Fault is an east-trending oblique fault with left-lateral strike-slip and either contractional or extensional dip-slip offset components (Personius et al., 2003). It offsets the 80,000-year-old Newport marine terrace by approximately 5 feet, indicating a relatively low rate of slip, if still active (Schlicker et al., 1973; Personius et al., 2003). The Yaquina Bay Fault is a generally east-northeast trending oblique fault that also has left-lateral strike-slip and either contractional or extensional dip-slip offset components (Personius et al., 2003).

This fault is believed to extend offshore for approximately 7 to 8 miles and may be a structurally controlling feature for the mouth of Yaquina Bay (Goldfinger et al., 1996; Geomatrix, 1995). At Yaquina Bay, a 125,000-year-old platform has been displaced approximately 223 feet up-on-the-north by the Yaquina Bay Fault. This fault has the largest component of vertical slip (as much as 2 feet per 1,000 years) of any active fault in coastal Oregon or Washington (Geomatrix, 1995). Although the age for the last movement of the Yaquina Bay Fault is not known, the fault also offsets 80,000-year-old marine terrace sediments.

4.0 Erosion and Slope Stability

The western part of the site is a high, steep marine terrace oceanfront bluff that has formed as the result of ocean wave erosion and undergoes continuous wind and rain impacts and episodic sloughing and landsliding. According to the Oregon Coastal Atlas Ocean Shores Data Viewer (http://www.coastalatlas.net/oceanshores, accessed September 2021), a beachfront protective structure is mapped along the bluff slope at the site; however, due to the colluvium and dense vegetation on the bluff slope, we did not observe the revetment.

The site lies in an area that has been mapped as undergoing critical erosion of marine terraces and sediments (Schlicker et al., 1973). Priest (1994) and Priest et al. (1994) determined the average annual erosion rate for the oceanfront bluff segments in the site area as 0.27 ± 0.34 feet per year. This erosion rate was calculated by measuring the distance between existing structures and the bluff and compared to distances measured on a 1939 or 1967 vertical aerial photograph.

Based on mapping completed by Priest and Allan (2004), the beach and bluff slope lie within the Active Erosion Hazard Zone. The area from the upper bluff edge to approximately 30 feet eastward lies in the High-Risk Coastal Erosion Hazard Zone; the next approximately 30 feet east lies in the Moderate-Risk Coastal Erosion Hazard Zone, and the easternmost part of the site lies in the Low-Risk Coastal Erosion Hazard Zone. Coastal erosion hazard zone definitions and methodology are provided below.

The methodology provided by Priest and Allan (2004) defines four coastal erosion hazard zones for bluffs of Lincoln County, Oregon, as follows:

"*The basic techniques used here are modified from Gless and others (1998), Komar and others (1999), and Allan and Priest (2001). The zones are as follows:*

1) <u>Active hazard zone:</u> The zone of currently active mass movement, slope wash, and wave erosion.

2) The other three zones define high-, moderate-, and low-risk scenarios for expansion of the active hazard zone by bluff top retreat. Similar to the dune-backed shorelines, the three hazard zones depict decreasing levels of risk that they will become active in the future. These hazard zone boundaries are mapped as follows:

a. High-risk hazard zone: The boundary of the high-risk hazard zone will represent a best case for erosion. It will be assumed that erosion proceeds gradually at a mean erosion rate for 60 years, maintaining a slope at the angle of repose for talus of the bluff materials.

b. Moderate-risk hazard zone: The boundary of the moderate-risk hazard zone will be drawn at the mean distance between the high- and low-risk hazard zone boundaries.

c. Low-risk hazard zone: The low-risk hazard zone boundary represents a "worst case" for bluff erosion. The worst case is for a bluff to erode gradually at a maximum erosion rate for 100 years, maintaining its slope at the angle of repose for talus of the bluff materials. The bluff will then be assumed to suffer a maximum slope failure (slough or landslide). For bluffs composed of poorly consolidated or unconsolidated sand, another worst-case scenario will be mapped that assumes that the bluff face will reach a 2:1 slope as rain washes over it and sand creeps downward under the forces of gravity. For these sand bluffs, whichever method produces the most retreat will be adopted" (Priest and Allan, 2004).

It should be noted that mapping done for the 2004 study was intended for regional planning use, not for site-specific hazard identification.

The site is also mapped in an area of moderate landslide susceptibility, and the bluff is mapped in an area of high landslide susceptibility based on the DOGAMI methodology (Burns, Mickelson, and Madin, 2016).

4.1 Analyses of Erosion and Flooding Potential

4.1.1 DOGAMI Beach Monitoring Data

Discussed in Section 3.2.3 above, beach monitoring data for this section of Oregon's coast shows that beach elevations varied by several feet from minimum to maximum over the monitored period of 1997 to 2002 (Allan and Hart, 2005).

4.1.2 Human Activities Affecting Shoreline Erosion

Human activities have not significantly altered the resistance of the bluff to wave attack at this site.

4.1.3 Mass Wasting

Weathering, landsliding, recession rates, and other erosional processes at this oceanfront site are discussed in Section 4.0 above and Section 4.1.8 below. The rate used for our setback analysis was 0.27 feet per year, based on the calculated erosion rates presented by Priest (1994) and Priest et al. (1994), our field observations, and a review of aerial photography.

4.1.4 Erosion Potential From Wave Runup Beyond Mean Water Elevation

Coastal erosion rates and hazard zones (as referenced in Priest and Allan, 2004) are presented in Section 4.0 above. In the bluff-backed shoreline recession methodology applicable to the subject site, wave erosion at the bluff toe and associated parameters (rock composition, vegetative/protective cover, ballistics of debris, bluff slope angle of repose, etc.) are more critical to erosion zone and rate estimates than calculating wave runup elevation which changes with many variables such as changing beach elevations, presence of transient dunes, etc. Because of the vegetative cover protecting the lower bluff slope, only minor erosion is expected with a high wave run-up event at this site. It is the chronic nature of the wave attack hazard that can undercut the toe of the bluff, creating bluff instability.

4.1.5 Frequency of Erosion-Inducing Processes

As discussed in Section 4.0 above, the average annual erosion rate for the dune at the site is 0.27 ± 0.34 feet per year (Priest, 1994; Priest et al., 1994), and as also discussed in Section 4.1.3 above, is currently estimated at 0.27 feet per year for the calculation of setbacks from the upper bluff edge. Ocean wave, wind, and rain erosion are continuous and ongoing processes that impact bluff recession. Future landsliding at the subject site would cause additional recession of the upper bluff. We anticipate that future landslides could fail back 3 to 10 feet at a time if not mitigated for; however, these would be very infrequent and impossible to predict when they will occur.

4.1.6 Bluff-Backed Shoreline Erosion Potential

Discussed in Section 4.0 above, including the methodology in Priest and Allan (2004).

4.1.7 Sea Level Rise

Information from NOAA's Garibaldi and Newport/South Beach monitoring stations provides an average sea level rise of approximately 2.13 ± 0.66 mm/year between 1967 and 2020 (NOAA Tides & Currents Sea Level Trends, http://tidesandcurrents.

noaa.gov/sltrends). Global climate change can also influence rates of sea-level rise (refer to Section 7.0).

4.1.8 Estimated Annual Erosion Rate

A detailed discussion of recession and estimated erosion rates is in Section 4.0 above; Priest (1994) and Priest et al. (1994) determined the average annual erosion rate for the bluff at the site as 0.27 ± 0.34 feet per year.

4.2 Assessment of Potential Reactions to Erosion Episodes

4.2.1 Legal Restrictions of Shoreline Protective Structures

As noted in Section 2.11 above, according to the Oregon Coastal Atlas Ocean Shores Data Viewer (http://www.coastalatlas.net/oceanshores, accessed September 2021), a beachfront protective structure is mapped along the bluff slope at the site; however, due to the dense vegetation and colluvium on the bluff slope, we did not observe the revetment. We expect that this general stretch of Oregon's coastline may have additional shoreline protection constructed as bluff recession continues in the future and homes are threatened. Lots were generally 'developed' on January 1, 1977; however, this is a legal issue that can have varying interpretations. According to the Ocean Shores Viewer (http://www.coastalatlas.net/oceanshores/, accessed September 2021), the site appears to be Goal 18 eligible for a beachfront protective structure.

4.2.2 Potential Reactions to Erosion Events and Future Erosion Control Measures

Site geologic hazards conclusions and development recommendations are presented in Section 8.0 below, which includes recommended oceanfront setback for foundations along with a discussion of inherent risks to development in coastal areas with characteristics such as those at the site, as presented and analyzed in Section 4.0 above. Deep foundations, oceanfront protective structures, retaining walls, underpinning of foundations, vegetation management, relocation of structures, and bioengineering can all be potential reactions and control measures to erosion events.

4.2.3 Annual Erosion Rate for the Property

An average annual erosion rate of 0.27 feet per year is used in the determination of oceanfront setbacks for the subject site. For further information, please refer to Sections 4.0 and 4.1.8 above.

5.0 Regional Seismic Hazards

Abundant evidence indicates that a series of geologically recent large earthquakes related to the Cascadia Subduction Zone have occurred along the coastline of the Pacific Northwest.

Evidence suggests that more than 40 great earthquakes of magnitude 8 and larger have struck western Oregon during the last 10,000 years. The calculated odds that a Cascadia earthquake will occur in the next 50 years range from 7–15 percent for a great earthquake affecting the entire Pacific Northwest, to about a 37 percent chance that the southern end of the Cascadia Subduction Zone will produce a major earthquake in the next 50 years (OSSPAC, 2013; OSU News and Research Communications, 2010; Goldfinger et al., 2012). Evidence suggests the last major earthquake occurred on January 26, 1700, and may have been of magnitude 8.9 to 9.0 (Clague et al., 2000; DOGAMI, 2013).

There is now increasing recognition that great earthquakes do not necessarily result in a complete rupture along the full 1,200 km fault length of the Cascadia subduction zone. Evidence in the paleorecords indicates that partial ruptures of the plate boundary have occurred due to smaller earthquakes with moment magnitudes (Mw) < 9 (Witter et al., 2003; Kelsey et al., 2005). These partial segment ruptures appear to occur more frequently on the southern Oregon coast, as determined from paleotsunami studies. Furthermore, the records have documented that local tsunamis from Cascadia earthquakes recur in clusters (~250–400 years) followed by gaps of 700–1,300 years, with the highest tsunamis associated with earthquakes occurring at the beginning and end of a cluster (Allan et al., 2015).

These major earthquake events were accompanied by widespread subsidence of a few centimeters to 1–2 meters (Leonard et al., 2004). Tsunamis appear to have been associated with many of these earthquakes. In addition, settlement, liquefaction, and landsliding of some earth materials are believed to have been commonly associated with these seismic events.

Other earthquakes related to shallow crustal movements or earthquakes related to the Juan de Fuca plate have the potential to generate magnitude 6.0 to 7.5 earthquakes. The recurrence interval for these types of earthquakes is difficult to determine from present data, but estimates of 100 to 200 years have been given in the literature (Rogers et al., 1996).

Based on the 1999 Relative Earthquake Hazard Map of the Lincoln City area (Madin and Wang, 1999), the subject site lies in an area designated as Zone C, which represents areas having low to intermediate relative hazards associated with earthquakes. The degree of relative hazard was based on the factors of ground motion amplification, liquefaction, and slope instability, with slope instability being the most critical factor at the subject site.

The subject site is mapped in an area of very strong expected earthquake shaking during an earthquake in a 500-year period (DOGAMI Oregon HazVu website, accessed September 2021). "Very Strong" is the third-highest level of a six-level gradation from "Light" to "Violent" in this mapping system.

6.0 Flooding Hazards

Based on the 2019 Flood Insurance Rate Map (FIRM, Panel #41041C0109E), the site lies in an area rated as Zone X, which is defined as an area determined to be outside the 0.2% annual chance floodplain. The lower bluff slope and beach area west of the site is rated as Zone VE (EL 28), which is defined as an area of 100-year coastal flood with velocity (wave action); base flood elevations and flood hazard factors determined.

Based on Oregon Department of Geology and Mineral Industries mapping (DOGAMI, 2013), the bluff slope and beach lie within the tsunami inundation zone resulting from a 9.1 and smaller magnitude Cascadia Subduction Zone (CSZ) earthquake. The existing house and area of the proposed addition lie outside the mapped CSZ tsunami inundation zones. The 2013 DOGAMI mapping is based upon five computer-modeled scenarios for shoreline tsunami inundation caused by potential CSZ earthquake events ranging in magnitude from approximately 8.7 to 9.1. The January 1700 earthquake event (discussed in Section 5.0 above) has been rated as an approximate 8.9 magnitude in DOGAMI's methodology. More distant earthquake source zones can also generate tsunamis.

7.0 Climate Change

According to most of the recent scientific studies, the Earth's climate is changing as the result of human activities which are altering the chemical composition of the atmosphere through the buildup of greenhouse gases, primarily carbon dioxide, methane, nitrous oxide, and chlorofluorocarbons (EPA, 1998). Although there are uncertainties about exactly how the Earth's climate will respond to enhanced concentrations of greenhouse gases, scientific observations indicate that detectable changes are underway (EPA, 1998; Church and White, 2006). Global sea-level rise, caused by melting polar ice caps and ocean thermal expansion, could lead to flooding of low-lying coastal property, loss of coastal wetlands, erosion of beaches and bluffs, and saltwater contamination of drinking water. Global climate change and the resultant sea-level rise will likely impact the subject site through accelerated coastal erosion and more frequent and severe flooding. It can also lead to increased rainfall, which can result in an increase in landslide occurrence.

8.0 Conclusions and Recommendations

The main engineering geologic concerns at the site are:

1. The bluff slope on the western part of the site is undergoing continuous erosion, sloughing, and landsliding, which can fail back 3 to 10 feet or greater at a time. Undercutting by ocean waves causes retreat of the toe of the slope, resulting in

instability and failures along the lower, middle, and upper slope. These hazards are common to oceanfront property in this area.

2. Fill and loose soils up to at least approximately 2.5 feet deep are present at the site in the area proposed for construction of the carport and will need to be removed from footing and slab areas prior to construction.

3. There is an inherent regional risk of earthquakes along the Oregon Coast, which could cause harm and damage structures. The bluff slope also lies within a mapped tsunami inundation hazard zone. A tsunami impacting the Lincoln City area could cause harm, loss of life, and damage to structures. These risks must be accepted by the owner, future owners, developers, and residents of the site.

The following recommendations should be adhered to during design and construction:

8.1 General Recommendations

1. HGSA will need to review a complete plan set for any proposed construction on the lot. The plans will need to incorporate the recommendations included herein. Please note that these recommendations are intended for the construction of an addition on the eastern portion of the existing house.

   Additional recommendations or modification of the recommendations included herein may be needed depending on the proposed design(s). If modifications to the existing structure contribute substantially greater loads to the existing foundations, additional geotechnical investigation, analysis, foundation design and construction recommendations may be required.

2. Carefully control and maintain all stormwater drainage systems at the site. Plan sets should incorporate proper drainage and erosion control, as discussed in Sections 8.4, 8.5, 8.8, 8.9, 8.10, and 8.11 below.

3. Lincoln City may require a topographic survey performed by a licensed land surveyor to identify the bluff edge and determine the bluff setback's exact location. Lincoln City may also require an infiltration test for on-site infiltration of stormwater.

It is our understanding that the existing concrete slab east of the house will remain in place during the construction of the attached carport addition, and new isolated footings will be utilized to support the structure. Provided that all recommendations herein are adhered to, no adverse effects are anticipated on adjacent properties.

8.2 Site Preparation and Foundation Setbacks

It is anticipated that excavations at the site can be completed using conventional earth moving equipment. Unsuitable fill and soft soils should be completely removed from all building areas (see Section 8.3 below).

Any tree stumps, including the root systems, should be removed from beneath footing, slab and pavement areas, and the resulting holes backfilled with compacted non-organic structural backfill placed in lifts not exceeding 8 inches and compacted to a dry density of at least 92 percent of the Modified Proctor maximum dry density (ASTM D1557).

Wet weather grading is not generally recommended. If wet weather grading is unavoidable due to construction schedules, or if wet soil conditions are encountered, stabilization of the subgrade soils with aggregate may become necessary. The use of clean, well-graded inch 1½ inch minus crushed rock fill (containing less than 5 percent material passing the No. 200 sieve) is recommended. Thickness of applied granular fill should be sufficient to stabilize the subgrade soils. The applied thickness of granular fills may be reduced by the use of geotextiles.

To help mitigate future recession of the bluff caused by erosion and landsliding, we recommend that new shallow foundations be set back a minimum of 21 feet east of the upper bluff edge, as shown on Figures 3 and 4. This setback would allow room on the subject property to mitigate slope issues should a (less probable) larger landslide occur in the future. We have determined this oceanfront setback based on an average annual erosion rate of 0.27 ft/yr for 60 years and have added Lincoln City's required additional 5 feet. Existing foundations for the deck and western portion of the house currently lie within the setback area; however, the proposed carport construction area lies east of this setback area.

Please note, the Oregon Coast is a dynamic and energetic environment. Most of the coastline is currently eroding and will continue to erode in the future. Most structures built near ocean bluffs will eventually be undermined by erosion and landsliding. The setback recommendations presented in this report are based on past average erosion rates as determined from aerial photography, and past and current geologic conditions and processes. These setbacks are intended to protect the structure(s) from bluff recession for 60 years. Geologic conditions and the rates of geologic processes can change in the future. Setbacks greater than our recommended minimum setbacks would provide the proposed structure with greater anticipated life and lower risk from some geologic hazards.

8.3 Soil Bearing Capacities for Shallow Foundations

Individual and/or continuous spread footings should bear in undisturbed, native, non-organic, medium-stiff/dense to stiff/dense soils, or properly engineered and compacted granular fill placed on these soils. All footing areas should be stripped of all organic and loose/soft soils and existing fills. We anticipate that non-organic, stiff soils will be encountered at depths of approximately 2.5 to 3 feet; however, depths may vary.

Footings bearing in undisturbed, native, non-organic, firm soils or properly compacted structural fill placed on these soils may be designed for the following:

ALLOWABLE SOIL BEARING CAPACITIES	
Allowable Dead Plus Live Load Bearing Capacity [a]	1,500 psf
Passive Resistance	200 psf/ft embedment depth
Lateral Sliding Coefficient	0.30
[a] Allowable bearing capacity may be increased by one-third for short-term wind or seismic loads.	

Our recommended minimum footing widths and embedment depths are as follows:

MINIMUM FOOTING WIDTHS & EMBEDMENT DEPTHS	
Minimum Footing Width	15 inches
Minimum Exterior Footing Embedment Depth [a]	18 inches
Minimum Interior Footing Embedment Depth [b]	6 inches
[a] All footings shall be embedded as specified above, or extend below the frost line as per Table R301.2(1) of the 2014 ORSC, whichever provides greater embedment. [b] Interior footings shall be embedded a minimum of 6 inches below the lowest adjacent finished grade, or as otherwise recommended by our firm. In general, interior footings placed on sloping or benched ground shall be embedded or set back from cut slopes in such a manner as to provide a minimum horizontal distance between the foundation component and face of the slope of one foot per every foot of elevation change.	

8.4 Slabs-On-Ground

All areas beneath slabs should be excavated a minimum of 6 inches into native, non-organic, firm soils. The exposed subgrade in the slab excavation should be cut smooth, without loose or disturbed soil and rock remaining in the excavation.

The slab excavation should then be backfilled with a minimum of 6 inches of ¾ inch minus, clean, free-draining, crushed rock placed in 8-inch lifts maximum, compacted to 92 percent of the Modified Proctor (ASTM D1557). Reinforcing of the slab is recommended, and the slab should be fully waterproofed in accordance with structural design considerations. Slab thickness and reinforcing should be determined in accordance with structural considerations. An underslab drainage system is recommended for all slabs, as per the architect's recommendations. Where floor coverings are planned, slabs should also be underlain by a suitable moisture barrier.

SLABS-ON-GROUND	
Minimum thickness of 3/4 inch minus crushed rock beneath slabs	6 inches
Compaction Requirements	92% ASTM D1557, compacted in 8-inch lifts maximum

8.5 Retaining Walls

It is our understanding that retaining walls will not be utilized in the design of the proposed carport addition. Please contact us for retaining wall recommendations if necessary.

8.6 Seismic Requirements

The structure and all structural elements should be designed to meet current Oregon Residential Specialty Code (ORSC) seismic requirements. Based on our knowledge of subsurface conditions at the site, and our analysis using the guidelines recommended in the ORSC, the structure should be designed to meet the following seismic parameters:

SEISMIC DESIGN PARAMETERS	
Site Class	D
Seismic Design Category	D_1
Mapped Spectral Response Acceleration for Short Periods	S_S = 1.338 g
Site Coefficients	F_a = 1.200 F_v = 1.700
Design Spectral Response Acceleration at Short Periods	S_{DS} = 1.07 g

8.7 Structural Fills

Structural fills should consist of imported, crushed granular material, free of organics and deleterious materials, and contain no particles greater than 1½ inches in diameter so that nuclear methods (ASTM D2922 & ASTM D3017) can be easily used for field density and moisture testing. All areas to receive fill should be stripped of all soft soils, organic soils, organic debris, existing fill, and disturbed soils.

Proper test frequency and earthwork documentation usually require daily observation during stripping, rough grading, and placement of structural fill. Field density testing should generally conform to ASTM D2922 and D3017, or D1556. To minimize the number of field and laboratory tests, fill materials should be from a single source and of a consistent character. Structural fill should be approved and periodically observed by HGSA and tested by a qualified testing firm. Test results will need to be reviewed and approved by HGSA. We recommend that at least three density tests be performed for every 18 inches or every 200 cubic yards of fill placed, whichever requires more testing. Because testing is performed on an on-call basis, we recommend that the earthwork contractor schedule the testing. Relatively more testing is typically necessary on smaller projects.

STRUCTURAL FILL	
Compaction Requirements	92% ASTM D1557, compacted in 8-inch lifts maximum, at or near the optimum moisture content (± 2%).
Benching Requirements [a]	Slopes steeper than 5H:1V that are to receive fill shall be benched. Fills shall not be placed along slopes steeper than 3H:1V, unless approved by H.G. Schlicker & Associates, Inc.

[a] Benches shall be cut into native, non-organic, firm soils. Benches shall be a minimum of 6 feet wide with side cuts no steeper than 1H:1V and no higher than 6 feet. The lowest bench shall be keyed in a minimum of 2 feet into native, non-organic, firm soils.

8.8 Groundwater

Groundwater may be encountered in excavations. If groundwater is encountered, unwatering of the excavation is required and should be the contractor's responsibility. This can typically be accomplished by pumping from one or more sumps, or daylighting excavations to drain.

8.9 Erosion Control

Vegetation should be removed only as necessary, and exposed areas should be replanted following construction. Disturbed ground surfaces exposed during the wet season (November 1 through April 30) should be temporarily planted with grasses, or protected with erosion control blankets or hydromulch.

Temporary sediment fences should be installed downslope of any disturbed areas of the site until permanent vegetation cover can be established.

Exposed sloping areas steeper than 3 horizontal to 1 vertical (3H:1V) should be protected with a straw erosion control blanket (North American Green S150 or equivalent) to provide erosion protection until permanent vegetation can be established. Erosion control blankets should be installed as per the manufacturer's recommendations.

8.10 Cut and Fill Slopes

We do not anticipate any temporary or permanent cut slopes related to the proposed development.

However, temporary unsupported cut and fill slopes less than 9 feet in height should be sloped no steeper than 1 horizontal to 1 vertical (1H:1V). If temporary slopes greater than 9 feet high are desired, or if water seepage is encountered in cuts, HGSA should be contacted to provide additional recommendations. Temporary cuts in excess of 4 feet high and steeper than 1H:1V will likely require appropriate shoring to provide for worker safety, per OSHA regulations. Temporary cuts should be protected from inclement weather by covering them with plastic sheeting to help prevent erosion and/or failure.

Permanent unsupported fill slopes shall be constructed no steeper than 2 horizontal to 1 vertical (2H:1V).

8.11 Drainage

Surface water should be diverted from building foundations and walls to approved disposal points by grading the ground surface to slope away a minimum of 2 percent for 6 feet towards a suitable gravity outlet to prevent ponding near the structures. Permanent subsurface drainage of the building perimeter is recommended to prevent extreme seasonal variation in moisture content of subgrade materials and subjection of foundations and slabs to hydrostatic pressures.

Footing drains should be installed adjacent to the perimeter footings and sloped a minimum of 2 percent to a gravity outlet. A suitable perimeter footing drain system would consist of 4-inch diameter, perforated PVC pipe (typical) embedded below and adjacent to the bottom of footings, and backfilled with approved drain rock. The type of PVC pipe to be utilized may depend on building agency requirements and should be verified prior to construction. HGSA also recommends lining the drainage trench excavation with a geotextile filter such as Mirafi® 140N or equivalent to increase the life of the drainage system. The perimeter drain excavation should be constructed in a manner that prevents undermining of foundation or slab components or any disturbance to supporting soils.

All roof drains should be collected and tightlined in a separate system independent of the footing drains, or an approved backflow prevention device shall be used. All roof and footing drains should be discharged to an approved disposal point. If water will be discharged to the ground surface, we recommend that energy dissipaters, such as splash blocks or a rock apron, be utilized at all pipe outfall locations. Water collected on the site should not be concentrated and discharged to adjacent properties. Water should not be disposed of along the bluff slope unless piped to the toe of the slope.

8.12 Plan Review and Site Observations

We should be provided the opportunity to review all site development, foundation, drainage, and grading plans prior to construction to assure conformance with the intent of our recommendations (Appendix B). The plans, details, and specifications should clearly show that the above recommendations have been implemented into the design.

A representative of HGSA should observe foundation setbacks and site foundation excavations prior to placing structural fill, forming and pouring concrete (Appendix B). Please provide us with at least five (5) days' notice prior to any needed site observations. There will be additional costs for these services.

9.0 Limitations

The Oregon Coast is a dynamic environment with inherent, unavoidable risks to development. Landsliding, erosion, tsunamis, storms, earthquakes, and other natural events can cause severe impacts to structures built within this environment and can be detrimental to the health and welfare of those who choose to place themselves within this environment. The client is warned that, although this report is intended to identify the geologic hazards causing these risks, the scientific and engineering communities' knowledge and understanding of geologic hazards processes is not complete. This report pertains to the subject site only and is not applicable to adjacent sites, nor is it valid for types of development other than that to which it refers. Geologic conditions, including materials, processes, and rates, can change with time, and therefore a review of the site and/or this report may be necessary as time passes to assure its accuracy and adequacy.

The boring logs and related information depict generalized subsurface conditions only at these specific locations, and at the particular time the subsurface exploration was completed. Soil and groundwater conditions at other locations may differ from the conditions at these boring locations.

Our investigation was based on engineering geological reconnaissance and a limited review of published information. The data presented in this report are believed to be representative of the site. The conclusions herein are professional opinions derived in accordance with current standards of professional practice, budget, and time constraints. No warranty is expressed or implied. The site-specific performance of this site during a seismic event has not been evaluated. If you would like us to do so, please contact us. This report may only be copied in its entirety.

10.0 Disclosure

H.G. Schlicker & Associates, Inc. and the undersigned Certified Engineering Geologist have no financial interest in the subject site, the project, or the Client's organization.

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It has been our pleasure to serve you. If you have any questions concerning this report or the site, please contact us.

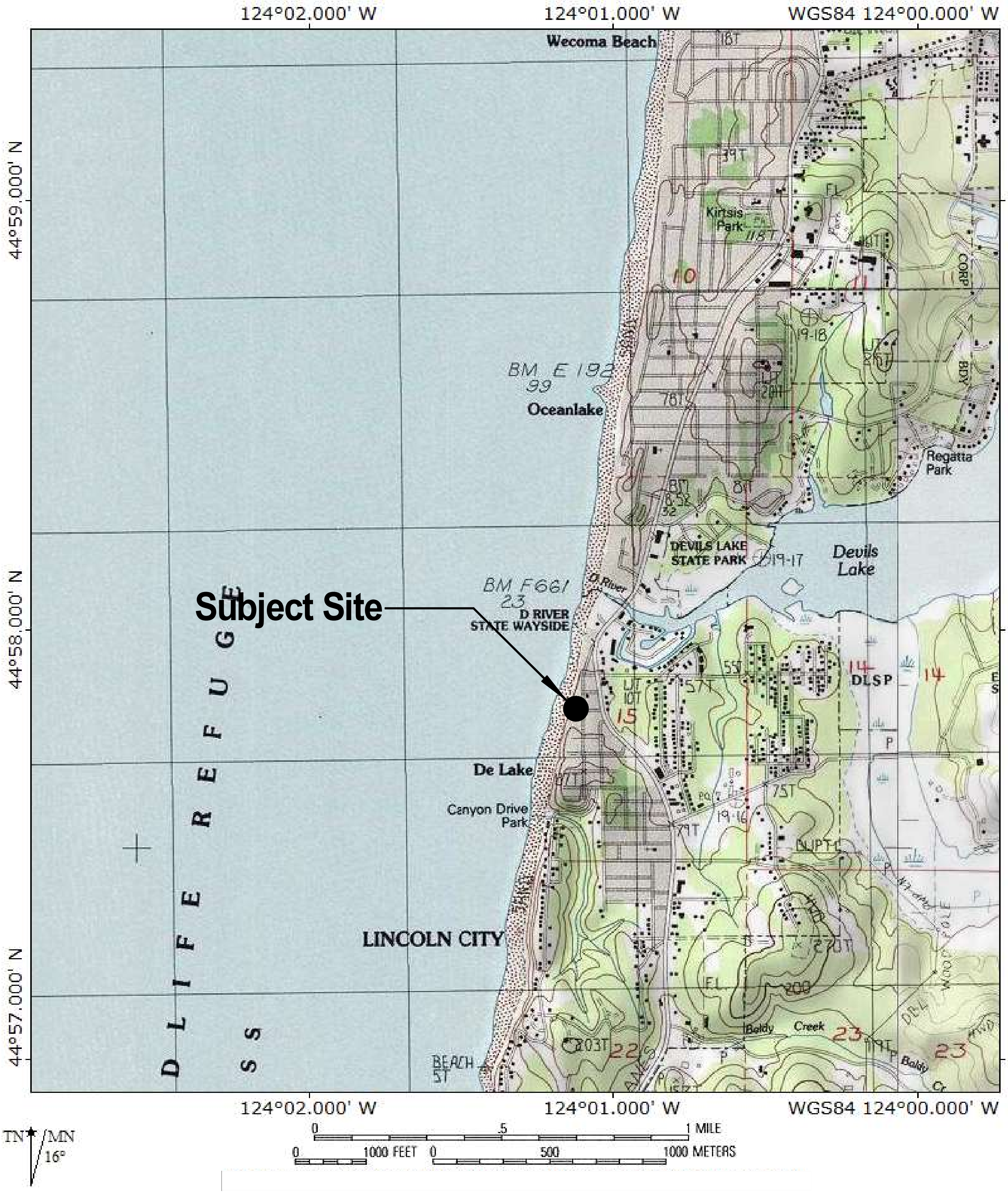
Respectfully submitted,

H.G. SCHLICKER AND ASSOCIATES, INC.

EXPIRES: 10/31/2022

J. Douglas Gless, MSc, RG, CEG, LHG
President/Principal Engineering Geologist

JDG:aml



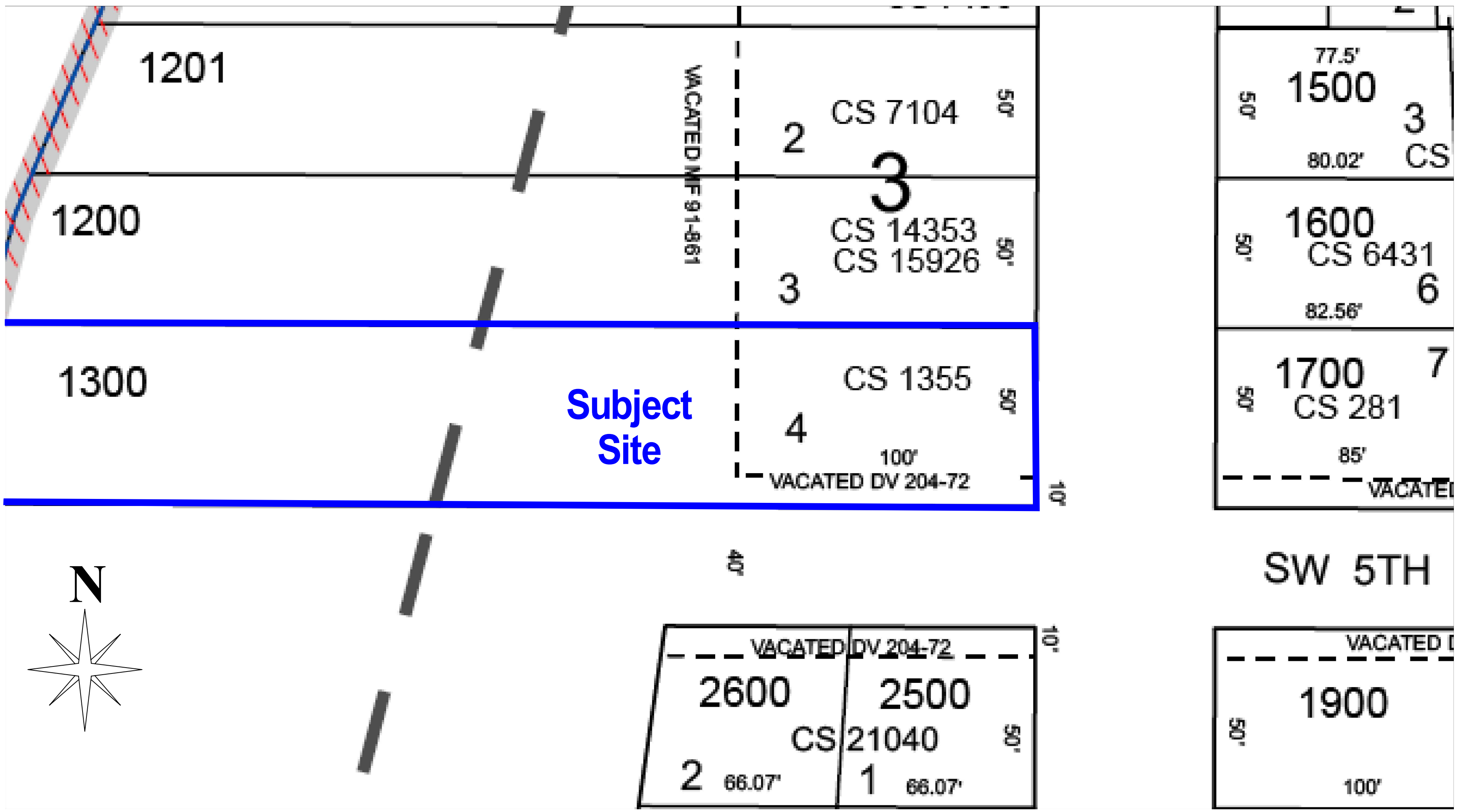
N

Date: 09/24/2021	**Project #Y214550**	Prepared by: AML
Scale: 1" = 2,000'		Approved by: JDG

Location Map
Tax Lot 1300, Map 7-11-15DB
887 SW 5th Street, Lincoln City, Oregon

H.G. Schlicker & Associates, Inc.

Figure 1

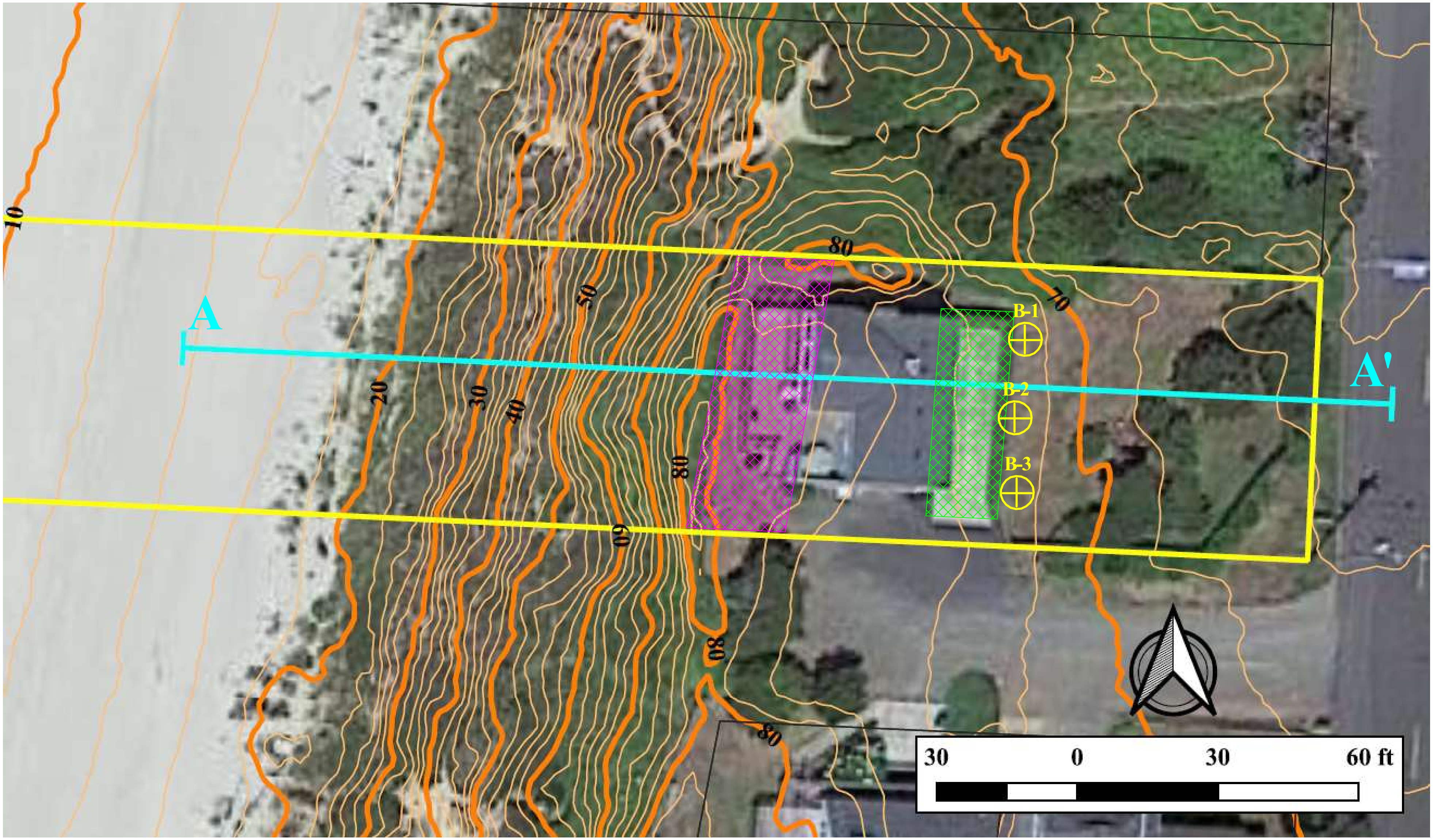


Date: 09/24/2021	**Project #Y214550**	Prepared by: AML
Scale: 1" = 50'		Approved by: JDG

Plat Map
Tax Lot 1300, Map 7-11-15DB
887 SW 5th Street, Lincoln City, Oregon

H.G. Schlicker & Associates, Inc. | **Figure 2**

Modified from the Lincoln County assessor's plat
07-11-15DB, Lincoln City
All locations and dimensions are approximate.



B-1 = Approximate location of hand augered boring

A — A' = Approximate trend of profile line

= Approximate proposed construction area

= Geologic hazards setback area

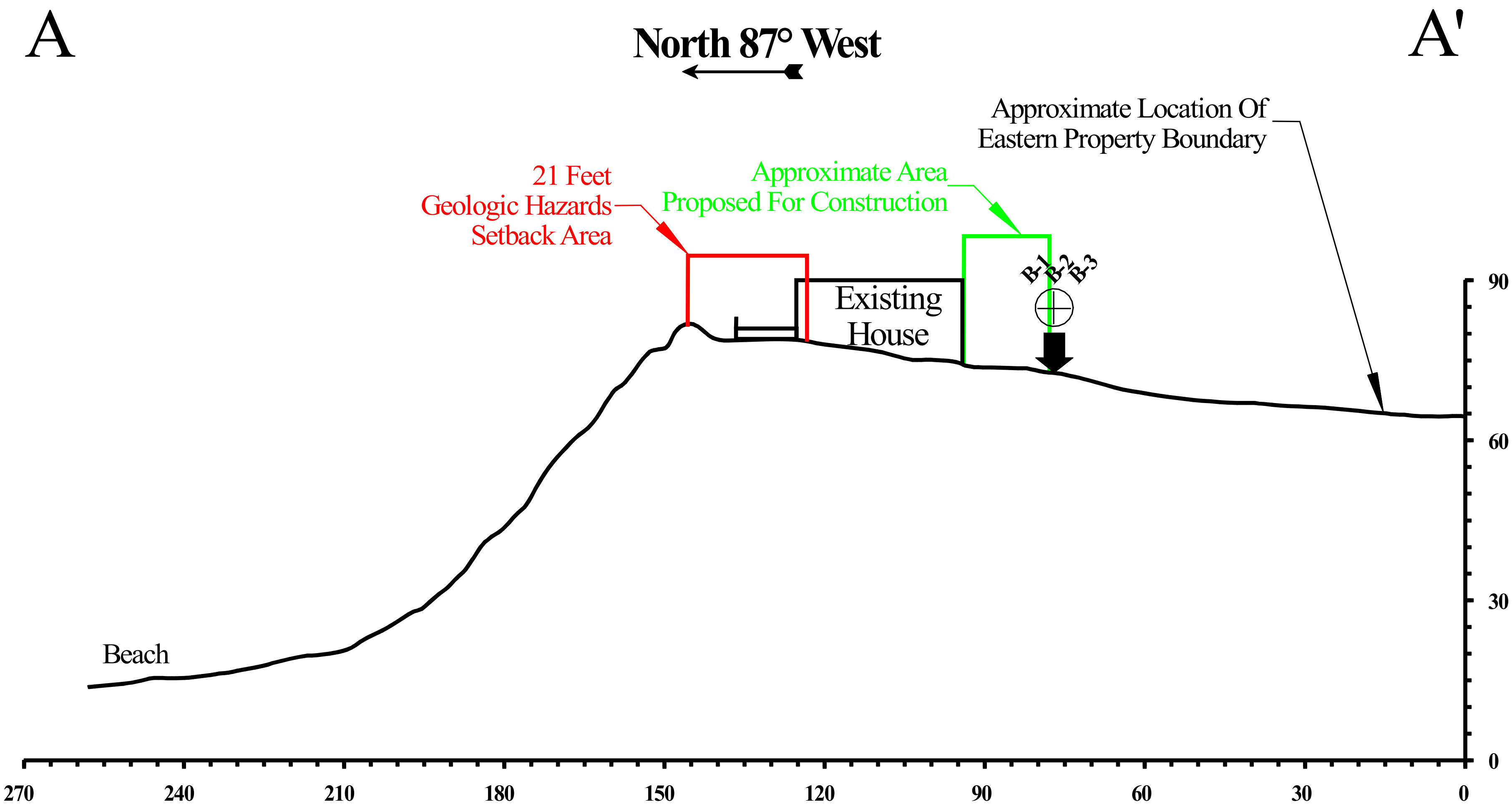
Imagery provided Google. Topographic data derived from West Coast 2016 El Nino Lidar provided by NOAA. All locations and dimensions are approximate.

Date: 09/24/2021	Project #Y204335	Prepared by: AML
Scale: 1" = 30'		Approved by: JDG

Site Topographic Map
Tax Lot 1300, Map 7-11-15DB
887 SW 5th Street, Lincoln City, Oregon

H.G. Schlicker & Associates, Inc.

Figure 3



B-1

= Approximate location of boring

All dimensions, elevations and locations are approximate.
Slope profile derived from West Coast 2016 El Nino Lidar data from NOAA.

Date: 09/24/2021 Scale: 1" = 20'	**Project #Y214551**	Prepared by: AML Approved by: JDG

Slope Profile, A-A'
Tax Lot 1300, Map 7-11-15DB
887 SW 5th Street, Lincoln City, Oregon

H.G. Schlicker & Associates, Inc.

Figure 4

Appendix A
– Site Photographs –

Photo 1 – Westerly view of the site from SW Ebb Avenue.

Photo 2 – Northerly view of the area proposed for construction of the attached carport addition.

Photo 3 – Northerly view of the western side of the existing house, deck and bluff edge

Photo 4 – View of the densely vegetated bluff slope from the beach.

Photo 5 – View of the soils encountered in Boring B-1.

Photo 6 – View of the soils encountered in Boring B-2.

Photo 7 – View of the soils encountered in Boring B-3.

Appendix B
– Checklist of Recommended Plan Reviews and Site Observations –

APPENDIX B
Checklist of Recommended Plan Reviews and Site Observations To Be Completed by a Representative of H.G. Schlicker & Associates, Inc.

Item No.	Date Done	Procedure	Timing
1*		Review site development, foundation, drainage, grading, and erosion control plans.	Prior to permitting and construction.
2*		Observe foundation excavations.	Following excavation of foundations, and prior to placing fill, forming and pouring concrete. **
3*		Review Proctor (ASTM D1557) and field density test results for all fill placed at the site.	During construction.

* There will be additional charges for these services.
** Please provide us with at least 5 days' notice prior to all site observations.

H.G. Schlicker & Associates, Inc.
607 Main Street, Suite 200 · Oregon City, Oregon 97045
(503) 655-8113 · FAX (503) 655-8173

Project #Y214550 April 26, 2022

Subject: **Plan Review**
Tax Lot 1300, Map 7-11-15DB
887 SW 5th Street
Lincoln City, Oregon

Dear Ms. Webb:

As requested, H.G. Schlicker and Associates, Inc. (HGSA) have reviewed the provided plans for the proposed garage addition at the subject site, Tax Lot 1300, Map 7-11-15DB, 887 SW 5th Street, Lincoln City, Oregon. The plan set consists of 8 design sheets, dated April 22, 2022, prepared by Nathan Johnson, and received in our offices by email attachment on April 25, 2022.

Based on our plan review, the plan set is in general conformance with the recommendations set forth in our Geologic Hazards and Geotechnical Investigation report of September 24, 2021 (HGSA #Y214550).

HGSA will need to conduct foundation excavation observations to approve subgrades in footing and slab areas prior to placing fill, forming or pouring concrete. Please provide us with 5 days' notice prior to the needed observations. If you have any questions concerning this letter or the site, please contact us.

Respectfully submitted,

H.G. SCHLICKER AND ASSOCIATES, INC.

CERTIFIED
OREGON
J. DOUGLAS GLESS
E-902
ENGINEERING GEOLOGIST

EXPIRES: 10/31/2022

J. Douglas Gless, MSc, RG, CEG, LHG
President/Principal Engineering Geologist

JDG:aml