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STAFF REPORT: REGULAR CALENDAR

Application No.:	**1-12-013**
Applicant:	**Rob and Patti Wilson**
Agent:	Royer Design/Build
Location:	396 Roundhouse Creek Road, approximately 4.5 miles north of the City of Trinidad in the Big Lagoon area Humboldt County (APN 517-251-006).
Project Description:	(1) Develop a new 1,456-sq-ft., 3-bedroom, one-story single-family residence, attached 528-sq-ft. 2-car garage, 168-sq-ft. covered patio, paved driveway with two off-street parking spaces, on-site sewage disposal system, and 2,500-gallon water storage tank for fire abatement; and (2) remove approximately nine conifer trees.
Staff Recommendation:	Approval with conditions.

SUMMARY OF STAFF RECOMMENDATION

Commission staff recommends **approval** of CDP application 1-12-013, as conditioned.

The applicants propose to (1) develop a new 1,456-sq-ft., 3-bedroom, one-story (maximum 16-ft-high) single-family residence, attached 528-sq-ft. 2-car garage, 168-sq-ft. covered patio, paved

driveway with two off-street parking spaces, on-site sewage disposal system, and 2,500-gallon water storage tank for fire abatement; and (2) remove approximately nine conifer (mostly nonnative Monterey pine) trees.

The new development proposed under this CDP application would be located a minimum of 186 feet back from the existing bluff edge. Although the subject site is located on the west side of Roundhouse Creek Road, it is not the westernmost lot. There are several developed properties with existing single-family residences located between this property and the bluff edge.

The primary Coastal Act issues associated with this project include the minimization of geologic hazards, protection of environmentally sensitive habitat areas, and protection of archaeological resources.

The Big Lagoon subdivision, where the proposed single-family residence would be constructed, has been subject to extraordinary rates of bluff retreat in the past. In the winter of 1997-1998, lots within the subdivision about 1,000 feet north of the subject site experienced catastrophic bluff failure where more than 60 feet of steep bluff retreated during the singular stormy winter.

The proposed new development would be setback a minimum of 186 feet from the existing bluff edge. The Commission's geologist reviewed the slope stability and bluff setback recommendations prepared by the applicant's geotechnical consultant, and believes that the development as proposed will be setback an adequate distance from the bluff edge to ensure safety from bluff retreat and erosion for the development's presumed economic life. Staff is recommending various special conditions to mitigate geologic hazard risks, including conditions prohibiting the future construction of bluff or shoreline protective devices to protect the development and restrictions on future improvements to the authorized development (see **Special Conditions 1-5**).

Staff also recommends **Special Conditions 6-10** requiring restrictions on exterior lighting, measures to protect water quality, protection of sensitive bird nesting habitat by limiting tree removal to non-nesting seasons, and protection of archaeological resources by requiring that a cultural resources monitor be present during ground-disturbing activities.

The Motion to adopt the staff recommendation of approval with special conditions is found below on page 4.

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EXHIBITS

Exhibit 1 – Regional location map
Exhibit 2 – Project vicinity map
Exhibit 3 – Site photos
Exhibit 4 – Proposed project plans
Exhibit 5 – R2 soils engineering report
Exhibit 6 – Slope setback recommendation report

I. MOTION AND RESOLUTION

The staff recommends that the Commission adopt the following resolution:

Motion:

I move that the Commission approve coastal development permit 1-12-013 pursuant to the staff recommendation.

Staff recommends a **YES** vote on the foregoing motion. Passage of this motion will result in approval of the permit as conditioned and adoption of the following resolution and findings. The motion passes only by affirmative vote of a majority of the Commissioners present.

Resolution:

The Commission hereby approves coastal development permit 1-12-013 and adopts the findings set forth below on grounds that the development as conditioned will be in conformity with the policies of Chapter 3 of the Coastal Act and will not prejudice the ability of the local government having jurisdiction over the area to prepare a Local Coastal Program conforming to the provisions of Chapter 3. Approval of the permit complies with the California Environmental Quality Act because either 1) feasible mitigation measures and/or alternatives have been incorporated to substantially lessen any significant adverse effects of the development on the environment, or 2) there are no further feasible mitigation measures or alternatives that would substantially lessen any significant adverse impacts of the development on the environment.

II. STANDARD CONDITIONS

This permit is granted subject to the following standard conditions:

1. **Notice of Receipt and Acknowledgment**: The permit is not valid and development shall not commence until a copy of the permit, signed by the permittee or authorized agent, acknowledging receipt of the permit and acceptance of the terms and conditions, is returned to the Commission office.

2. **Expiration**: If development has not commenced, the permit will expire two years from the date on which the Commission voted on the application. Development shall be pursued in a diligent manner and completed in a reasonable amount of time. Application for extension of the permit must be made prior to the expiration date.

3. **Interpretation**: Any questions of intent of interpretation of any condition will be resolved by the Executive Director or the Commission.

4. **Assignment**: The permit may be assigned to any qualified person, provided assignee files with the Commission an affidavit accepting all terms and conditions of the permit.

5. **Terms and Conditions Run with the Land**: These terms and conditions shall be perpetual, and it is the intention of the Commission and the permittee to bind all future owners and possessors of the subject property to the terms and conditions.

III. SPECIAL CONDITIONS

This permit is granted subject to the following special conditions:

1. **Conformance of Final Design and Construction Plans to the Geologic Reports.**
   a. All final design and construction plans, including site preparation, foundation design, and drainage plans, shall be consistent with the recommendations contained in the geologic report titled, "R2 Soils Engineering Report for APN 517-251-006…" dated June 26, 2012, prepared by Oswald Geologic. All authorized development shall be located at least 186 back from the bluff edge as recommended by LACO Associates in the geologic report titled "Slope Setback Recommendation Report" dated July 30, 2012 and as further supplemented by the proposed plot plan prepared by Royer Design/Build dated October 22, 2012.
   b. PRIOR TO ISSUANCE OF THE COASTAL DEVELOPMENT PERMIT, the applicant shall submit, for the Executive Director's review and approval, evidence that a licensed professional (Certified Engineering Geologist or Geotechnical Engineer) has reviewed and approved all final site preparation, foundation design, and drainage plans and the minimum bluff edge setback (at least 186 feet) plot plan, and has certified that each of those plans is consistent with all of the recommendations specified in the above-referenced geologic reports and plot plans approved by the California Coastal Commission for the project site.
   c. The permittee shall undertake development in accordance with the approved final plans. Any proposed changes to the approved final plans shall be reported to the Executive Director. No changes to the approved final plans shall occur without a Commission amendment to this coastal development permit unless the Executive Director determines that no amendment is legally required.

2. **No Future Bluff or Shoreline Protective Device.**
   a. By acceptance of this permit, the applicants agree, on behalf of themselves and all successors and assigns, that no bluff or shoreline protective device(s) shall ever be constructed to protect the development approved pursuant to coastal development permit (CDP) 1-12-013, including, but not limited to, the single-family residence or other development under this CDP, in the event that the authorized development is threatened with damage or destruction from waves, erosion, storm conditions, bluff retreat, landslides, ground subsidence or other natural hazards in the future. By acceptance of this permit, the applicants hereby waive, on behalf of themselves and all successors and assigns, any rights to construct such devices that may exist under Public Resources Code Section 30235.

b. By acceptance of this permit, the applicants further agree, on behalf of themselves and all successors and assigns, that the landowner(s) shall remove the development authorized by this permit, including, but not limited to, the single-family residence or other development authorized under this CDP, if any government agency has ordered that the structures are not to be occupied due to any of the hazards identified above. In the event that portions of the development fall to the beach before they are removed, the landowner shall remove all recoverable debris associated with the development from the beach and ocean and lawfully dispose of the material in an approved disposal site. Such removal shall require a CDP.

c. In the event the edge of the bluff recedes to within 10 feet of the authorized development but no government agency has ordered that the structures not be occupied, a geotechnical investigation shall be prepared by a licensed geologist or civil engineer with coastal experience retained by the landowner(s), that addresses whether any portions of the structures are threatened by waves, erosion, storm conditions, bluff failure, or other natural hazards. The report shall identify all those immediate or potential future measures that could stabilize the structures without shore or bluff protection, including, but not limited to, removal or relocation of the structures. The report shall be submitted to the Executive Director and the appropriate local government officials. If the geotechnical report concludes that the structures are unsafe for occupancy, the permittee shall, within ninety (90) days of submitting the report, apply for a CDP amendment to remedy the hazard, which shall include removal of the threatened portion of the structure.

3. **Assumption of Risk, Waiver of Liability, and Indemnity Agreement**. By acceptance of this permit, the applicants acknowledge and agree (a) that the site may be subject to hazards from earthquakes, erosion, landslides, bluff failure, and other geologic hazards; (b) to assume the risks to the applicants and the property that is the subject of this permit of injury and damage from such hazards in connection with this permitted development; (c) to unconditionally waive any claim of damage or liability against the Commission, its officers, agents, and employees for injury or damage from such hazards; and (d) to indemnify and hold harmless the Commission, its officers, agents, and employees with respect to the Commission's approval of the project against any and all liability, claims, demands, damages, costs (including costs and fees incurred in defense of such claims), expenses, and amounts paid in settlement arising from any injury or damage due to such hazards.

4. **Deed Restriction Recordation of Permit Conditions**. PRIOR TO ISSUANCE OF THIS COASTAL DEVELOPMENT PERMIT, the applicants shall submit to the Executive Director for review and approval documentation demonstrating that the applicants have executed and recorded against the parcel(s) governed by this permit a deed restriction, in a form and content acceptable to the Executive Director: (a) indicating that, pursuant to this permit, the California Coastal Commission has authorized development on the subject property, subject to terms and conditions that restrict the use and enjoyment of that property; and (b) imposing the Special Conditions of this permit as covenants, conditions and restrictions on the use and enjoyment of the Property. The deed restriction shall include a legal description of the entire parcel or parcels governed by this permit. The deed

restriction shall also indicate that, in the event of an extinguishment or termination of the deed restriction for any reason, the terms and conditions of this permit shall continue to restrict the use and enjoyment of the subject property so long as either this permit or the development it authorizes, or any part, modification, or amendment thereof, remains in existence on or with respect to the subject property.

5. **Future Development Restriction.** This permit is only for the development described in coastal development permit (CDP) 1-12-013. Pursuant to Title 14 California Code of Regulations (CCR) Section 13250(b)(6), the exemptions otherwise provided in Public Resources Code (PRC) Section 30610(a) shall not apply to the development governed by the CDP 1-12-013. Accordingly, any future improvements to this structure authorized by this permit shall require an amendment to CDP 1-12-013 from the Commission or shall require an additional CDP from the Commission or from the applicable certified local government. In addition thereto, an amendment to CDP 1-12-013 from the Commission or an additional CDP from the Commission or from the applicable certified local government shall be required for any repair or maintenance identified as requiring a permit in PRC Section 30610(d) and Title 14 CCR Sections 13252(a)-(b).

6. **Lighting Limitations**. All exterior lighting attached to the authorized structures shall be low-wattage and downcast shielded such that no glare will be directed beyond the bounds of the property.

7. **Construction Responsibilities.** The permittee shall adhere to all the various construction-related best management practices (BMPs) described and listed on project plans dated October 22, 2012 submitted with CDP application 1-12-013 including, but not limited to, the following:

   a. No construction materials, debris, or waste shall be placed or stored where it may be subject to entering coastal waters or environmentally sensitive areas;
   b. Any and all debris resulting from construction activities shall be removed from the project site and disposed of properly;
   c. During the course of the project work, all trash shall be properly contained, removed from the work site on a regular basis, and properly disposed of to avoid contamination of habitat during demolition and construction activities;
   d. All on-site stockpiles of construction debris and soil or other earthen materials shall be covered and contained whenever there is a potential for rain to prevent polluted water runoff from the site; and
   e. BMPs shall be used to prevent the entry of polluted stormwater runoff into coastal waters and wetlands during construction and post-construction, including the use of BMPs to capture and clean up any accidental releases of oil, grease, fuels, lubricants, or other hazardous materials. In addition, relevant BMPs as detailed in the current California Storm Water Quality Best Management Handbooks (http://www.cabmphandbooks.com) shall be used including, but not limited to, construction BMPs for the use of silt fencing and protection of storm drain inlets and post-construction BMPs for site design and landscape planning, roof runoff controls, alternative building materials, vegetated buffer strips, and bioretention.

8. **Tree Removal Restrictions.** Authorized tree removal is prohibited during the bird breeding/nesting season period of April 1 through August 31.

9. **Revegetation Standards and Restrictions.**
   a. Only native plant species shall be planted on the property. All proposed plantings and erosion-control seeding shall be obtained from local genetic stocks within Humboldt County. If documentation is provided to the Executive Director that demonstrates that native vegetation from local genetic stock is not available, native vegetation obtained from genetic stock outside of the local area may be used. No plant species listed as problematic and/or invasive by the California Native Plant Society, the California Invasive Plant Council, or as may be identified from time to time by the State of California, shall be employed or allowed to naturalize or persist on the site. No plant species listed as a "noxious weed" by the State of California or the federal government shall be utilized within the property; and
   b. Rodenticides containing any anticoagulant compounds, including but not limited to, Bromadiolone, Brodifacoum, or Diphacinone, shall not be used on the property.

10. **Protection of Archaeological Resources.**
   a. PRIOR TO ISSUANCE OF THIS COASTAL DEVELOPMENT PERMIT, the applicant shall provide to the Executive Director evidence that the applicant has coordinated with the Tribal Historic Preservation Officer (THPO) for the Yurok Tribe to arrange for a cultural resources monitor to be present on the project site during, at a minimum, initial ground disturbing activities.
   b. A cultural resources monitor approved by the Yurok Tribe shall be present to oversee all activities in which there will be ground disturbance, unless evidence has been submitted for the review and approval of the Executive Director that the THPO has agreed that a cultural resources monitor need not be present to oversee all ground-disturbing activities.
   c. If an area of historic or prehistoric cultural resources or human remains are discovered during the course of the project, all construction shall cease and shall not recommence except as provided in subsection (d) hereof, and a qualified cultural resource specialist shall analyze the significance of the find.
   d. A permittee seeking to recommence construction following discovery of the cultural deposits shall submit an archaeological plan for the review and approval of the Executive Director, prepared in consultation with the THPO of the Yurok Tribe.
      i. If the Executive Director approves the Archaeological Plan and determines that the Archaeological Plan's recommended changes to the proposed development or mitigation measures are *de minimis* in nature and scope, construction may recommence after this determination is made by the Executive Director.
      ii. If the Executive Director approves the Archaeological Plan but determines that the changes therein are not *de minimis*, construction may not recommence until after an amendment to this permit is approved by the Commission.

IV. FINDINGS AND DECLARATIONS

The Commission hereby finds and declares as follows:

A. PROJECT DESCRIPTION

The applicants propose to (1) develop a new 1,456-sq-ft., 3-bedroom, one-story (maximum 16-ft-high) single-family residence, attached 528-sq-ft. 2-car garage, 168-sq-ft. covered patio, paved driveway with two off-street parking spaces, on-site sewage disposal system, and 2,500-gallon water storage tank for fire abatement; and (2) remove approximately nine conifer (mostly nonnative Monterey pine) trees. Project plans are attached as **Exhibit 4**.

B. BACKGROUND AND ENVIRONMENTAL SETTING

The subject property is located at 396 Roundhouse Creek Road (APN 517-251-06) in the Big Lagoon area of northern Humboldt County (**Exhibits 1-2**). The approximately 0.3-acre lot slopes gently to the north with an average gradient of less than 4 percent. The property is part of the Big Lagoon subdivision, which is located on an uplifted marine terrace at an elevation of approximately 125 feet above mean sea level (**Exhibit 3**).

The proposed new development would be located a minimum of 186 feet back from the existing bluff edge (**Exhibit 4**). Although the subject site is located on the west side of Roundhouse Creek Road, it is not the westernmost lot. There are several developed properties with existing single-family residences located between this property and the bluff edge.

The Big Lagoon subdivision has been subject to extraordinary rates of bluff retreat in the past. In the winter of 1997-1998, lots within the subdivision about 1,000 feet north of the subject site experienced catastrophic bluff failure where more than 60 feet of steep bluff retreated during the singular stormy winter. As a result, in 1999, the owners of a nearby home located at 176 Roundhouse Creek Road, which had originally been constructed approximately 50 feet from the bluff edge, as approved by the Commission under CDP 1-87-230 in 1989, applied for a CDP to move the approved house from the original building footprint to a separate inland parcel due to the imminent threat of bluff failure. The Executive Director issued a CDP waiver (1-99-066-W) to authorize the house relocation in September of 1999. In addition, in the spring of 2003, the Executive Director approved emergency permit 1-03-027-G to relocate an existing residence (constructed in 1974 under CDP NCR-74-CC-344) located approximately 600 feet north of the subject site and 50 feet from the bluff edge inland to a new foundation approximately 160 feet from the bluff edge (at 294 Roundhouse Creek Rd.) (**Exhibit 3**). The Commission approved the follow-up CDP for the relocation of this nearby house in December of 2003 under CDP 1-03-024.

The subject undeveloped lot is vegetated with several large conifer trees (mostly nonnative Monterey pine trees, with some smaller Sitka spruce trees). As a result, virtually no views to the ocean currently are available from the Roundhouse Creek Road or other public vantage points in this particular area.

Based on a query of the California Natural Diversity Database and an investigation of the property by Commission staff, there are no wetlands or other known environmentally sensitive

habitat areas located on or immediately adjacent to the property. However, it is possible that the existing mature conifer trees on the property support seasonal breeding and nesting habitat for birds protected under the state Fish and Game Code and federal Migratory Bird Treaty Act.

There is no evidence of public use of the property for public access, no evidence of trails on the property, and no indication from the public that the site has been used for public access purposes in the past. The potential for public access to nearby beach and shoreline areas include an informal trail to Patricks Point State Park located about 1,000 feet south at the end of Roundhouse Creek Road and informal access to the State Park beach approximately a half mile to the north, near the bluff failure area at the north end of Ocean View Drive. In addition, Big Lagoon County Park is located less than a mile north of the property.

Although Humboldt County has a certified local coastal program (LCP), the property is located in a non-certified area that includes all of the lots in the Big Lagoon subdivision that are locally planned and zoned for residential use and located on the west side of Roundhouse Creek Road and Ocean View Drive. As a consequence, the Commission retains CDP jurisdiction over the site, and the standard of review for issuance of a CDP is whether the development is consistent with the Chapter 3 policies of the Coastal Act.

C. OTHER AGENCY APPROVALS

Humboldt County

The proposed project requires a special permit from Humboldt County for the design review and major vegetation removal aspects of the proposed project. The County approved SP-12-007 on October 11, 2012.

D. LOCATING AND PLANNING NEW DEVELOPMENT

Section 30250(a) of the Coastal Act states that new development shall be located within or near existing developed areas able to accommodate it or in other areas with adequate public services and where it will not have significant adverse effects, either individually or cumulatively, on coastal resources. The intent of this policy is to channel development toward more urbanized areas where services are provided and potential impacts to resources are minimized.

The subject property, which is undeveloped, is surrounded on all sides by developed rural residential lots. The property is locally planned and zoned as “Residential Single-Family with No Further Subdivision Allowed” and a “Design Review” combining zone. The CDP application does not include a subdivision proposal, and the proposed new single-family residence is a principally permitted use consistent with the parcel’s local zoning designation.

The County Division of Environmental Health (DEH) has indicated that the proposed on-site sewage disposal system (prepared by Pacific Watershed Associates, dated May 25, 2012) is acceptable as proposed to serve the proposed three-bedroom dwelling, and the DEH will oversee construction/installation of the new system under permits issued through the County Building Division. In addition, the proposed new residence will be connected to the public water system managed by the Big Lagoon Community Services District. Thus, there are adequate sewage and water systems to serve the proposed development.

Although the subject site is located in a geologically hazardous area, as discussed in Finding IV.E below, the development has been conditioned to minimize geologic hazards, assure stability, and avoid erosion and landform alteration consistent with the requirements of Section 30253 of the Coastal Act. Furthermore, as discussed in Findings IV.F, G, and H below, the project has been conditioned to protect visual resources, water quality, environmentally sensitive nesting bird habitat, and archaeological resources.

Therefore, the Commission finds that as conditioned, the proposed development is consistent with Coastal Act Section 30250(a), in that it is located in a developed area, has adequate water and sewer capability to accommodate it, and will not cause significant adverse effects, either individually or cumulatively, to coastal resources.

E. GEOLOGIC HAZARDS

Section 30253 of the Coastal Act states, in applicable part, as follows:

> *New development shall do all of the following:*
>
> *(a) Minimize risks to life and property in areas of high geologic, flood, and fire hazard.*
>
> *(b) Assure stability and structural integrity, and neither create nor contribute significantly to erosion, geologic instability, or destruction of the site or surrounding area or in any way require the construction of protective devices that would substantially alter natural landforms along bluffs and cliffs…*

As discussed above in Finding IV-B, the ~0.3-acre property is located in the Big Lagoon subdivision on the west side of Roundhouse Creek Road on an uplifted marine terrace about 125 feet above mean sea level. The marine terrace is at least a half-mile long, as measured from its bifurcation with a gulch approximately 500 feet south of the subject site to its north end near the end of Oceanview Drive, where episodes of catastrophic bluff failure have occurred in the past (as discussed above).

The geologic report describes the terrace and surrounding beach area as follows:

> *"The beach profile from Agate Beach to Big Lagoon is characterized by a steep beach face and relatively shallow sloping berm that comprises the backshore environment. The steeply sloping beach face is a reflection of the coarse particle size being transported and deposited within the swash zone and along the beach face. A longshore bar does not appear to be present as a result of the coarse particle size. The entire beach system can be morphologically classified as a "reflective" beach due to its steep, linear beach faces, and well-developed beach cusps and berm. As is typical of reflective beaches, the entire beach system from Agate Beach to Big Lagoon experiences surging breakers and high wave run-up. The lack of a longshore bar allows wave energy to be delivered directly to the beach face unimpeded, resulting in an erosive coastline that has experienced significant coastal retreat."*

The subject property is generally flat, with a slight northward gradient. Although the site is located on the west side of the road, there are several developed lots with existing single-family residences located between the subject property and the bluff edge. The new development proposed would be located at least 186 feet back from the existing bluff edge.

The applicant submitted two geotechnical reports for the project. An R2 soils engineering report prepared by Oswald Geologic (dated June 26, 2012) investigated subsurface soil conditions to determine minimum foundation design specifications in general accordance with County grading ordinance and California Building Code requirements (**Exhibit 5**). The report provides various recommendations for the proposed project related to site preparation, foundation design, and drainage. In addition, LACO Associates completed a geologic investigation for the site (**Exhibit 6**, dated July 30, 2012) to confirm the stability of the bluff west of the proposed building site and to determine the minimum setback distance from the bluff edge needed to ensure the safety of the proposed development from bluff retreat hazards for the development's presumed economic life (i.e., at least 75 years).

The LACO geotechnical report notes in part the following with respect to geologic hazards in the area:

> "*Slope failure events over the last 75 years provide evidence that coastal bluffs within the project area are highly susceptible to both mass wasting and erosion…*"
>
> …
>
> "*…This section of coastal bluff has a higher potential for slope failure, in general, than many areas of Humboldt County due to (among other factors) the over-steepened sea cliff, easily erodible soils, high annual precipitation, and direct exposure to northwest winter swells coupled with a steep beach face. An additional contributing factor is the lack of an offshore bar, which would reduce wave energy prior to reaching the shoreline...*"

Based on the results of the slope stability analysis and bluff retreat rate analysis, the report recommends a minimum bluff edge setback distance of 177 feet. This includes a setback of 73 feet from the most distant slope failure surface measured to ensure the minimum factor of safety (FOS) recommended by the Commission's geologist[1] and a setback of 94 feet to account for the estimated historic bluff retreat rate of 1.25 feet per year (multiplied by the new development's presumed economic life of 75 years), plus an additional buffer of 10 feet to account for uncertainty in the analyses and to ensure a sufficiently safe distance from less stable geologic areas.

The Commission's geologist (Mark Johnsson) reviewed the geotechnical report and agreed with some, but not all, of its conclusions and recommendations. Dr. Johnsson believes that a FOS setback distance of 73 feet without the proposed additional buffer of 10 feet for a total of 83 feet is adequate, because a 73-ft setback distance is large enough to achieve a FOS of 1.5, as recommended[1], accounts for uncertainty in the analysis, and provides a sufficiently safe distance

[1] Based on http://www.coastal.ca.gov/W-11.5-2mm3.pdf.

from less stable geologic areas. Dr. Johnsson believes the report's proposed bluff retreat setback is deficient, because it does not adequately account for the effects of future sea level rise and climate change on bluff stability. Dr. Johnsson notes that the amount of bluff retreat predicted by the LACO report for the next 75 years (94 feet) is a simple extrapolation of the measured historic rate (1.25 feet per year) at the site spanning the past 64 years. This analysis assumes that the bluff will retreat at the same rate over the next 75 years as it has retreated over the past 64 years, which is an unlikely scenario considering rising relative sea level[2] and the fact that the toe of the bluff is especially well exposed to storm waves (as the report notes, as cited above), which may increase in frequency and/or intensity due to future climate change. In the absence of more rigorous forecasting, Dr. Johnsson recommends that the highest historic bluff retreat rate measured along the bluff at or near the site be used as an estimate for future bluff retreat rates. The geotechnical report cites three other sources of historic bluff retreat measured along the bluff near the site, as shown in the following table (from page 8 of the report):

Table 4: Comparison of Bluff Retreat Rate Estimations for Big Lagoon Area

Source	*Distance from site*	*Time Span (years)*	*Estimated Retreat Rate (feet per year)*
Tuttle, 1981	*200 feet North and South*	*34*	*1.5 to 2.7*
Busch, 2003	*300 feet North*	*61*	*1.0*
LACO, 2006	*900 feet North*	*58*	*1.5*
This Study	---	*64*	*1.25*

The very high rate of 2.7 feet per year reported by Tuttle (1981) for a site 200 feet south of the subject site may be an anomaly associated with the gulley that exists near that location. But Tuttle (1981) and LACO (2006) report a rate of 1.5 feet per year for nearby sites (as shown above) on the same uplifted marine terrace. These sites are located within 900 feet of the project site and are similarly situated as bluff top lots above a uniformly eroded linear bluff face. In the opinion of Dr. Johnsson, 1.5 feet per year is a more appropriate rate to use in estimating future bluff retreat than the 1.25 feet used in the applicant's geotechnical report. Using the rate of 1.5 feet per year increases the bluff retreat setback by 18.75 feet over the bluff retreat setback derived using the 1.25 feet per year rate recommended in the geotechnical report. Overall, applying the 1.5 ft. per year rate (1.5 ft/year x 75 years) combined with the 73-ft FOS setback as discussed above results in a total recommended setback of 186 feet from the bluff edge.

As shown in the project plans (**Exhibit 4**), the applicant has revised the project description and plans to site all development a minimum of 186 feet from the bluff edge, as recommended by the geotechnical report and Dr. Johnsson's increased setback recommendation.

The Commission finds that the minimum 186-foot setback from the bluff proposed by the applicant is sufficient to protect the new development from bluff retreat hazards over its expected economic life. Adherence to this requirement, as well as the foundation design and other recommendations determined to be necessary by the Oswald Geologic site investigation, is required by **Special Condition 1**, which requires that prior to permit issuance, a geotechnical engineer shall approve all final site preparation, foundation design, and drainage plans and the

[2] See https://download.nap.edu/catalog.php?record_id=13389.

minimum bluff edge setback (at least 186 feet) plot plan. The Commission finds that only as conditioned to ensure that the mitigation measures are properly incorporated into the development can the project be found consistent with Section 30253 of the Coastal Act.

Although a comprehensive geotechnical evaluation is a necessary and useful tool that the Commission relies on to determine if proposed development is permissible at all on any given bluff top site, the Commission finds that a geotechnical evaluation alone is not a guarantee that a development will be safe from bluff retreat. It has been the experience of the Commission that in some instances, even when a thorough professional geotechnical analysis of a site has concluded that a proposed development will be safe from bluff retreat hazards, episodes of unexpected bluff retreat prompting the relocations of residences back from bluff failure areas sometimes still do occur. Examples include, but are not limited to, the following:

- The Kavich Home at 176 Roundhouse Creek Road in the Big Lagoon Area north of Trinidad (Humboldt County). As discussed above (in Finding IV-B), in 1989, the Commission approved the construction of a new house on a vacant bluff top parcel (Permit 1-87-230). Based on the geotechnical report prepared for the project it was estimated that bluff retreat would jeopardize the approved structure in about 40 to 50 years. In 1999 the owners applied for a coastal development permit to move the approved house from the bluff top parcel to a landward parcel because the house was threatened by 40 to 60 feet of unexpected bluff retreat that occurred during a 1998 El Niño storm event. The Executive Director issued a waiver of coastal development permit (1-99-066-W) to authorize moving the house in September of 1999.

- The Denver/Canter home at 164/172 Neptune Avenue in Encinitas (San Diego County). In 1984, the Commission approved construction of a new house on a vacant bluff top lot (Permit 6-84-461) based on a positive geotechnical report. In 1993, the owners applied for a seawall to protect the home (Permit Application 6-93-135). The Commission denied the request. In 1996 (Permit Application 6-96-138), and again in 1997 (Permit Application 6-97-90) the owners again applied for a seawall to protect the home. The Commission denied the requests. In 1998, the owners again requested a seawall (Permit Application 6-98-39) and submitted a geotechnical report that documented the extent of the threat to the home. The Commission approved the request on November 5, 1998.

- The Arnold project at 3820 Vista Blanca in San Clemente (Orange County). Coastal development permit (Permit 5-88-177) for a bluff top project required protection from bluff top erosion, despite geotechnical information submitted with the permit application that suggested no such protection would be required if the project conformed to 25-foot bluff top setback. An emergency coastal development permit (Permit 5-93-254-G) was later issued to authorize bluff top protective works.

The Commission notes that the examples above are not intended to be absolute indicators of bluff erosion on the subject parcel, as coastal geology can vary significantly from location to location. However, these examples do illustrate that site-specific geotechnical evaluations cannot always accurately account for the spatial and temporal variability associated with coastal processes and therefore cannot always absolutely predict bluff erosion rates. Collectively, these

examples have helped the Commission form its opinion on the vagaries of geotechnical evaluations with regard to predicting bluff erosion rates. Geologic hazards are episodic, and bluffs that may seem stable now may not be so in the future. Although the project has been evaluated and designed in a manner to minimize the risk of geologic hazards, and although the Commission is requiring with **Special Condition 1** that the applicant adhere to all recommended specifications (including recommended setbacks) to minimize potential geologic hazards, some risk of geologic hazard still remains. This risk is reflected in the R2 soils engineering report, which references certain "limitations" of the analysis, such as: "*…I recognize that the site is in a dynamically active area and conditions can and will change…*" This language in the report itself is indicative of the underlying uncertainties of this and any geotechnical evaluation and supports the notion that no guarantees can be made regarding the safety of the proposed development with respect to bluff retreat. Geologic hazards are episodic, and bluffs that may seem stable now may not be so in the future.

The Commission finds that the subject lot is an inherently hazardous piece of property, that the coastal bluff near the property is highly unstable and erosive, and that the proposed new development could be subject to geologic hazards and potentially someday require a bluff protective device, inconsistent with Section 30253 of the Coastal Act.

The proposed development could not be approved as being consistent with Section 30253 of the Coastal Act if projected bluff retreat would affect the proposed development and necessitate construction of a seawall to protect it. The Commission finds that the risks of geologic hazard will be minimized if development is sited and designed according to the setback and construction recommendations and conditions of this permit. However, given that the risks cannot be completely eliminated and the geologic report cannot assure that shoreline protection will never be needed to protect the proposed new home, the Commission finds that the proposed development is consistent with the Coastal Act only if it is conditioned to provide that shoreline protection will not be constructed.

Therefore, the Commission further finds that due to the inherently hazardous nature of this property, the fact that no geology report can conclude with certainty that a geologic hazard does not exist, the fact that the approved development and its maintenance may cause future problems that were not anticipated, and because new development shall not engender the need for shoreline protective devices, it is necessary to attach **Special Condition 2**. This condition prohibits the construction of shoreline protective devices on the parcel, requires that the landowners provide a geotechnical investigation and remove the authorized structure and its foundation if bluff retreat reaches the point where the structure is threatened, and requires that the landowners accept sole responsibility for the removal of any structural debris resulting from landslides, slope failures, or erosion of the site. These requirements are necessary for consistency with Section 30253 of the Coastal Act, which states in part that new development shall minimize risk to life and property in areas of high geologic hazard, assure structural integrity and stability, and neither create nor contribute significantly to erosion, geologic instability, or destruction of the site or surrounding areas, nor in any way require the construction of protective devices that would substantially alter natural landforms along bluffs and cliffs.

The Commission also attaches **Special Condition 3**, which requires the landowners to assume the risks of extraordinary erosion and geologic hazards of the property and waive any claim of liability on the part of the Commission. Given that the applicants have chosen to implement the project despite these risks, the applicants must assume the risks. In this way, the applicants are notified that the Commission is not liable for damage as a result of approving the permit for development. The condition also requires the applicants to indemnify the Commission in the event that third parties bring an action against the Commission as a result of the failure of the development to withstand hazards.

Furthermore, **Special Condition 4** requires the applicants to record a deed restriction to impose the special conditions of the permit as covenants, conditions and restrictions on the use and enjoyment of the property. This special condition is required, in part, to ensure that the development is consistent with the Coastal Act and to provide notice of potential hazards of the property and help eliminate false expectations on the part of potential buyers of the property, lending institutions, and insurance agencies that the property is safe for an indefinite period of time and for further development indefinitely into the future, or that a protective device could be constructed to protect the approved development and will ensure that future owners of the property will be informed of the Commission's immunity from liability and the indemnity afforded the Commission.

As noted above, some risks of an unforeseen natural disaster, such as an unexpected landslide, catastrophic bluff failure, significant erosion, etc., could result in destruction or partial destruction of the new single-family residence or other development approved by the Commission. In addition, the development itself and its maintenance may cause future problems that were not anticipated. When such an event takes place, public funds are often sought for the clean-up of structural debris that winds up on the beach or on an adjacent property. As a precaution, in case such an unexpected event occurs on the subject property, **Special Condition 2**, described above, also requires the landowners to accept sole responsibility for the removal of any structural debris resulting from landslides, bluff failures, or erosion on the site and agree to remove the authorized development should the bluff retreat reach the point where a government agency has ordered that these facilities not be used.

Thus, the Commission finds that as conditioned, the proposed development will not contribute significantly to the creation of any geologic hazards and will not have adverse impacts on slope stability or cause erosion. The Commission also notes that Section 30610(a) of the Coastal Act exempts certain additions to existing single-family residential structures from coastal development permit requirements. Pursuant to this exemption, once a house has been constructed, certain additions and accessory buildings that the applicant might propose in the future are normally exempt from the need for a permit or permit amendment. Depending on its nature, extent, and location, such an addition or accessory structure could contribute to geologic hazards at the site. For example, installing a landscape irrigation system on the property in a manner that leads to saturation of the bluff could increase the potential for landslides or catastrophic bluff failure. Another example would be installing a sizable accessory structure for additional parking, storage, or other uses normally associated with a single family home in a manner that does not provide for the recommended setback from the bluff edge.

Accordingly, Section 30610(a) requires the Commission to specify by regulation those classes of development which involve a risk of adverse environmental effects and require that a permit be obtained for such improvements. Pursuant to Section 30610(a) of the Coastal Act, the Commission adopted Section 13250 of Title 14 of the California Code of Regulations (CCR). Section 13250(b)(6) specifically authorizes the Commission to require a permit for additions to existing single-family residences that could involve a risk of adverse environmental effect by indicating in the development permit issued for the original structure that any future improvements would require a development permit. As noted above, certain additions or improvements to the approved structure could involve a risk of creating geologic hazards at the site. Therefore, pursuant to Section 13250 (b)(6) of Title 14 of the CCR, the Commission attaches **Special Condition 5**, which requires that all future development on the subject parcel that might otherwise be exempt from coastal permit requirements requires an amendment or coastal development permit. This condition will allow future development to be reviewed by the Commission to ensure that future improvements will not be sited or designed in a manner that would result in a geologic hazard. As previously discussed, **Special Condition 4** also requires that the applicants record and execute a deed restriction approved by the Executive Director against the property that imposes the special conditions of this permit as covenants, conditions and restrictions on the use and enjoyment of the property. Special Condition 4 will also help assure that future owners are aware of these CDP requirements applicable to all future development.

The Commission thus finds that the proposed development, as conditioned to include Special Conditions 1 through 5, is consistent Section 30253 of the Coastal Act, because the development as conditioned (1) will not contribute significantly to the creation of any geologic hazards, (2) will not have adverse impacts on the stability of the coastal bluff or on erosion, and (3) will not require the construction of shoreline protective works. Only as conditioned is the proposed development consistent with the Coastal Act.

F. VISUAL RESOURCES

Section 30251 of the Coastal Act states, in applicable part, as follows:

> *The scenic and visual qualities of coastal areas shall be considered and protected as a resource of public importance. Permitted development shall be sited and designed to protect views to and along the ocean and scenic coastal areas, to minimize the alteration of natural land forms, to be visually compatible with the character of surrounding areas, and, where feasible, to restore and enhance visual quality in visually degraded areas…*

As previously mentioned, the property is undeveloped and currently vegetated with approximately 15 large conifer trees and herbaceous ground cover. A narrow blue-water view of the ocean is afforded through the subject property and properties to the west from Roundhouse Creek Road to the northwest. Otherwise, views of the ocean are blocked by vegetation and houses to the west of the subject site. The existing view to the ocean afforded through the site may be slightly enhanced by the proposed project, which includes the removal of approximately nine mature conifer trees (and the retention of at least seven mature conifer trees on site). Thus,

the proposed new development will be sited and designed to protect views to and along the ocean and scenic coastal areas.

In addition, the property is more or less flat, and the project proposes no grading. Therefore, the development as proposed minimizes the alteration of natural land forms.

Moreover, the proposed development was reviewed and approved as proposed by the Big Lagoon Design Review Committee in a public hearing held on June 30, 2012. The Committee found the proposed single-story, maximum 16-ft-high development, as proposed, to be visually compatible with the character of the surrounding area. The surrounding area is characterized by developed residential lots with homes similar in scale, materials, and building design to the proposed contemporary-style home, which proposes to use architectural stone and hardi-plank shingle siding.

Although the surrounding neighborhood is mostly developed with existing homes, the overall nighttime character of the area has relatively minimal exterior lighting evident. Accordingly, to prevent the cumulative impacts of glare to the visual resources of the area, the Commission attaches **Special Condition 6**, which requires that all exterior lighting associated with the proposed development be low-wattage and downcast shielded such that no glare is directed beyond the bounds of the property.

Therefore, the Commission finds that the proposed project, as conditioned, will protect public views to the ocean, minimize the alteration of natural land forms, and be visually compatible with the character of surrounding area, consistent with Section 30251 of the Coastal Act.

G. PROTECTION OF WATER QUALITY

Section 30230 of the Coastal Act states as follows:

> *Marine resources shall be maintained, enhanced, and where feasible, restored. Special protection shall be given to areas and species of special biological or economic significance. Uses of the marine environment shall be carried out in a manner that will sustain the biological productivity of coastal waters and that will maintain healthy populations of all species of marine organisms adequate for long-term commercial, recreational, scientific, and educational purposes.*

Section 30231 of the Coastal Act states as follows:

> *The biological productivity and the quality of coastal waters, streams, wetlands, estuaries, and lakes appropriate to maintain optimum populations of marine organisms and for the protection of human health shall be maintained and, where feasible, restored through, among other means, minimizing adverse effects of waste water discharges and entrainment, controlling runoff, preventing depletion of ground water supplies and substantial interference with surface water flow, encouraging waste water reclamation, maintaining natural vegetation buffer areas that protect riparian habitats, and minimizing alteration of natural streams.*

As cited above, Coastal Act Sections 30230 and 30231 require, in part, that marine resources and coastal wetlands and waters be maintained, enhanced, and where feasible restored. These policies specifically call for the maintenance of the biological productivity and quality of marine resources, coastal waters, streams, wetlands, and estuaries necessary to maintain optimum populations of all species of marine organisms and for the protection of human health.

As described in notes on the project plans dated October 22, 2012 (**Exhibit 4**), the applicants have proposed to require that the contractor for the proposed development implement various water quality protection measures and best management practices (BMPs) during construction. These include instituting an on-site spill prevention and control response program consisting of BMPs to capture and clean up any accidental releases of oil, grease, fuels, lubricants, or other hazardous materials. The applicants also have proposed the use of BMPs as detailed in the current California Storm Water Quality Best Management Handbooks (http://www.cabmphandbooks.com), including, but not limited to, BMPs for site design and landscape planning, roof runoff controls, alternative building materials, vegetated buffer strips, and bioretention. Furthermore, various BMPs will be used for construction work that occurs during the rainy season, including the use of silt fencing, protecting storm drain inlets, applying mulch and/or temporary seeding to bare soil areas, and various other measures.

To ensure that the project implements the measures proposed and minimizes potential impacts to water quality associated with stormwater runoff and construction practices, the Commission attaches **Special Condition 7**. This condition requires that various construction-related responsibilities are adhered to during the course of the proposed construction work, including those described above and on the October 22, 2012 plans submitted by with CDP application 1-12-013. Thus, as conditioned, the Commission finds that the proposed project will maintain and enhance the functional capacity of the habitat, maintain and restore optimum populations of marine organisms, and protect human health as mandated by the requirements of Sections 30230 and 30231 of the Coastal Act.

H. PROTECTION OF ENVIRONMENTALLY SENSITIVE HABITAT AREAS

Section 30240 of the Coastal Act states as follows:

> *(a) Environmentally sensitive habitat areas shall be protected against any significant disruption of habitat values, and only uses dependent on such resources shall be allowed within such areas.*
>
> *(b) Development in areas adjacent to environmentally sensitive habitat areas and parks and recreation areas shall be sited and designed to prevent impacts which would significantly degrade such areas, and shall be compatible with the continuance of such habitat areas.*

Section 30107.5 of the Coastal Act defines "environmentally sensitive area" as:

> *"…any area in which plant or animal life or their habitats are either rare or especially valuable because of their special nature or role in an ecosystem and which could be easily disturbed or degraded by human activities and developments."*

As discussed above in Finding IV-B, there are no wetlands or other known environmentally sensitive habitat areas located on or immediately adjacent to the property. However, it is possible that the existing mature conifer trees on the property support seasonal breeding and nesting habitat for birds protected under the state Fish and Game Code and federal Migratory Bird Treaty Act. According to the *Atlas of the Breeding Birds of Humboldt County, California,*[3] up to 60 species of birds breed in the terrestrial habitats of the Big Lagoon area.

The project proposes to remove a total of nine trees (mostly nonnative Monterey pines). Tree removal during the bird nesting season (typically April 1 through August 31) could adversely affect sensitive nesting birds such as raptors and various species of migratory birds protected under state and/or federal regulations. To ensure that the proposed tree removal work does not result in significant disruption or degradation of occupied nesting habitat consistent with the requirements of Section 30240 of the Coastal Act, the Commission attaches **Special Condition 8**. This condition restricts the timing of tree removal work to ensure avoidance of any sensitive nesting habitat that may be present during bird breeding and nesting seasons.

In addition, **Special Condition 9** requires that only native and/or non-invasive plant species be planted and used in erosion-control seeding on the subject property. The Commission finds that the adjacent park and recreation area, which contains wetlands and other environmentally sensitive habitats, could be adversely affected if nonnative, invasive plant species were introduced in landscaping or erosion control seeding at the subject site. If any of the proposed landscaping or seeding were to include introduced invasive exotic plant species, the weedy plants could colonize (e.g., via wind or wildlife dispersal) the nearby park and recreation area over time, displace native vegetation, and significantly degrade the recreation area and the functions and values of its natural habitats. Special Condition 9 also includes a provision prohibiting the use of certain anticoagulant-based rodenticides that are known to pose significant primary and secondary risks to non-target wildlife present in urban and urban/wildland interface areas. As property owners sometimes use such pesticides to prevent wild critters from grazing on landscaping and other vegetation, and as these target species commonly are preyed upon by raptors or other environmentally sensitive predators and scavengers, the pest control compounds can bio-accumulate in the animals that have consumed the rodents to concentrations toxic to the ingesting non-target species. Thus, Special Condition 9-b is intended to avoid this potential cumulative impact to environmentally sensitive wildlife species.

The Commission thus finds that as conditioned, the project will not result in significant disruption or degradation of ESHA consistent with Section 30240 of the Coastal Act.

I. PROTECTION OF ARCHAEOLOGICAL RESOURCES

Section 30244 of the Coastal Act states as follows:

> *Where development would adversely impact archeological or paleontological resources as identified by the State Historic Preservation Officer, reasonable mitigation measures shall be required.*

[3] Hunter, J.E. et al. 2005. *Atlas of the Breeding Birds of Humboldt County, California.* Redwood Region Audubon Society. Eureka, CA.

The project site is located within the ancestral lands of the Yurok Tribe. In its processing of the required special permit for the proposed project, Humboldt County referred the project to the Yurok Tribe. A representative from the Yurok Tribe visited the property, completed an initial ground survey, and recommended that a tribal cultural monitor be present during initial ground disturbance. Thus, the County's special permit includes Condition of Approval #9, which requires that the applicant retain the services of a Yurok tribal monitor to be present during initial ground disturbing activities to review the soils and determine whether or not there is the potential for artifacts to be present. The condition further states that "*If concealed or previously unknown archaeological remains are discovered during project implementation, all necessary steps will be taken to protect them in accordance with the Yurok Tribe's Standard Operating Procedures for Inadvertent Discoveries of Archaeological Remains*."

Accordingly, to ensure protection of any archaeological resources that may be discovered at the site during excavation for the proposed new residence consistent with Section 30244, the Commission is also requiring in **Special Condition 10** that the applicant coordinate with the Yurok Tribe to arrange for a cultural resources monitor to be present on the project site during initial ground-disturbing activities. If an area of archaeological deposits is discovered during the course of the authorized development, all construction must cease, and a qualified archaeologist must analyze the significance of the find. To recommence construction following discovery of cultural deposits, the applicant is required to submit a supplementary archaeological plan for the review and approval of the Executive Director, prepared in consultation with the Yurok Tribe, to determine whether the changes are *de minimis* in nature and scope, or whether an amendment to this permit is required.

Thus, the Commission finds that the proposed development, as conditioned, is consistent with Coastal Act Section 30244, as the development will include mitigation measures to ensure that the development will not adversely impact archaeological resources.

J. PUBLIC ACCESS

Coastal Act Sections 30210, 30211, and 30212 require the provision of maximum public access opportunities, with limited exceptions. Coastal Act Section 30210 requires in applicable part that maximum public access and recreational opportunities be provided when consistent with public safety, private property rights, and natural resource protection. Section 30211 requires in applicable part that development not interfere with the public's right of access to the sea where acquired through use (i.e., potential prescriptive rights or rights of implied dedication). Section 30212 requires in applicable part that public access from the nearest public roadway to the shoreline and along the coast be provided in new development projects, except in certain instances, such as when adequate access exists nearby or when the provision of public access would be inconsistent with public safety. In applying Sections 30211 and 30212, the Commission is limited by the need to show that any denial of a permit application based on these sections or any decision to grant a permit subject to special conditions requiring public access is necessary to avoid or offset a project's adverse impact on existing or potential public access.

The potential for public access to nearby beach and shoreline areas include an informal trail to Agate Beach, in Patricks Point State Park, located about 1,000 feet south off of the end of

Roundhouse Creek Road and informal access to the State Park beach approximately a half mile to the north, near the bluff failure area at the north end of Ocean View Drive. In addition, Big Lagoon County Park, which includes beach access, boating access to the lagoon, and a campground, is located less than a mile north of the property.

There is no evidence of public use of the property for public access, no evidence of trails on the property, and no indication from the public that the site has been used for public access purposes in the past. As previously described, the subject lot is situated on a bluff-top parcel with existing single family residences located between the property and the steep, over 100-ft-high bluff face. The proposed development will not significantly and adversely increase the demand for public access to the shoreline, as it involves developing an existing single family residential lot. For all of these reasons, the Commission finds that the proposed project, which does not include provision of public access, is consistent with the public access policies of the Coastal Act.

K. LOCAL COASTAL PROGRAM

Section 30604(a) of the Coastal Act states as follows:

> *(a) Prior to certification of the Local Coastal Program, a coastal development permit shall be issued if the issuing agency, or the commission on appeal, finds that the proposed development is in conformity with the provisions of Chapter 3 (commencing with Section 30200) of this division and that the permitted development will not prejudice the ability of the local government to prepare a Local Coastal Program that is in conformity with the provisions of Chapter 3 (commencing with Section 30200). A denial of a coastal development permit on grounds it would prejudice the ability of the local government to prepare a Local Coastal Program that is in conformity with the provisions of Chapter 3 (commencing with Section 30200) shall be accompanied by a specific finding which sets forth the basis for such conclusion.*

This section of the Act provides that the Commission shall issue a CDP only if the project will not prejudice the ability of the local government having jurisdiction to prepare an LCP that conforms with the Chapter 3 policies of the Coastal Act.

The area that includes the subject site and all of the lots in the Big Lagoon subdivision that are locally planned and zoned for residential use and located on the west side of Roundhouse Creek Road and Ocean View Drive lacks a certified LCP. As conditioned, the proposed development will be consistent with Chapter 3 of the Coastal Act, and approval of the project will not prejudice the ability of Humboldt County to prepare a LCP for this area that is in conformity with the provisions of Chapter 3 of the Coastal Act.

L. CALIFORNIA ENVIRONMENTAL QUALITY ACT (CEQA)

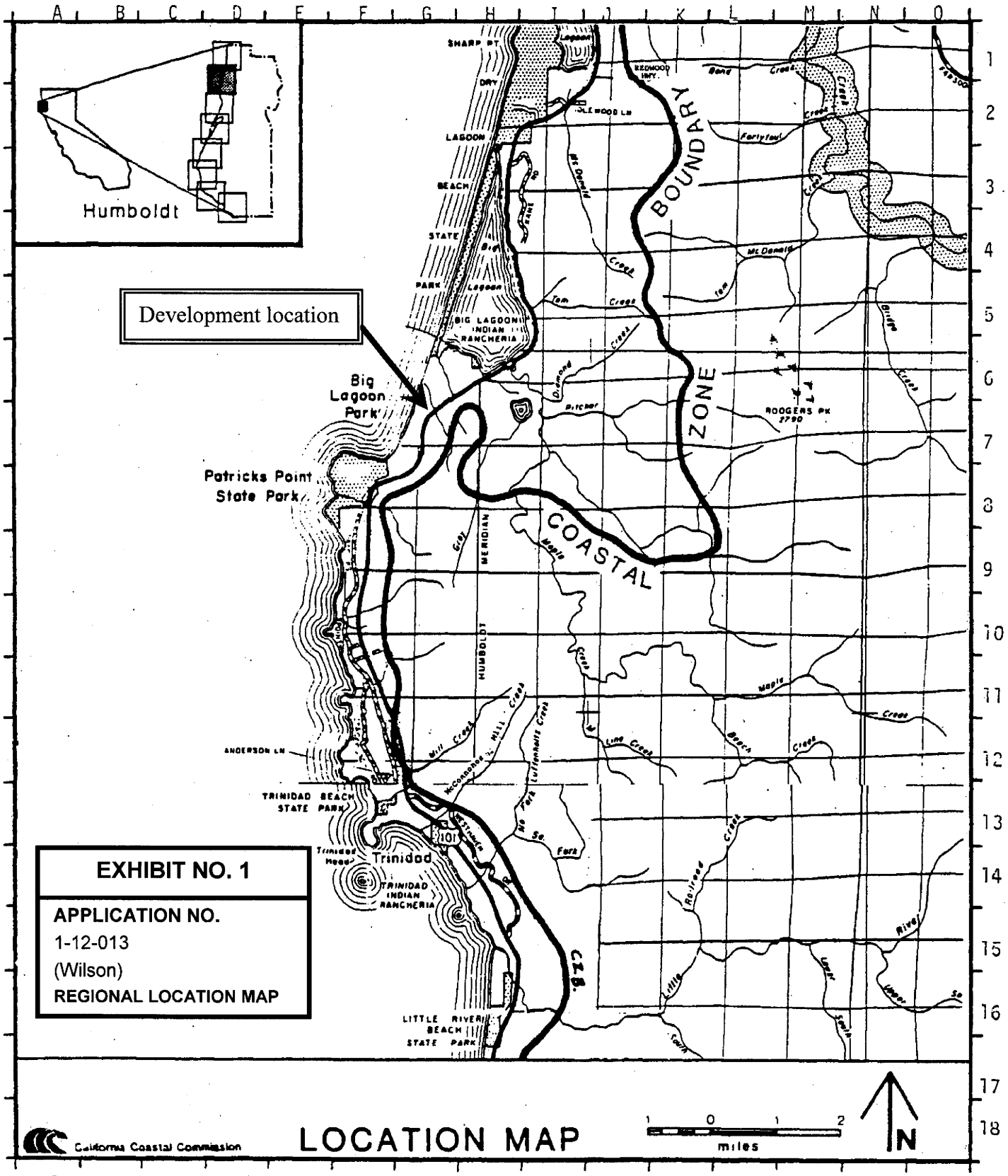
Humboldt County served as the lead agency for the project for CEQA purposes. The County determined that the project qualified for a CEQA categorical exemption under Class 3, Section 15303(a) of CEQA Guidelines.

Section 13906 of the Commission's administrative regulation requires Coastal Commission approval of coastal development permit applications to be supported by a finding showing the application, as modified by any conditions of approval, is consistent with any applicable requirements of the California Environmental Quality Act (CEQA). Section 21080.5(d)(2)(A) of CEQA prohibits a proposed development from being approved if there are any feasible alternatives or feasible mitigation measures available, which would substantially lessen any significant adverse effect the proposed development may have on the environment.

The Commission incorporates its findings on Coastal Act consistency at this point as if set forth in full. As discussed above, the proposed project has been conditioned to be consistent with the policies of the Coastal Act. The findings address and respond to all public comments regarding potential significant adverse environmental effects of the project that were received prior to preparation of the staff report. As specifically discussed in these above findings, which are hereby incorporated by reference, mitigation measures that will minimize or avoid all significant adverse environmental impacts have been required. As conditioned, there are no other feasible alternatives or feasible mitigation measures available which would substantially lessen any significant adverse impacts which the activity may have on the environment. Therefore, the Commission finds that the proposed project, as conditioned to mitigate the identified impacts, can be found consistent with the requirements of the Coastal Act to conform to CEQA.

APPENDIX A: SUBSTANTIVE FILE DOCUMENTS

- Application File for CDP 1-12-013, received 4/3/12
- Slope Setback Recommendation Report, LACO Associates, dated 7/30/12
- R2 Soils Engineering Report, Oswald Geologic, dated 6/26/12
- Onsite Wastewater Treatment Evaluation Report, Pacific Watershed Assoc., dated 5/25/12
- CDP File 1-87-230
- CDP File NCR-74-CC-344
- CDP File 1-03-024
- CDP File 1-99-066-W
- CDP File 6-84-461
- CDP File 6-93-138
- CDP File 6-97-090
- CDP File 6-98-039
- CDP File 5-88-177
- CDP File 5-93-254-G
- Humboldt County Special Permit 12-007 approved on 10/11/12
- County of Humboldt Local Coastal Program



County of Humboldt

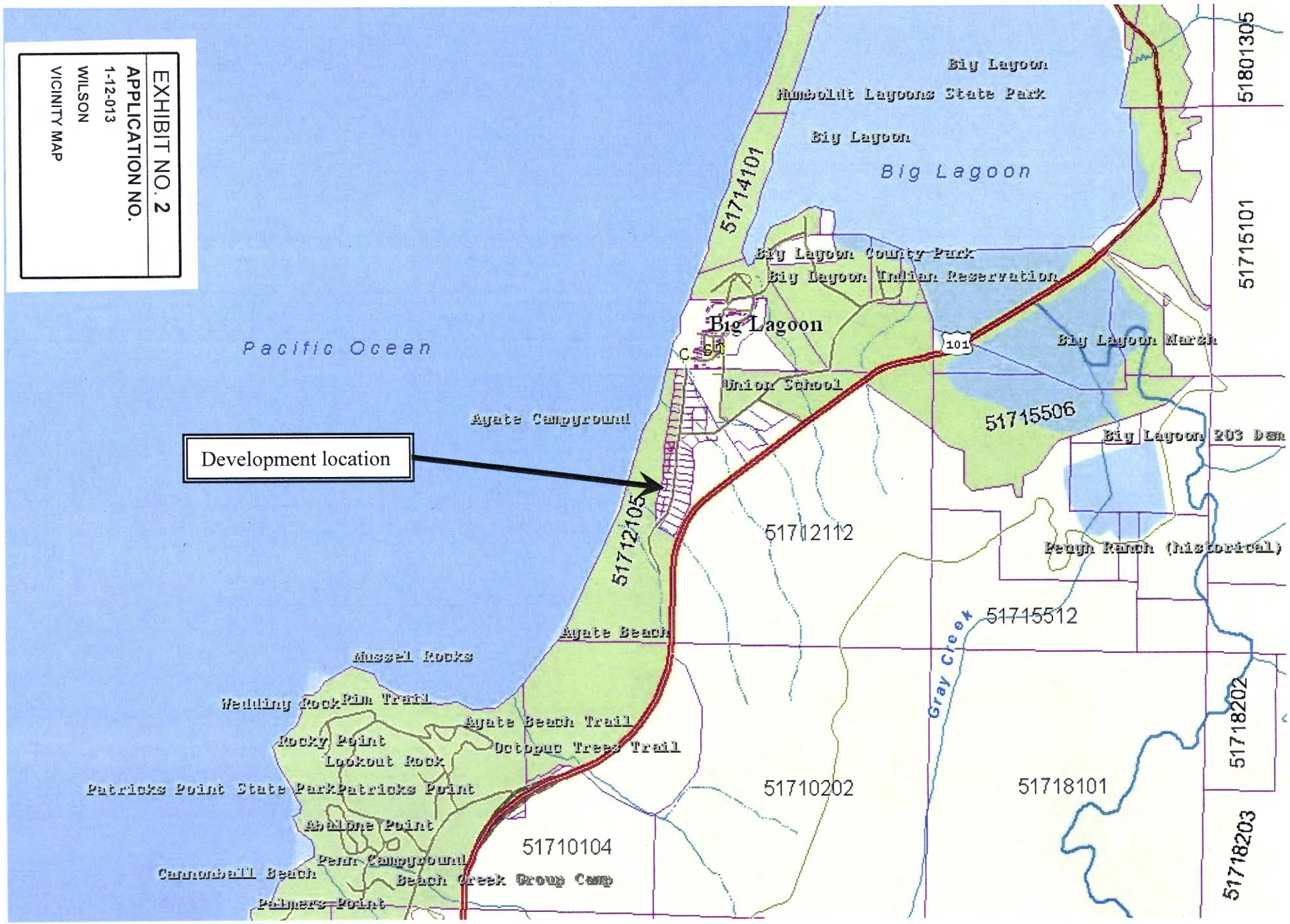


EXHIBIT NO. 2
APPLICATION NO.
1-12-013
WILSON
VICINITY MAP
Development location
Pacific Ocean
Big Lagoon
Humboldt Lagoons State Park
Big Lagoon
Big Lagoon County Park
Big Lagoon Indian Reservation
Big Lagoon
Union School
Big Lagoon Marsh
Big Lagoon 203 Dam
Peough Ranch (historical)
Gray Creek
Agate Campground
Agate Beach
Agate Beach Trail
Mussel Rocks
Wedding Rock
Rim Trail
Rocky Point
Lookout Rock
Patricks Point State Park
Patricks Point
Abalone Point
Penn Campground
Cannonball Beach
Beach Creek Group Camp
Palmers Point
51714101
51712105
51712112
51715506
51715512
51710202
51718101
51710104
51801305
51715101
51718202
51718203
101

2002 aerial view

EXHIBIT NO. 3
APPLICATION NO.
1-12-013
WILSON
SITE PHOTOS (1 of 3)

June 2012 photo of site taken from Roundhouse Creek Road.

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BEST MANAGEMENT PRACTICES

BEST MANAGEMENT PRACTICES ARE REQUIRED AFTER OCT. 15 AND THROUGHOUT THE RAINY SEASON

SILT FENCING:
- INSPECT AND MAINTAIN SILT FENCES AFTER EACH RAINSTORM.
- MAKE SURE THE BOTTOM OF THE SILT FENCE IS BURIED IN THE GROUND.
- SECURELY ATTACH THE MATERIAL TO THE STAKES.
- DON'T PLACE SILT FENCES IN THE MIDDLE OF A WATERWAY OR USE THEM AS A CHECK DAM.
- MAKE SURE STORMWATER IS NOT FLOWING AROUND THE SILT FENCE.

SITE STABILIZATION:
- VEGETATE, MULCH, OR OTHERWISE STABILIZE ALL EXPOSED AREAS AS SOON AS LAND ALTERATIONS HAVE BEEN COMPLETED.

STORM DRAIN INLET PROTECTION:
- USE ROCK, HAY WADDLES OR OTHER APPROPRIATE MATERIAL TO COVER THE STORM DRAIN INLET TO FILTER OUT TRASH AND DEBRIS.
- MAKE SURE THE ROCK SIZE IS APPROPRIATE, (USUALLY 1 TO 2 INCHES IN DIAMETER.
- IF YOU USE INLET FILTERS , MAINTAIN THEM REGULARLY.

DIRT STOCKPILES:
- COVER OR SEED ALL DIRT STOCKPILES.

SLOPES:
- ROUGH GRADE OR TERRACE SLOPES.
- BREAK UP LONG SLOPES WITH SEDIMENT BARRIERS, OR UNDER DRAIN, OR DIVERT STORMWATER AWAY FROM SLOPES.

CONSTRUCTION ENTRANCES:
- ROCK ENTRANCES TO REMOVE MUD AND DIRT FROM TIRES OF CONSTRUCTION VEHICLES BEFORE THEY ENTER A PAVED ROADWAY.
- PROPERLY SIZE ENTRANCE BMPs FOR ALL ANTICIPATED VEHICLES.
- MAKE SURE THAT THE CONSTRUCTION ENTRANCE DOES NOT BECOME BURIED IN SOIL.

VEGETATIVE BUFFERS:
- INSTALL AND PROTECT VEGETATIVE BUFFERS ALONG WATER BODIES TO SLOW AND FILTER STORMWATER RUNOFF.
- MAINTAIN BUFFERS BY MOWING OR REPLANTING PERIODICALLY TO ENSURE THEIR EFFECTIVENESS.

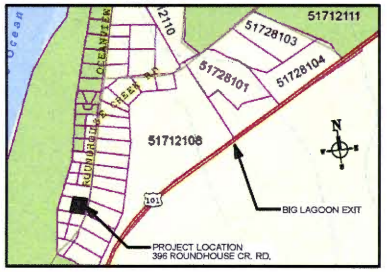
PROTECT NATURAL FEATURES:
- MINIMIZE CLEARING AND AMOUNT OF EXPOSED SOIL.
- IDENTIFY AND PROTECT AREAS WHERE EXISTING VEGETATION WILL NOT BE DISTURBED BY CONSTRUCTION ACTIVITY.
- PROTECT STREAMS, STREAM BUFFERS, WILD WOODLANDS, WETLANDS OR OTHER SENSITIVE AREAS FROM ANY DISTURBANCE OR CONSTRUCTION ACTIVITY BY FENCING OR OTHERWISE CLEARLY MARKING THESE AREAS.

CONSTRUCTION PHASING:
- SEQUENCE CONSTRUCTION ACTIVITIES SO THAT THE SOIL IS NOT EXPOSED FOR LONG PERIODS OF TIME.
- INSTALL KEY SEDIMENT CONTROL PRACTICES BEFORE SITE GRADING BEGINS.
- SCHEDULE SITE STABILIZATION ACTIVITIES, SUCH AS LANDSCAPING, TO BE COMPLETED IMMEDIATELY AFTER THE LAND HAS BEEN GRADED TO ITS FINAL CONTOUR.

PROJECT DESCRIPTION

THE OWNERS OF THE PROPERTY AT 396 ROUNDHOUSE CREEK ROAD, APN 517-251-06 ARE PROPOSING TO CONSTRUCT A NEW 1,456 SqFt, MAXIMUM 16 Ft HIGH, ONE STORY, THREE BEDROOM, SINGLE FAMILY RESIDENCE WITH AN ATTACHED 528 SqFt TWO-CAR GARAGE AND 168 SqFt OF ADJOINING COVERED PATIO SPACE. THERE WILL BE A PRIVATE SEWAGE DISPOSAL SYSTEM AND WATER IS PROVIDED BY THE BIG LAGOON COMMUNITY SERVICE DISTRICT. A 2,500 GALLON WATER STORAGE TANK WILL BE PROVIDED ON SITE TO COMPLY WITH SRA FIRE SAFE POLICY.

VICINITY MAP



PROJECT DATA :

OWNERS :
ROB & PATTI WILSON
490 MARBLE Ct.
REDDING, CA 96003

PROJECT LOCATION :
396 ROUNDHOUSE CREEK Rd.
BIG LAGOON, CA 95570

ZONING :
RESIDENTIAL SINGLE FAMILY
ZONE (RS-x/D)
COASTAL ZONE

PARCEL :
APN(s) 517-251-06

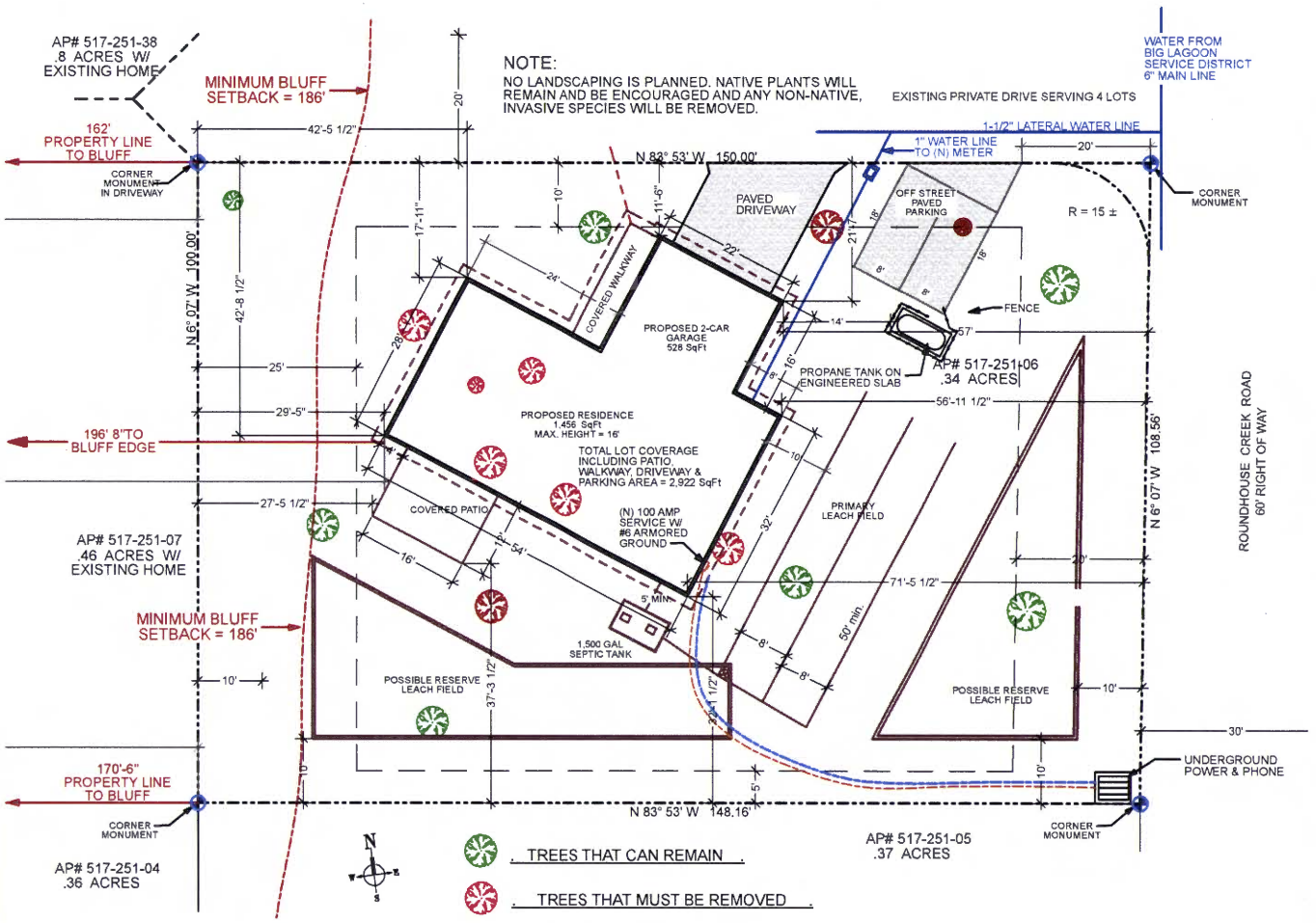
ACREAGE :
.34 ACRES - 14,839 SqFt

BUILDING AREA :
2,270 SqFt

UTILITIES :
SEWER - PRIVATE SEPTIC
WATER - BLCSD
ELECTRICITY - PG&E
TELEPHONE - PAC.BELL
NATURAL GAS - PG&E

SHEET INDEX

SHEET 1..PLOT PLAN, GENERAL NOTES
SHEET 2..EROSION CONTROL PLAN
SHEET 3..PERSPECTIVES & NORTH ELEVATION
SHEET 4..SOUTH, EAST & WEST ELEVATIONS
SHEET 5..FLOOR PLAN



PLOT PLAN

SCALE: 1" = 30'

ROYER
DESIGN / BUILD
ARCATA, CALIFORNA, 95521
8263 WEST END ROAD1
PHONE: 707-826-1965
LICENSE # 716487

NEW RESIDENCE :
ROB & PATTI WILSON
490 MARBLE Ct.
REDDING, CA 96003
PHONE: 530-241-1835

APN 517-251-06

PROJECT LOCATION :
396 ROUNDHOUSE CR. RD.
BIG LAGOON
CA, 95570

EXHIBIT NO. 4
APPLICATION NO.
1-12-013
WILSON

PROPOSED PROJECT PLANS
(1 of 5)

EROSION CONTROL NOTES:

1. ALL SURFACE WATER DRAINAGE SHOULD BE CONTROLLED TO FLOW AWAY FROM THE ADJACENT PROPERTIES. ALL EROSION CONTROL METHODS SHALL BE IN COMPLIANCE WITH HUMBOLDT COUNTY DEPARTMENT OF PUBLIC WORKS REQUIREMENTS.

2. ALL LOOSE SOIL AND DEBRIS SHALL BE REMOVED FROM THE STREET AREAS UPON STARTING OPERATIONS AND PERIODICALLY THEREAFTER AS DIRECTED BY THE INSPECTOR. ALL ENTRANCES SHALL BE MAINTAINED IN A CONDITION THAT WILL PREVENT TRACKING OR FLOWING OF SEDIMENT ONTO PUBLIC RIGHTS-OF-WAY

3. AFTER SEWER AND UTILITY TRENCHES ARE BACKFILLED AND COMPACTED, THE SURFACES OVER SUCH TRENCHES SHALL BE MOUNDED SLIGHTLY TO PREVENT CHANNELING OF WATER IN THE TRENCH AREA.

4. ALL EROSION AND SEDIMENT CONTROL MEASURES SHALL BE INSPECTED BY THE ENGINEER OF RECORD. THE CONTRACTOR IS RESPONSIBLE FOR IMPLEMENTING ALL EROSION AND SEDIMENT CONTROL MEASURES. SHOULD EROSION AND SEDIMENT CONTROL MEASURES FAIL, THE ENGINEER OF RECORD SHALL PROVIDE A FINAL REPORT TO THE HUMBOLDT COUNTY BUILDING DEPARTMENT PRIOR TO OCCUPANCY.

5. APPLY VEGETATIVE STABILIZATION (I.E. MULCH AND/OR TEMPORARY SEEDING AS APPROVED BY ENGINEER) WITHIN 7 DAYS OF LAND CLEARING OR GRADING TO ANY PORTION OF THE SITE THAT IS PLANNED TO BE IDLE FOR MORE THAN 45 DAYS.

6. THE EROSION AND SEDIMENT CONTROL MEASURES WILL BE OPERABLE DURING THE RAINY SEASON (OCTOBER 15-APRIL 15).

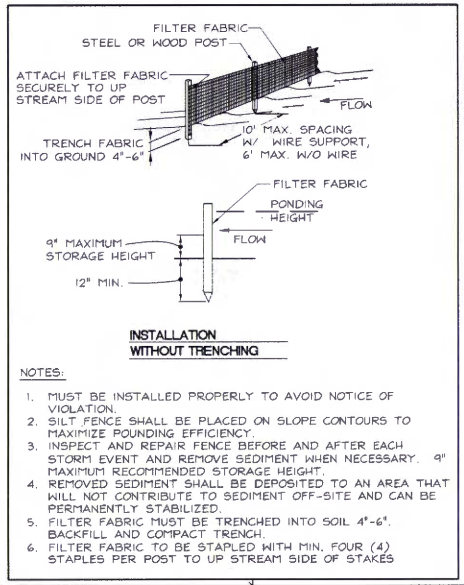
7. DURING THE RAINY SEASON, ALL PAVED AREAS WILL BE KEPT CLEAR OF EARTH MATERIAL AND DEBRIS. THE SITE WILL BE MAINTAINED SO THAT SEDIMENT-LADEN RUNOFF DOESN'T ENTER THE STORM DRAINAGE SYSTEM.

8. CONTRACTOR SHALL HAVE TOOLS, EQUIPMENT, AND MATERIALS TO PROVIDE EROSION CONTROL MEASURES MADE NECESSARY BY A CONSTRUCTION OPERATION, ON THE JOB SITE BEFORE BEGINNING THAT OPERATION.

9. ADJACENT PROPERTIES SHALL BE PROTECTED FROM STORM WATERS, MUD, SILT, ETC. ON A DAILY BASIS.

10. EXCESSIVE DUST SHALL BE CONTROLLED AT ALL TIMES DURING CONSTRUCTION AND UNTIL FINAL COMPLETION. THE CONTRACTOR, WHEN HE/SHE OR HIS/HERS SUBCONTRACTOR ARE OPERATING EQUIPMENT ON SITE, SHALL PREVENT FORMATION OF EXCESSIVE AIRBORNE NUISANCES BY WATERING AND/OR TREATING THE SITE OF THE WORK IN SUCH A MANNER THAT WILL CONFIRM DUST PARTICLES TO THE IMMEDIATE SURFACE OF THE WORK. THE CONTRACTOR WILL BE RESPONSIBLE FOR ANY DAMAGE CAUSED BY DUST FROM HIS OWN ACTIVITIES OR HIS SUBCONTRACTORS ACTIVITIES IN PERFORMING THE WORK UNDER THIS CONTRACT AND SHALL BE RESPONSIBLE FOR ANY CITATIONS, FINES, OR CHARGES RESULTING FROM DUST NUISANCES. DUST CONTROL WILL BE DONE ON A DAILY BASIS.

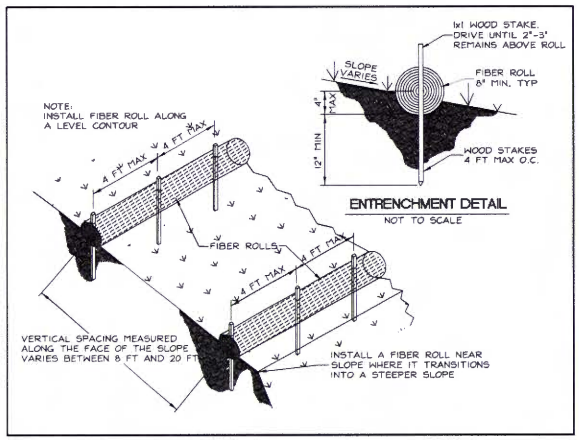
11. ALL EROSION & SEDIMENT CONTROL WORK SHALL CONFORM TO SEC. 331-12 OF THE HUMBOLDT COUNTY LAND USE AND ORDINANCE AND TO SECTION 20-3 OF CALTRANS STANDARD SPECIFICATIONS.



INSTALLATION WITHOUT TRENCHING

NOTES:

1. MUST BE INSTALLED PROPERLY TO AVOID NOTICE OF VIOLATION.
2. SILT FENCE SHALL BE PLACED ON SLOPE CONTOURS TO MAXIMIZE POUNDING EFFICIENCY.
3. INSPECT AND REPAIR FENCE BEFORE AND AFTER EACH STORM EVENT AND REMOVE SEDIMENT WHEN NECESSARY. 9" MAXIMUM RECOMMENDED STORAGE HEIGHT.
4. REMOVED SEDIMENT SHALL BE DEPOSITED TO AN AREA THAT WILL NOT CONTRIBUTE TO SEDIMENT OFF-SITE AND CAN BE PERMANENTLY STABILIZED.
5. FILTER FABRIC MUST BE TRENCHED INTO SOIL 4"-6". BACKFILL AND COMPACT TRENCH.
6. FILTER FABRIC TO BE STAPLED WITH MIN. FOUR (4) STAPLES PER POST TO UP STREAM SIDE OF STAKES



ENTRENCHMENT DETAIL
NOT TO SCALE

NOTE:
CONTRACTOR SHALL INSTITUTE AN ON-SITE SPILL PREVENTION AND CONTROL RESPONSE PROGRAM, CONSISTING OF BEST MANAGEMENT PRACTICES FOR THE STORAGE OF CLEAN-UP MATERIALS, TRAINING, DESIGNATION OF RESPONSIBLE INDIVIDUALS, AND REPORTING PROTOCOLS TO THE APPROPRIATE PUBLIC AND EMERGENCY SERVICE AGENCIES IN THE EVENT OF A SPILL. THIS PROGRAM SHALL BE IMPLEMENTED AT THE PROJECT TO CAPTURE AND CLEAN UP ANY ACCIDENTAL RELEASES OF OIL, GREASE, FUELS, LUBRICANTS, OR OTHER HAZARDOUS MATERIALS FROM ENTERING COASTAL WATERS.

THE PROGRAM SHALL INCLUDE A SCHEDULE FOR INSTALLATION AND MAINTENANCE OF APPROPRIATE CONSTRUCTION SOURCE CONTROL BEST MANAGEMENT PRACTICES TO PREVENT ENTRY OF STORMWATER RUN-OFF INTO THE CONSTRUCTION SITE AND THE ENTRAINMENT OF EXCAVATED MATERIALS INTO RUN-OFF LEAVING THE CONSTRUCTION SITE.

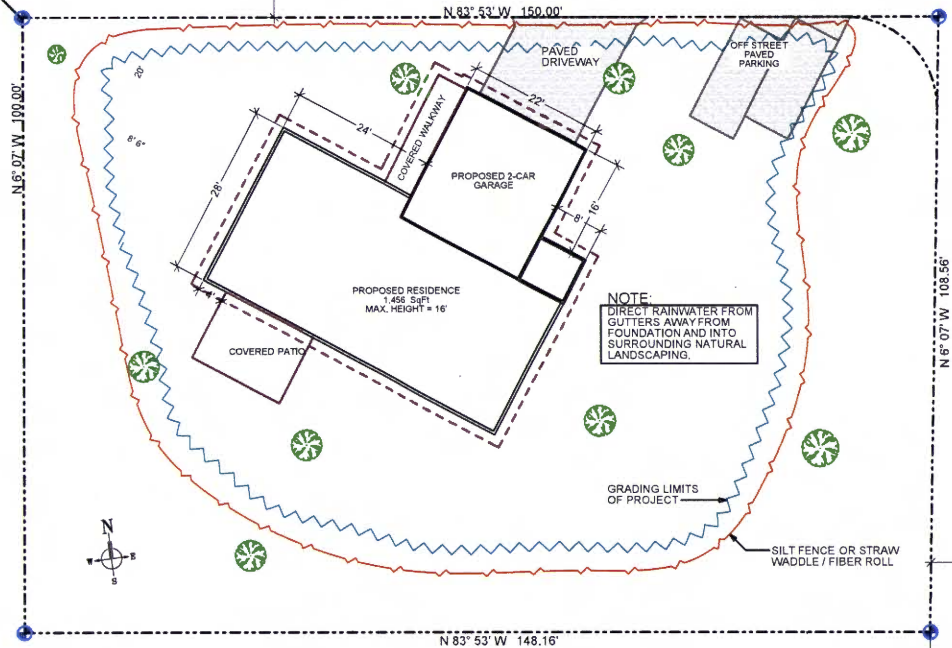
THE PROGRAM SHALL INCLUDE A SCHEDULE FOR INSTALLATION, USE AND MAINTENANCE OF APPROPRIATE CONSTRUCTION MATERIALS HANDLING AND STORAGE BEST MANAGEMENT PRACTICES TO PREVENT THE ENTRY OF POLLUTED STORMWATER RUN-OFF FROM THE COMPLETE DEVELOPMENT INTO COASTAL WATERS.

NOTE:
RUN-OFF FROM THE PROJECT SITE SHALL NOT INCREASE SEDIMENTATION IN THE SURROUNDING COASTAL WATERS.

RUN-OFF FROM THE PROJECT SITE SHALL NOT RESULT IN POLLUTANTS ENTERING THE SURROUNDING COASTAL WATERS.

BEST MANAGEMENT PRACTICES AS OUTLINED IN THESE PLANS SHALL BE USED TO PREVENT THE ENTRY OF POLLUTED STORM-WATER RUN-OFF INTO COASTAL WATERS DURING CONSTRUCTION.

USE BEST MANAGEMENT PRACTICES AS DETAILED IN THE CALIFORNIA STORMWATER BEST MANAGEMENT PRACTICE HANDBOOK, INCLUDING, BUT NOT LIMITED TO, SD-10 (SITE DESIGN & LANDSCAPE PLANNING, SD-11 (ROOF RUNOFF CONTROLS), SD-21 (ALTERNATIVE BUILDING MATERIALS), TC-31 (VEGETATED BUFFER STRIP), AND TC-32 (BIORETENTION)



EROSION CONTROL PLAN

SCALE: 1" = 30'

ROYER
DESIGN / BUILD
ARCATA, CALIFORNA, 95521
8263 WEST END ROAD1
PHONE: 707-826-1965
LICENSE # 716487

NEW RESIDENCE :
ROB & PATTI WILSON
490 MARBLE Ct.
REDDING, CA 96003
PHONE: 530-241-1835

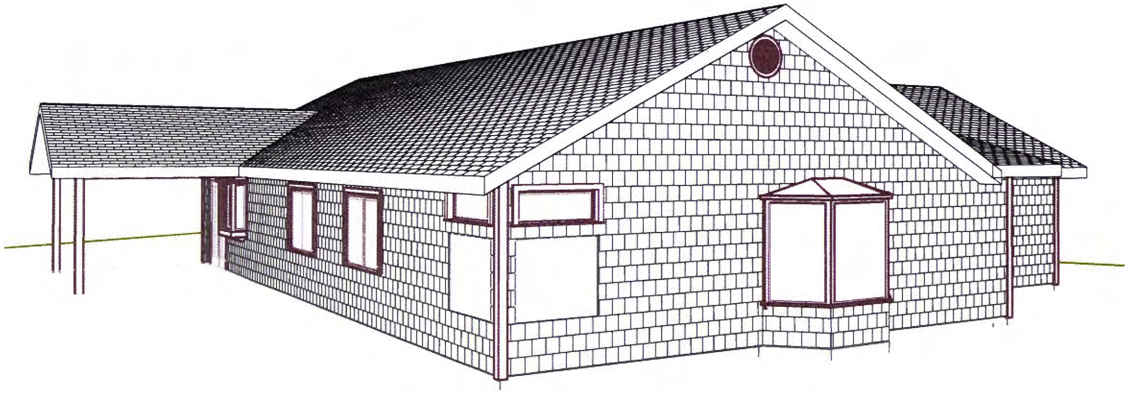
APN 517-251-06

PROJECT LOCATION :
396 ROUNDHOUSE CR. RD.
BIG LAGOON
CA, 95570

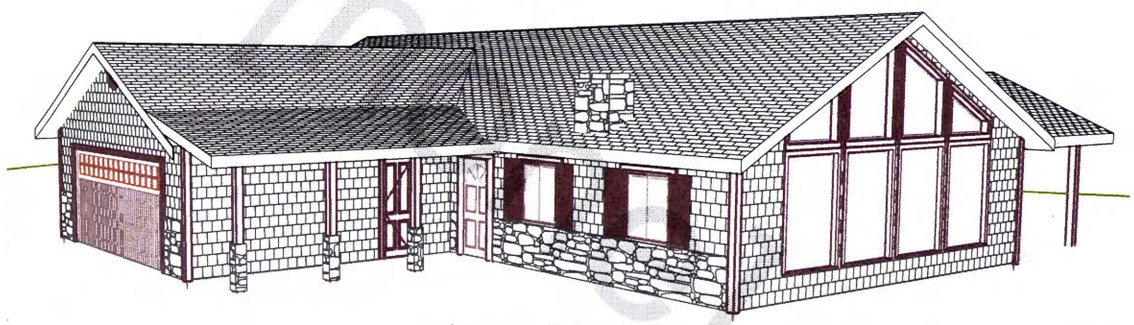
Drawn by Timothy Royer
Date 10-22-12
Signature:

Drawing Scale
AS SHOWN

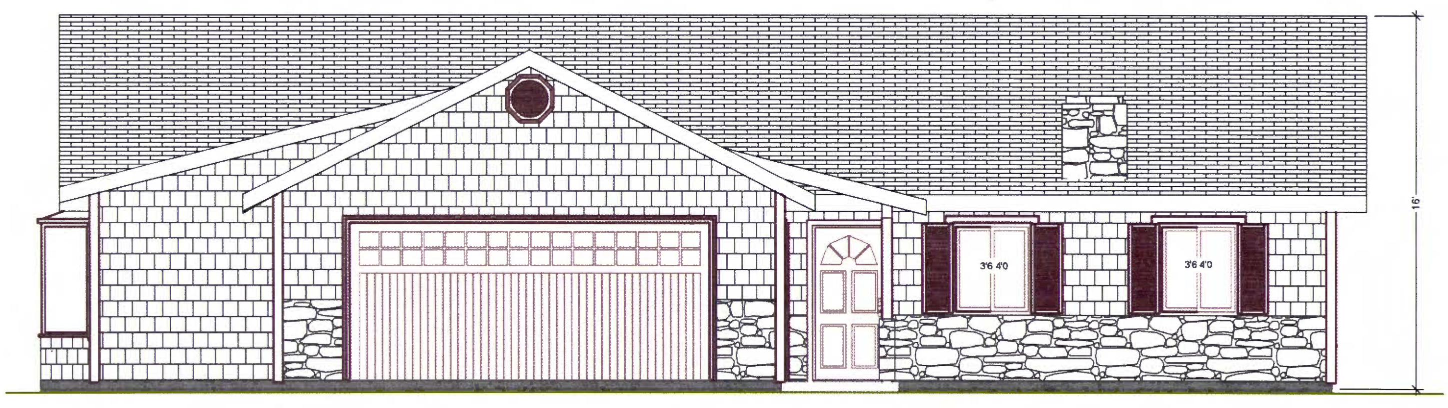
SHEET:
2 of 5



Generic Perspective



Generic Perspective



NORTH ELEVATION

1/8" = 1'-0"

3 of 5

ROYER
DESIGN / BUILD
ARCATA, CALIFORNA, 95521
8263 WEST END ROAD1
PHONE: 707-826-1965
LICENSE # 716487

APN 517-251-06

PROJECT LOCATION :
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BIG LAGOON
CA, 95570

NEW RESIDENCE :
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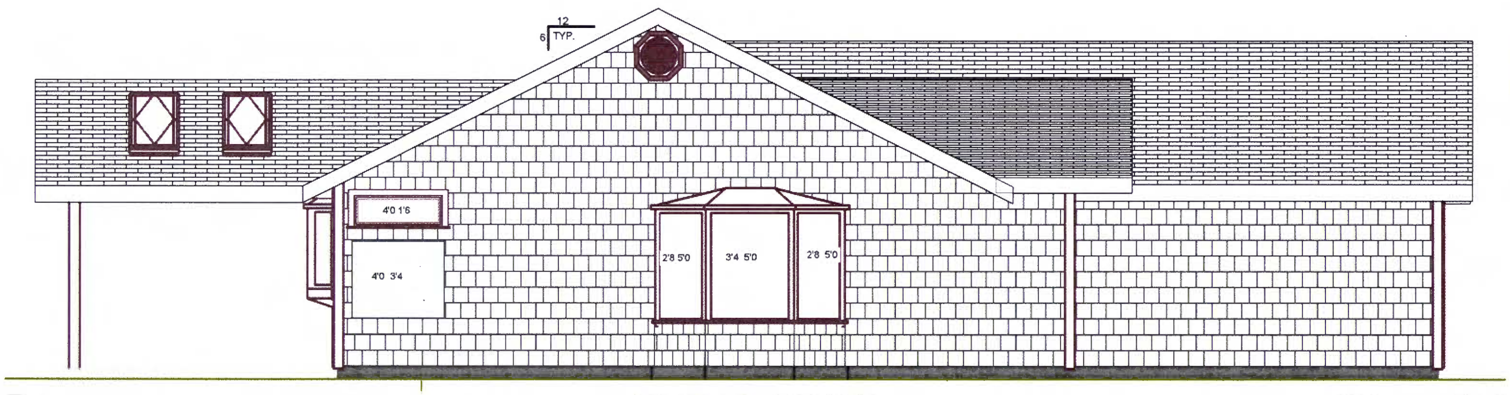
490 MARBLE Ct.
REDDING, CA 96003
PHONE: 530-241-1835

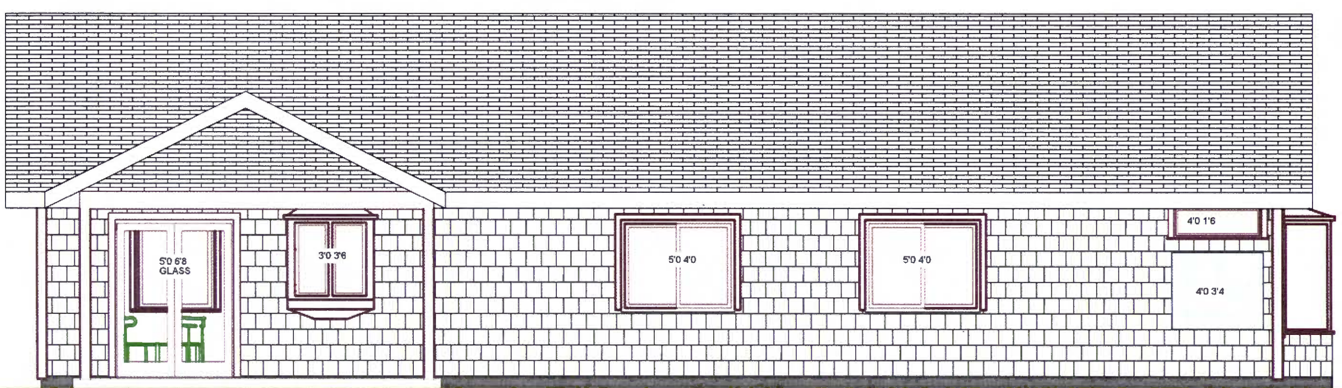
Drawn by Timothy Royer
Date 10-22-12
Signature:

Drawing Scale AS SHOWN

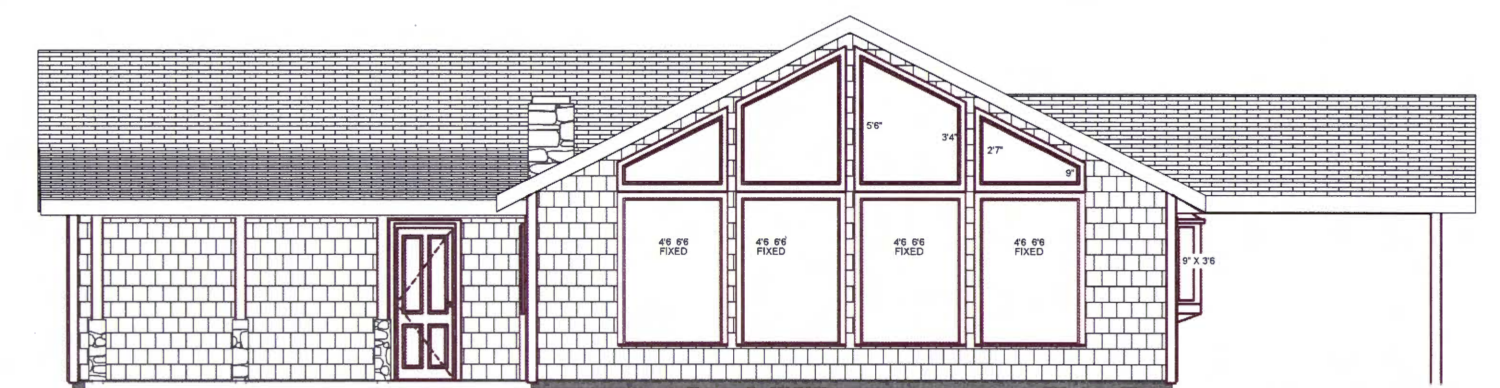
SHEET: 3 of 5



E-1 EAST ELEVATION 1/8" = 1'-0"



S-1 SOUTH ELEVATION 1/8" = 1'-0"



W-1 WEST ELEVATION 1/8" = 1'-0"

4 of 5

ROYER
DESIGN / BUILD
ARCATA, CALIFORNA, 95521
8263 WEST END ROAD1
PHONE: 707-826-1965
LICENSE # 716487

NEW RESIDENCE :
ROB & PATTI WILSON
490 MARBLE Ct.
REDDING, CA 96003
PHONE: 530-241-1835

APN 517-251-06

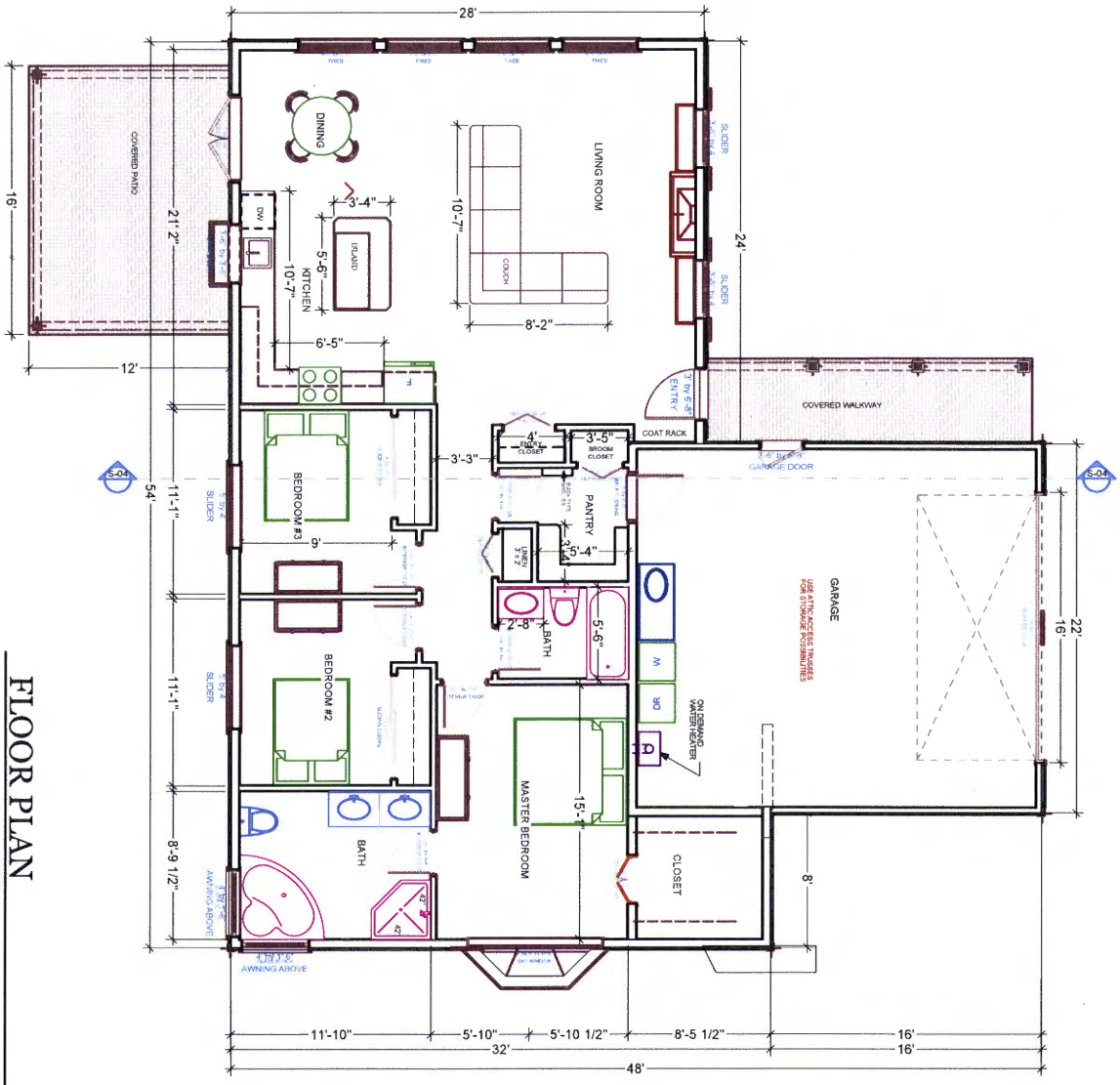
PROJECT LOCATION :
396 ROUNDHOUSE CR. RD.
BIG LAGOON
CA, 95570

Drawn by Timothy Royer
Date 10-22-12
Signature:

Drawing Scale AS SHOWN

SHEET: 4 of 5

5 of 5



FLOOR PLAN

SCALE: 3/32" = 1'-0"

NEW RESIDENCE :

ROB & PATTI WILSON

490 MARBLE Ct.
REDDING, CA 96003

PHONE: 530-241-1835

APN 517-251-06

PROJECT LOCATION :
396 ROUNDHOUSE CR. RD.
BIG LAGOON
CA, 95570

ROYER
DESIGN / BUILD
ARCATA, CALIFORNA, 95521
8263 WEST END ROAD1
PHONE: 707-826-1965
LICENSE # 716487

Drawn by: Timothy Royer
Date 10-22-12
Signature:

Drawing Scale: AS SHOWN

SHEET: 5 of 5

OSWALD GEOLOGIC
natural resource based solutions
John A Oswald
certified engineering geologist
CA lic. PG 7219, CEG 2291
po box 126
Loleta, CA 95551
707 733 5077

June 26, 2012

R2 SOILS ENGINEERING REPORT FOR APN 517-251-006, HUMBOLDT CC

Prepared for: **Wilson**
396 Roundhouse Creek Road
Big Lagoon, CA

1.0 INTRODUCTION

This evaluation is prepared at the request of Pacific Watershed Associates, consultant to the landowner, for a R2 soils engineering report for the described project on the subject property. Specifically, this report evaluates sub-surface soil conditions at the project site and based on soil conditions encountered provides recommendations for minimum foundation design specifications in general accordance with Humboldt County grading ordinance and California Building Code (CBC, 2010).

1.1 PROJECT UNDERSTANDING

Based on conversations with Tim Royer, Royer Design Build, it is my understanding that a single-story residence with attached garage and onsite sewer services is proposed on the flat to gently sloped parcel. The proposed structure will have a concrete slab foundation and an approximate footprint of 1,990 ft^2.

1.2 SCOPE OF WORK

The scope of services for this investigation included characterizing two soil hand-auger boring; performing a site reconnaissance of the area in proximity to the building site; review of pertinent soil investigations conducted for siting of septic systems and water source, developing recommendations for foundation support and earthwork; and preparation of this report. The following information, recommendations, and design criteria are presented in this report:

- Description of site terrain and local geology.
- Description of subsurface soil and groundwater conditions interpreted based on field exploration.
- Logs of auger borings conducted for this investigation.
- Assessment of potential earthquake-related geologic and geotechnical hazards including surface fault rupture, liquefaction, settlement (total and differential), site instability, and discussion of mitigation measures.
- Seismic design parameters per the applicable portions of the 2010 California Building Code (CBC), including soil profile type (site class), seismic design category, fault classifications, and near-source factors.
- Discussion of appropriate foundation design options.
- Recommendations regarding foundation elements, including:
  - Allowable soil bearing pressures (dead, live, and seismic loads)
  - Minimum foundation embedment
- Recommendations for earthwork, site and subgrade preparation, fill placement, and compaction requirements.

2.0 SITE DESCRIPTION

The project property is identified as Assessors Parcel Number **200-241-011** in Humboldt County California, and is approximately .45 acres in size. The parcel is located between the 160-foot and 200-foot topographic contour on the USGS 7.5 minute quadrangle and is estimated at an elevation of approximately 180 feet above mean sea-level (Figure 1). The lot is located at 396 Roundhouse Creek Road in Big Lagoon, California. Pertinent location information is provided in Table 1 below.

The project site is currently undeveloped and encompasses nearly level to gently sloping ground with a northwesterly slope aspect (Figure 2). The project site owners propose to construct a new single-story, residence. The area proposed for development is within the central portion of the parcel (Figure 2). The new structure will be conventional wood-frame construction and founded on a slab foundation. Ingress and egress is from an existing gravel driveway that runs along the northern parcel boundary immediately west of Roundhouse Creek Road.

The residence will be served by local utilities. Water will be supplied by the Big Lagoon Water District. Additional site improvements include an onsite sewage disposal system, gravel parking area, and vegetation removal.

Table 1: Pertinent Location Information	
Hum.Co. GIS Lat and Long	41.1518°, -124.1361°
Legal Description	NW 1/4 of Section 24 Township 9N; HB&M
USGS Quadrangle	Trinidad USGS 7.5-minute quadrangle.

2.1 SITE INVESTIGATION

One 3 ¼-inch hand auger boring was completed to 6-feet in depth for this investigation. The investigation also relies on 3 hand auger borings, two excavator test-pits, and observation well logs prepared by Pacific Watershed Associates for this development project. The boring for this investigation was logged in the field by a Certified Engineering Geologist in general accordance with ASTM D2488 (Visual-Manual Procedure). Upon completion, the boring was backfilled with spoils to existing grade. The boring location with respect to the building footprint is depicted on the Figure 2 Site Plan. A Soil Profile Log containing the soil classifications is included as Appendix A.

3.0 SITE GEOLOGIC CONDITIONS

Geologic mapping show the project area as underlain by uplifted deformed late Pleistocene marine terrace deposits. Geotechnical drilling investigations conducted in the Big Lagoon and Patrick's Point State Park area show the Pleistocene marine terrace deposits consist of alternating medium dense to very dense, poorly graded gravels with sands and clays, and poorly graded sands with gravel and silt. Overlying the marine terrace deposits are beach and eolian deposits consisting of dune sand and a silt cap likely to have been deposited following uplift and emergence of the marine terrace sediments (Vadurro, pers. Comm. 2012; Aalto et al., 1981)(Figure 3).

The marine terrace deposits are tilted gently to the north and form the broad, gently north sloping landform the residences of Big Lagoon are laid out on. Dip slope bedrock conditions are not expected to play a factor in stability of the proposed site because of the type materials involved and the low dip of the marine terrace.

The proposed residence is about 175 feet upslope of the break-in-slope to the sea cliff over looking Agate Beach. The steep beach profile at Agate Beach and shallow sloping berm allow a large portion of the wave energy to be directed onto the beach face. The sea cliff along this section has historically experienced significant erosion and retreat. The proposed residence appears set far enough back from the sea cliff for the life of the project. The stability of the sea cliff and its potential affects to the proposed development are discussed more in depth in a separate report by LACO Associates (Royer, pers. Comm.; 2012).

3.1 SITE SOIL CONDITIONS

The generalized stratigraphy underlying the project site within the upper 6-feet of the subsurface profile consists of eolian silt and silty fine sand. Detailed description of the subsurface stratigraphy encountered during drilling is provided in the Soil Profile Log HA-1 included as Appendix A and the boring is located on Figure 2.

Given the general uniformity of the material as observed in the boring, described in test pits and borings adjacent the proposed structure, It is anticipated that the subgrade soils will be laterally continuous across the site.

At the time of the field investigation and in the borings, no groundwater was encountered to a depth of approximately 5 feet below existing grade. Additionally, soil mottling indicative of seasonal high groundwater elevations, was not observed to about 5-feet in depth. Groundwater depths may fluctuate with seasonal climatic variations and changes in land use. Groundwater was reported at 104.5 inches in depth in an observation well placed by Pacific Watershed Associates in Observation well OW-1. Another observation well located up gradient of the proposed building site did not show any groundwater accumulation during the same period of observation.

3.1.1 Site Class

Based on this investigation a conservative estimate of site materials within upper 100 feet of the ground surface, the parcel is placed in **Site Class D**, stiff soil profile, average material properties below site, as described in Table 1613.5.2 of the 2010 CBC.

3.2 SEISMIC CONDITIONS

This project site is located within a seismically active region in which large earthquakes are expected to occur during the economic life span (50-years) of the proposed development. North of the Mendocino triple junction and San Andreas fault zone, the Cascadia subduction zone controls the regional tectonic framework. The project site is located on young sediments that are being deformed within the fold and thrust belt atop the subducting Gorda plate of the Cascadia subduction zone. The fold and thrust belt is a series of imbricate, northeast dipping, low angle thrust faults and associated folds that show evidence of recent fault rupture and folding.

The project area is located in the northerly portion of the Mad River fault zone along the northeast-dipping backlimb of the Trinidad anticline as evidenced by the tilted nature of the underlying terrace deposits. The Trinidad fault is an active reverse (thrust) fault located less than seven miles south of the project site, and is recognized to be the fault responsible for the active growth of the Trinidad anticline. The offshore trace of the Trinidad fault may be as close as four miles to the project site.

The Trinidad fault is recognized by the State of California as being active with an assigned slip rate of 2.5 ± 1.5 mm/yr (USGS, 1996). The Trinidad fault consists of a northwest striking, northeast dipping thrust fault with a reported dip of 45 degrees. The upper-bound earthquake considered likely to occur

on the Trinidad fault has an estimated M_w of 7.3 (ICBO-CDMG, 1998).

Based on the record of historical earthquakes (~150 years), faults within the plate boundary zone and internally deforming Gorda Plate, have produced numerous small-magnitude and several moderate to large (i.e. M>6) earthquakes affecting the local area. Several active regional seismic sources in addition to the Little Salmon fault are proximal to the project site and have the potential to produce strong ground motions. These seismic sources include the following:

- The Cascadia subduction zone (CSZ) wherein oceanic crust of the Juan de Fuca/Gorda plate is being actively subducted beneath the leading edge of the North American plate. The CSZ in its entirety extends from the Mendocino triple junction to British Columbia. Plate convergence along the Gorda segment of the CSZ is occurring at a rate of approximately 30 to 40 millimeters per year (mm/yr) (Heaton & Kanamori, 1984). Rupture along the entire CSZ boundary may produce an earthquake with a maximum moment magnitude (M_w) of 9.0 or greater (Satake, 2003).
- The Mendocino fault, an offshore, high-angle, east-west-trending, right-lateral strike-slip fault that forms the boundary between the subducting Gorda plate and northwest migrating Pacific plate.
- Faults within the internally-deforming Gorda plate consisting of high-angle, northeast-trending, left-lateral, strike-slip faults.

3.2.1 Seismic Design Parameters

Software version 5.1.0 from the US Geological Survey was used to determine seismic design parameters SDs and SD1 according to 2010 CBC standards and requirements for foundation design (USGS, 2011). Input parameters included latitude and longitude taken from Humboldt County GIS, and site class as determined from site conditions described above. The output was determined for 2005 ASCE Chapter 7 standards and is shown below and summarized in Table 2. The USGS maintains a website with updated software for seismic design parameters at: http://earthquake.usgs.gov/research/hazmaps/design/

3.2.2 Program Output

Conterminous 48 States
2005 ASCE 7 Standard
Latitude = 41.1518
Longitude = -124.13610000000001
Spectral Response Accelerations Ss and S1
Ss and S1 = Mapped Spectral Acceleration Values
Site Class B - Fa = 1.0 ,Fv = 1.0
Data are based on a 0.01 deg grid spacing

Period (sec)	Sa (g)
0.2	2.563 (Ss, Site Class B)
1.0	1.154 (S1, Site Class B)

Conterminous 48 States
2005 ASCE 7 Standard
Latitude = 41.1518
Longitude = -124.13610000000001
Spectral Response Accelerations SMs and SM1
SMs = Fa x Ss and SM1 = Fv x S1
Site Class D - Fa = 1.0 ,Fv = 1.5

Period (sec)	Sa (g)
0.2	2.563 (SMs, Site Class D)
1.0	1.731 (SM1, Site Class D)

Conterminous 48 States
2005 ASCE 7 Standard
Latitude = 41.1518
Longitude = -124.13610000000001
Design Spectral Response Accelerations SDs and SD1
SDs = 2/3 x SMs and SD1 = 2/3 x SM1
Site Class D - Fa = 1.0 ,Fv = 1.5

Period (sec)	Sa (g)
0.2	1.709 (SDs, Site Class D)
1.0	1.154 (SD1, Site Class D)

Earthquake Ground Motion Parameter software version 5.1.0 (02/10/11)

The recommended site-specific seismic and soil parameters were calculated per the 2010 California Building Code (CBC) for Seismic Design Values for Buildings Occupancy Category II. Please see specific recommendations for the seismic design category below.

4.0 GEOLOGIC HAZARDS

The following sections provide disclosure and discussion of geologic hazards based on the Humboldt County GIS hazard mapping and observed site conditions.

4.1 Liquefaction Hazards

Liquefaction is the catastrophic reduction of soil strength in response to rapid changes in soil pore-water pressures during strong ground motions associated with moderate to large earthquakes. Youd and Perkins (1978) characterized the response of earth materials under differing groundwater conditions during strong ground motion. The study determined that when located below the groundwater surface, young geologic formations comprised of unconsolidated, granular soil and artificial fills were more susceptible to liquefaction during seismic loading. Pacific Watershed Associates observed groundwater in observation well OW-1 during the site investigation. No groundwater was observed in observation well OW-2 during the same period of observation. It is likely the observed groundwater elevations at the site are variable and possibly perched in places atop less permeable layers at depth.

According to the Humboldt County web GIS map the subject parcel is **not** located within an area of potential liquefaction. Based on the age and density of the soils and geologic materials observed in borings and exposed in the near by sea cliff underlying the potential hazard for liquefaction at the site is considered low. Additionally, as shown in Map S-3 of special publication 115 (CDMG, 1995) the project site is not located in an area with a known potential for liquefaction.

4.2 Surface Rupture

The project site is located about 7 miles north of the mapped trace of the Trinidad fault (Jennings, 1994). The subject parcel is not located within an Alquist-Priolo earthquake fault zone and is not a project subject to A-P regulation. Therefore, based on the information available, the potential for

surface fault rupture to occur at the project site during the design lifetime is considered negligible.

4.3 Slope Stability

The subject parcel is reported as an area recognized as having moderate instability according to the Humboldt County web GIS Hazards Map (D2, Humboldt County GIS). Slope gradients at the proposed foundation site about 3-5%. The proposed project is not threatened by any stability conditions located onsite.

The proposed development is about 175 feet from the break-in-slope to the sea cliff overlooking Agate Beach. Failures of the bluff along this section of coast are common and are triggered during periods of high precipitation, large storm-waves, and strong ground motions associated with moderate to large earthquakes. Failures along the sea cliff to the west of the proposed development typically occur as block topples with relatively vertical failure planes and are largely caused by undermining of the sea cliff by large storm wave events. The frequency of failures is episodic and associated with climatic events that control the amount and timing of annual precipitation locally.

Stability issues associated with coastal bluff retreat are discussed in a separate report associated with this permit. My understanding is this report concurs with the assessment that the set back of the proposed development is appropriate for site conditions (Royer, pers. Comm., 2012). The proposed development appears to be set back an appropriate distance from the bluff based on onsite conditions and historical performance of the coastal bluff.

4.4 Flood Hazards

The project site is **not** located in the Federal Emergency Management Agency delineated 100-year flood zone as shown on the Humboldt County web GIS map.

4.5 Tsunami Hazards

The project site is **not** located in the tsunami evacuation area by Humboldt County web GIS map.

4.6 Settlement

Settlement is a function of the foundation loading and the bearing soils. No anticipated foundation loads have been provided at the time this report was prepared. There is about 2.5- to 3.0-feet of compressible fill and soil consisting native organic soils underlying the proposed building footprint. These materials are considered unsuitable to bear the anticipated structural loads of the proposed structure. Typical "code foundations" may experience excessive settlement if constructed on these shallow fill and residual soils.

The bearing soils below a depth of 30- to 36-inches are relatively uniform in composition. Provided all load bearing structural elements are founded on similar materials as recommended below the risk of total and differential settlement is low and is not anticipated to have detrimental effects on foundation performance.

4.7 Soil Swelling or Shrinkage

As discussed in Section 3.2, the subsurface soils at foundation load-bearing depths consist predominantly of non-plastic to low-plasticity silty sand. As a result of the granular, non-plastic soils encountered, the hazard to the structure associated with potential swelling or shrinkage of these materials beneath the foundation is low to negligible.

5.0 RECOMMENDATIONS

This section contains recommendations to the design professional based on 2010 CBC, Humboldt County grading ordinance, and 2005 ASCE Chapter 7 requirements.

5.1 Setback Recommendations for Descending and Ascending Slopes

The project footprint location as proposed is adequate for the conditions observed with minor grading. The observed site is appropriate for the intended use as siting for a residential structure. Therefore, no additional slope setback recommendations are warranted by this investigation.

5.2 Site Preparation

All undocumented fill soils, fine-grained top soils, and any other debris encountered at or below the existing ground surface should be removed at the locations beneath the foundation elements. All earthwork, including but not limited to, site clearing, grubbing, and stripping should be conducted during dry weather conditions, if feasible.

In some cases, structural fills may be needed beneath foundation elements where unexpected deleterious materials are found at depth during construction. See below under Section 5.6 Foundation Design.

5.3 Structural Fills

The use of structural fills is not anticipated for this project. If used, imported aggregate base material may be placed beneath footings or floor slabs, or used as trench backfill and for pavement subgrade foundation elements, the fills shall consist of:

5.3.1 ***Aggregate Base***. This material should meet the requirements in the Caltrans Standard Specifications (1999), Class 2 Aggregate Base (3/4-inch maximum particle size).

5.4 Compaction Standard

Structural fills are not anticipated for this project. However all structural fills when placed beneath footings or slabs, or as backfill adjacent to foundations, the fills shall be

5.4.1 Class 2 ***Aggregate Base*** compacted to a relative compaction of at least 95 percent. The moisture content of the material should be between 1 percent below and 3 percent above the optimum moisture. The material should be placed in horizontal lifts that do not exceed 8 inches in uncompacted thickness.

5.5 Site Specific Seismic Design Parameters

All structural design shall be in conformance with the requirements of the 2010 California Building Code for seismic design category and are based on calculations presented in Section 3.3.1 above and summarized in the table below.

Table 2 summarizes the seismic design parameters calculated for the site based on conditions encountered during investigation.

Table 2: Seismic Design and Spectral Response Parameters		
Site Class	**D**	
Design Acceleration Spectral Response	SDs (0.2 s)	SD1 (1.0 s)
	1.709 g	**1.154 g**
Seismic Design Category	**E**	

5.6 Foundation Design

The following foundation recommendations assume a single-story residence is to be constructed on this site. Soil conditions allow for the proposed structures to be supported on a shallow foundation system that consists of a reinforced slab-on-grade with thickened edge.

All footings, including the thickened edge of any floor slab should bear on undisturbed competent native granular soils below the silty topsoil. Concrete floor slabs should be supported on an engineered fill. The engineered fill should consist of a minimum of 8-inches of compacted Class 2 Aggregate Base or select fill. To minimize the potential for moisture transmission through the floor, the slab should be underlain by a vapor barrier consisting of an impermeable membrane.

5.6.1 Foundation Footing Depth

- All load-bearing structural elements shall be embedded into and bear upon, suitably dense, undisturbed soil encountered below non-engineered fills and silty topsoil. The depth to these competent soils varies from about **32--inches** in the western footprint area to about **39-inches** in the eastern footprint area of the project site. The depth of embedment shall at a minimum be designed in accordance with the requirements of the 2010 CBC.

5.6.2 Allowable Soil Bearing Pressures

- For design of foundation elements embedded a minimum of 12-inches into suitably dense undisturbed native **SM** soils encountered beginning below the base of the fill soils and organic soils, an allowable bearing pressure of **2,000 pounds per square foot** for dead load plus long-term live load, in accordance with Table 1804.A.2 (CBC, 2010) is recommended.
- The allowable bearing pressure may be increased by one-third when using alternate load combinations in Section 1605.3.2 (CBC, 2010) that include wind or earthquake loads. At minimum, all footings should be designed and sized in accordance with the 2010 CBC.

5.7 Drainage and Landscaping

The building site should be graded to provide positive drainage away from the foundation elements of the structure. The grading, landscaping, and construction should be such that no water is allowed to pond anywhere on the site, nor to migrate beneath the proposed structure.

- A minimum gradient of three percent should be maintained for all impervious surfaces within 10 feet of the structure.
- A minimum gradient of five percent should be maintained for landscaped areas within 10 feet of the structure.
- All roof storm drainage should be controlled with the installation of gutters and downspouts. Downspouts should be connected to tight-lines to convey roof storm runoff away from a structure to a suitable outlet point.

6.0 CONCLUSIONS

This investigation documents geologic hazards, site materials, and provides foundation bearing load capacities, foundation depth, design recommendations, and seismic design parameters based on site conditions encountered, requirements of the 2010 CBC, and Humboldt County grading ordinance. It is my opinion that the structure poses a low risk of exacerbating the existing conditions presented by geologic and natural hazards present at the site reviewed. The site is considered adequate for the intended use of founding a residential structure.

6.1 Limitations

This report, recommendations, and conclusions are solely intended for the site discussed above. The information contained in this report is only intended for use at the stated site using the stated uses. This report should not be used as justification for any other project or site, and only be used for information purposes if referenced and reviewed for other projects. I recognize that the site is in a dynamically active area and conditions can and will change. I have used my best professional judgment to assess the present and future risks and assist the landowner in proposing development that does not increase the risk to the resources present in the project area or subject the landowner to untenable hazards. If conditions different from those described in this report are encountered during construction, the project engineer/builder/owner should contact this office to review the new conditions and evaluate their bearing on the validity of any recommendations provided herein.

The opinions presented herein have been developed using that degree of care and skill ordinarily exercised, under similar circumstances, by reputable engineering geologists practicing in this or similar localities. No other warranty, expressed or implied, is made as to the professional advice included in this report.

The analyses and recommendations contained in this report are based on data obtained from subsurface exploration. The methods used indicate subsurface conditions only at specific locations where soils were observed, and only to the depths penetrated, and cannot always be relied on to accurately reflect stratigraphic variations that commonly exist between sampling locations.

Do not apply any of this report's conclusions or recommendations if the nature, design, or location of the proposed residence is changed. If changes are contemplated, the author of this report should be consulted to review the impact on the applicability of the recommendations in this report. The author of this report is not responsible for any claims, damages, or liability associated with any other party's interpretation of the subsurface data or reuse of this report for other projects or at other locations without written authorization.

I trust that this report will be sufficient for your immediate purposes. Please contact me if you have any questions.

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ENGINEERING
GEOLOGIST
STATE OF CALIFORNIA

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Certified Engineering Geologist; CEG 2291 PG 7219

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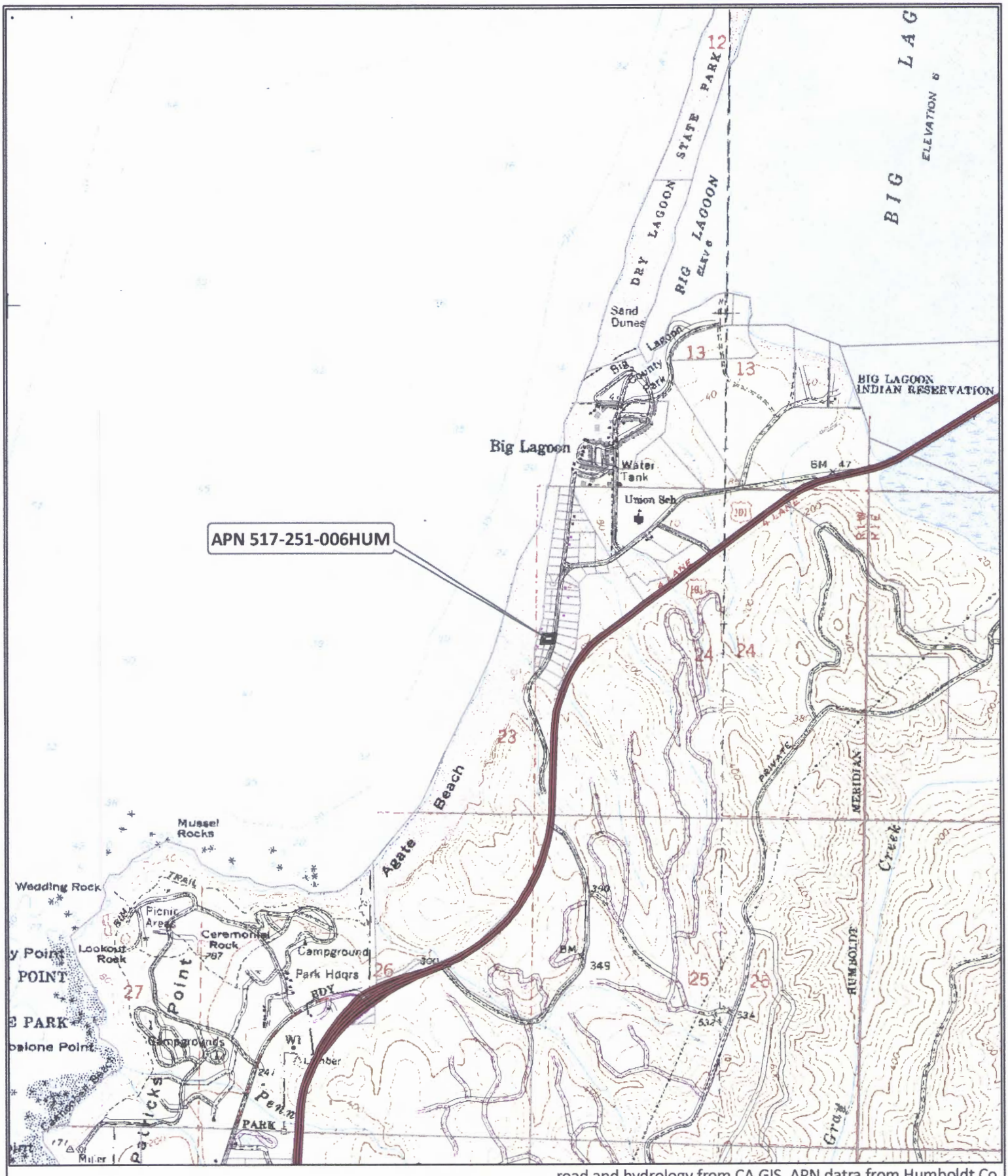


road and hydrology from CA GIS, APN datra from Humboldt Co.
USGS Trinidad and Rodgers Peak 7.5' Quadrangles

OSWALD GEOLOGIC
PO Box 126
Loleta CA
95551

location of parcel is approximate

N

2,000 1,000 0 2,000 Feet

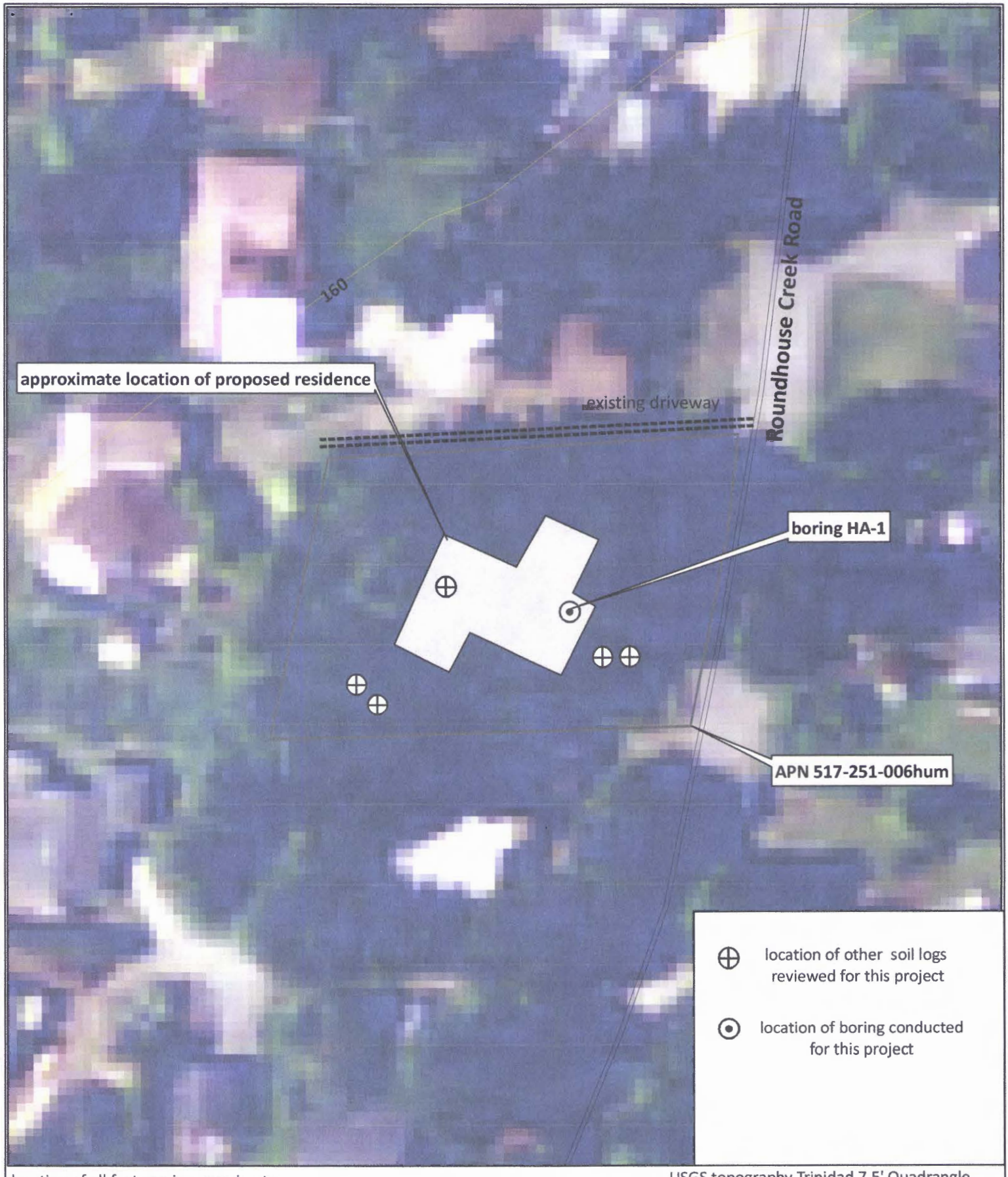
contour interval 40-feet

project:

517-251-006 Humboldt Co. R2

Figure 1: Location Map 11414

06/19/12-jao | 04-12-02



location of all features is approximate

USGS topography Trinidad 7.5' Quadrangle

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Loleta CA
95551

06/19/12-jao | 04-12-02

N

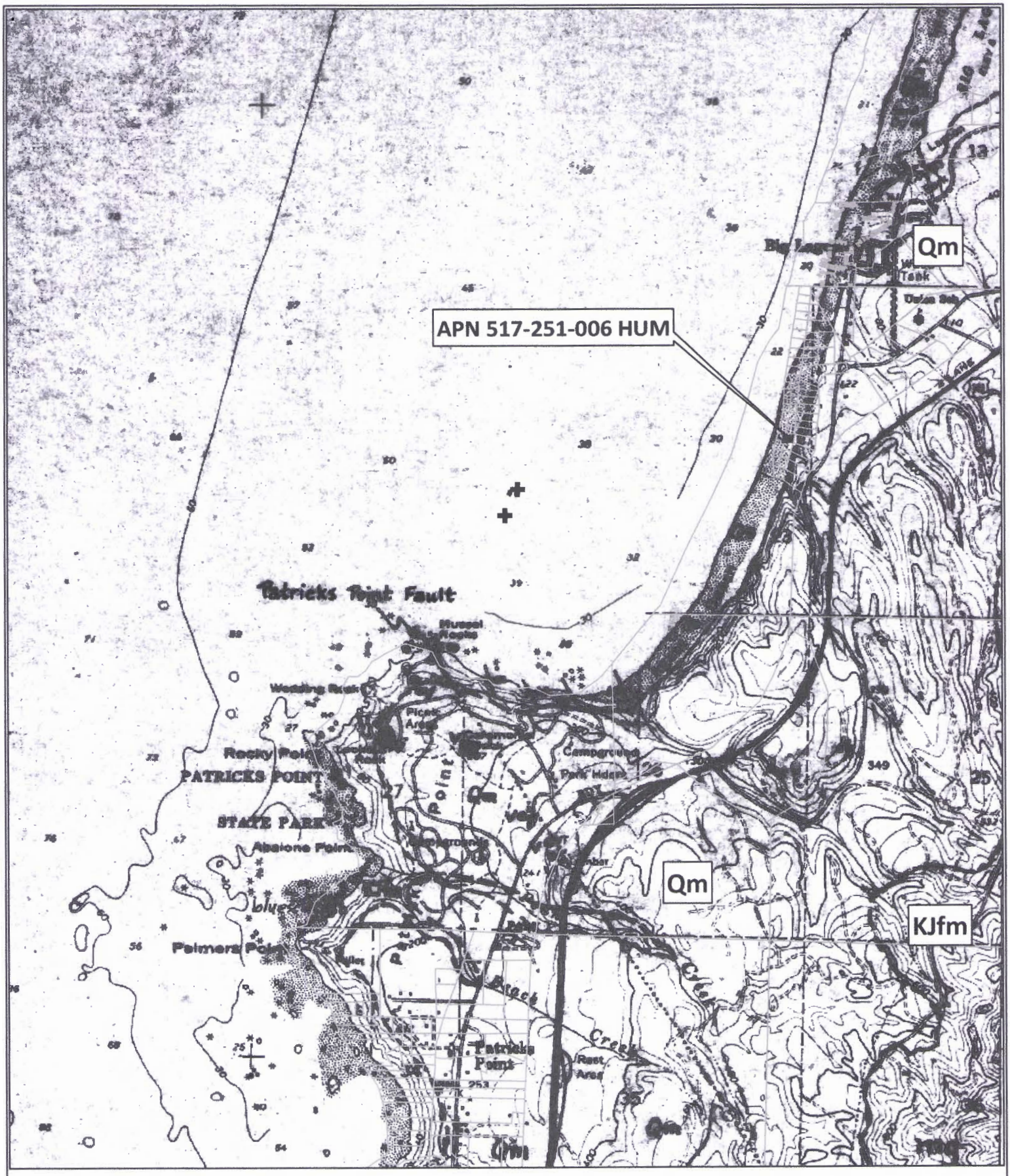
50 25 0 50 Feet

contour interval 40-feet

project:

517-251-006 Humboldt Co. R2

Figure 2: Site Map 12/4/14



geologic mapping from unpubished: Aalto et al. (1981)

USGS topography Trinidad 7.5' Quadrangle

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95551

06/19/12-jao | 04-12-02

N

location of parcel approximate

2,000 1,000 0 2,000 Feet

contour interval 40-feet

project:

517-251-006 Humboldt Co. R2

Figure 3: Regional Geologic Map

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Appendix A

Oswald Geologic	project: 517-251-006hum-R2	location: 396 Roundhouse Road Big Lagoon
Location Sketch — North Arrow	Drilling Method: hand auger	boring no: HA-1
see figures for location description	Sampling Method: visual manual, disturbed	Sheet 1 of 1
Elevation: ~160' USGS	Water Depth: not obs	Start Time: 11:50 am; Finish Time: 12:30 pm
	Time: 11:30 am	Date: 6/08/12; Date: 6/08/12
	Date: 6/8/12	

date: 6/08/12 jao

by: jao

Checked by:

COMMENTS	Depth in Feet	Soil Graph	Surface Conditions: undeveloped lot, Monterey Pine, grasses, fern, shrubs, many iris; forest litter: 6"; mostly pine needles, twigs, few down timber >6 in. dia.
forest duff	0		SOIL DESCRIPTION
	1	SM1	10YR 3/3 dark brown silty fine SAND (SM), moist, loose to med dense
			non plastic, low toughness, non dilatant
	2		many roots, bioturbated,
becomes tighter	3	3.25	mixed with <1-inch peds of yellowish brown soil
	4	SM2	10YR 4/6 dark yellowish brown silty fine SAND (SM) dry, firm to hard, weak cement
			non plastic, low toughness, non dilatant,
	5	5.25	
	6		auger completed at 5.25 feet, target depth acquired
	7		
	8		
	9		
	0		
	1		
	2		
	3		
	4		
	5		
	6		
	7		
	8		
	9		
	0		

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Slope Setback Recommendation Report

New Single-Family Residence
396 Roundhouse Creek Road, Big Lagoon, California
Assessor's Parcel Number 517-251-06

July 30, 2012

Prepared for:
Timothy Royer

LACO Project No. 7619.00

EXHIBIT NO. 6
APPLICATION NO.
1-12-013
WILSON
SLOPE SETBACK
RECOMMENDATION REPORT
(1 of 24)

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Slope Setback Recommendation Report

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396 Roundhouse Creek Road, Big Lagoon, California
Assessor's Parcel Number 517-251-06

July 30, 2012

Prepared for:
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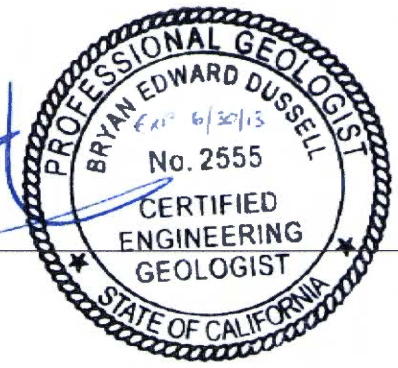
Richard E. Yahn, PE



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COASTAL BLUFF
RECOMMENDED DEVELOPMENT SETBACK REPORT

New Single-Family Residence
396 Roundhouse Creek Road, Big Lagoon, California
Assessor's Parcel Number 517-251-06
LACO Project Number 7619.00

1.0 INTRODUCTION

1.1 Purpose

This Report presents a recommended development setback from the coastal bluff westerly of the proposed single-family residence at 396 Roundhouse Creek Road in Big Lagoon, California (Figure 1). The recommended development setback is based on the results of a site specific quantitative slope instability analysis and bluff retreat rate analysis completed in accordance with California Coastal Commission Memorandum W11.5 (Johnsson 2003).

This report was prepared in accordance with our Engineering Services Agreement dated May 10, 2012, with Mr. Timothy Royer (Client). Our scope of services included:

- Site review and mapping of ocean bluff (within approximately 100 feet laterally of planned residence) under direction of a LACO Certified Engineering Geologist
- Preparation of a scaled topographic cross section of the bluff west of the site using existing LiDAR (Light Detection and Randing) data, obtained from the Coastal LiDAR Project (CCC 2009-2011)
- Review and compile soil information from our in-house database and published documents for use in a mathematical slope instability analysis
- Perform a mathematical slope instability analysis of the bluff west of the proposed building site using assumed soil strength parameters based on data from our data base and published literature
- Conduct a time-series, aerial-photographic analysis and review existing published data to estimate and establish historic bluff retreat rates
- Establish a recommended setback from the existing edge of bluff based on the results of the slope instability analysis and bluff retreat rate for a 75-year design life (per the California Coastal Commission)
- Prepare this report documenting the result of LACO's quantitative slope instability analysis, bluff retreat rate, and providing a minimum development setback distance from the top of the existing bluff edge based on California Coastal Commission Memorandum W11.5 guidelines

Our Scope of Services did not include the collection of subsurface data or survey controlled topographic mapping.

1.2 Limitations

This Report has been prepared for the exclusive use of our client, his contractors and subconsultants, and appropriate public authorities for specific application to development of the site.

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The analyses and recommendations contained in this Report are based on data available in published and unpublished documents along with assumptions about subsurface conditions. LACO has endeavored to comply with the generally accepted engineering geologic standard of care common to the local area. LACO makes no other warranty, express, or implied.

Do not apply any of this Report's conclusions or recommendations if the nature, design, or location of the development is changed. If changes are contemplated, LACO should be consulted to review their impact on the applicability of the recommendation in this Report. Also note that LACO is not responsible for any claims, damages, or liability associated with any other party's interpretation of the subsurface data or reuse of this Report for other projects or at other locations without our express written authorization.

2.0 PROJECT DESCRIPTION

2.1 Project Location

Pertinent project site location information is listed in Table 1 below.

Table 1 – Project Location Information

Latitude and Longitude	41.1518°N and -124.1361°W
Legal Description	Assessor Parcel Number 517-251-096
Parcel Size	0.45 acres
United States Geologic Survey Quadrangle	Trinidad 7.5-minute topographic quadrangle

*Based on coordinates provided by Humboldt County Planning and Building GIS Portal for parcel centroid

2.2 Proposed Development

The project site is currently undeveloped and encompasses nearly level to gently sloping ground with a northerly slope aspect. Client proposes to develop the site with a new single-family residence. The area proposed for development is located near the easterly property boundary adjacent to Roundhouse Creek Road (Figure 2). The westernmost edge of the proposed development area is set back approximately 192 feet from the closest point along the bluff edge.

3.0 SITE AND SUBSURFACE CONDITIONS

3.1 Site Conditions

The project site is located on an uplifted Pleistocene marine terrace surface that slopes gently to the north at an average gradient of less than 4 percent. Topographically, the portion of terrace surface within the project site boundaries is situated between the 120-foot and 160-foot topographic contours as depicted on the Trinidad Quadrangle Special Studies Zone Map, 7.5-minute series (CDMG 1983).

3.2 Geologic Setting

Based on observations made during our site visit and review of data included in existing reports for the area, the project site is underlain by late Pleistocene marine terrace deposits. Previous subsurface explorations in the Big Lagoon and Patrick's Point State Park areas indicate the

Pleistocene marine terrace deposits consist of alternating sequences of medium-dense to very-dense, poorly-graded gravels with sands and clays, and poorly-graded sands with gravel and silt (Busch, 2006, Soun, 2007, LACO, 2000, LACO, 2002, PWA, 2012). Overlying the marine terrace deposits are beach and eolian deposits consisting of dune sand and a silt cap.

The beach profile from Agate Beach to Big Lagoon is characterized by a steep beach face and relatively shallow sloping berm that comprises the backshore environment. The steeply sloping beach face is a reflection of the coarse particle size being transported and deposited within the swash zone and along the beach face. A longshore bar does not appear to be present as a result of the coarse particle size. The entire beach system can be morphologically classified as a "reflective" beach due to its steep, linear beach faces, and well-developed beach cusps and berm. As is typical of reflective beaches, the entire beach system from Agate Beach to Big Lagoon experiences surging breakers and high wave run-up. The lack of a longshore bar allows wave energy to be delivered directly to the beach face unimpeded, resulting in an erosive coastline that has experienced significant coastal retreat.

3.3 Seismicity

This project site is located within a seismically active region in which large earthquakes are expected to occur during the economic life span (75 years) of the development. North of the Mendocino triple junction, the regional tectonic framework is controlled by the Cascadia Subduction Zone (CSZ), wherein oceanic crust of the Juan de Fuca/Gorda plate is being actively subducted beneath the leading edge of the North American plate. The CSZ in its entirety extends from the Mendocino triple junction to British Columbia. Plate convergence along the Gorda segment of the CSZ is occurring at a rate of approximately 30 to 40 millimeters per year (mm/yr) (Heaton & Kanamori, 1984). Rupture along the entire CSZ boundary may produce an earthquake with a maximum moment magnitude (M_w) of 9.0 or greater (Satake, 2003).

Upper plate crustal deformation associated with the subduction of the Gorda plate is expressed as a 90-kilometer (km) wide fold and thrust belt that comprises the accretionary complex along the North American plate margin (Carver, 1987). Faults associated with the offshore and onshore portions of the CSZ fold and thrust belt, include the Little Salmon and Mad River fault zones.

The project area is located in the northerly portion of the Mad River fault zone along the northeast-dipping backlimb of the Trinidad anticline as evidenced by the tilted nature of the underlying terrace deposits. The Trinidad fault is an active reverse (thrust) fault located less than 7 miles south of the project site, and is recognized to be the fault responsible for the active growth of the Trinidad anticline. The offshore trace of the Trinidad fault may be as close as 4 miles to the project site.

The Trinidad fault is recognized by the State of California as being active with an assigned slip rate of 2.5 ± 1.5 mm/yr (USGS, 1996). The Trinidad fault consists of a northwest striking, northeast dipping thrust fault with a reported dip of 45 degrees. The upper-bound earthquake considered likely to occur on the Trinidad fault has an estimated M_w of 7.3 (ICBO-CDMG, 1998).

Based on the record of historical earthquakes (approximately 150 years), faults within the plate boundary zone and internally deforming Gorda Plate have produced numerous small-magnitude and several moderate to large (i.e., magnitude greater than 6) earthquakes affecting the local area. Several active regional seismic sources in addition to those described above are proximal to the project site and have the potential to produce strong ground motions. These seismic sources include:

- The northern segment of the San Andreas transform fault that represents the boundary between the stable North American plate and the northwest-migrating Pacific plate;
- The Mendocino fault, an offshore, high-angle, east-west-trending, right-lateral strike-slip fault that forms the boundary between the Gorda and Pacific plates; and
- Faults within the internally-deforming Gorda plate consisting of high-angle, northeast-trending, left-lateral, strike-slip faults.

3.4 Soil Conditions

Based on observations of the bluff face made during our site reconnaissance on June 15, 2012, and review of information reported from prior explorations (Busch, 2006, Soun, 2007, LACO, 2000, LACO, 2002, and PWA, 2012), the soils beneath the site are assumed to be composed of approximately 10 feet of loose eolian sand and silt overlying an undetermined thickness of weakly- to moderately-cemented silty sand (SM), poorly-graded sand (SP), and well-graded sands/gravels (SW/GW). The maximum depth explored during prior explorations was 40 feet below the ground surface (LACO 2000). Busch (2006) grouped the soils into four soil layers (depicted as layers A, B, C, and D in our stability analysis; see Appendix A).

3.5 Groundwater Conditions

Shallow (<10 feet bgs) groundwater monitoring wells installed to support design of the onsite sewage disposal system for the site, recorded water within 8.6 feet of the ground surface immediately following precipitation events (PWA, 2012). However, the deep (<200 feet bgs) water supply wells for the Big Lagoon community and a private residence adjacent to the site record groundwater at depths of 80 to 90 feet below the ground surface and 168 feet below the ground surface, respectively (Wall, 2012 , HCDEH, 1983 and Asara, 2012). Similarly, deep soil borings in the area did not encounter shallow groundwater.

Boring and well locations are shown on Figure 1 and groundwater data is presented below in Table 2.

Table 2: Groundwater Elevations in the Big Lagoon Area

Source	Distance from site	Screened Interval Depth (feet)	Depth to water (feet)	Groundwater Elevation[1] (feet)
Soun 2007	2,000 feet North	no screen, boring only	> 24	< 66
LACO 2000	5,800 feet Southwest	no screen, boring only	> 65	< 142
Big Lagoon Community well	1,500 feet Northeast	80 - 200	80 - 90	40
Wall Domestic Well	400 feet South	240-247	160	29

[1]Groundwater elevation based on surface elevation (NAVD88) from LiDAR (CCC 2009-2011)

Based on 1) the presence of loose eolian soils within the surficial soil profile, 2) the weak- to moderately-cemented nature of the soils below the eolian soils, 3) the presence of a 140-foot-high free face (bluff) within 200 feet of the site, and 4) the observation that groundwater in the nearest water supply well (Wall domestic well) is typically at an elevation of 21 feet (NAVD88); the shallow groundwater observed by PWA (2012) is interpreted to represent temporary perched water from precipitation. This interpretation is supported by the absence of a seepage face and phreatophytic plants along the face of the bluff within the project area.

The stabilized groundwater level beneath the site is anticipated to be in excess of 141 feet below the ground surface (below an elevation of 29 feet). For conservatism, a groundwater depth of 130 feet below the ground surface (40 feet in elevation) was used in the slope stability analysis for this site.

3.6 Existing Bluff Face and Slope Instability

Slope failure events over the last 75 years provide evidence that coastal bluffs within the project area are highly susceptible to both mass wasting and erosion. Slope failures along the coastal bluffs in the vicinity of the site typically occur in the form of toe erosion with shear failure in the weakly-cemented soils and as tensile-exfoliation failures in areas that are moderately-cemented. Slope failures have been observed to be temporally episodic due to external factors associated with El Niño-Southern Oscillation weather events such as those which occurred during the winters of 1940-41, 1941-42, 1946-47, 1951-52, 1965-66, 1972-73, 1977-78, 1982-83, 1987-88, 1993-94, 1994-1995, and 1997-98 (WRCC 2003).

Evidence of historic slope failures and coastal bluff retreat is observable along the coastal bluff from Agate Beach to Big Lagoon. This section of coastal bluff has a higher potential for slope failure, in general, than many areas of Humboldt County due to (among other factors) the over-steepened sea cliff, easily erodible soils, high annual precipitation, and direct exposure to northwest winter swells coupled with a steep beach face. An additional contributing factor is the lack of an offshore bar, which would reduce wave energy prior to reaching the shoreline.

4.0 QUANTITATIVE SLOPE INSTABILITY ANALYSIS

4.1 Discussion and Methodology

Table 1 of Memorandum W11.5 (Johnsson 2003) presents the guidelines for performing quantitative slope stability analysis for purposes of establishing setback distances. Simplified, the guidelines state the following:

- The analysis should demonstrate a setback distance associated with a factor of safety of 1.5 for static conditions and 1.1 for seismic conditions
- The effects of earthquakes on slope stability may be addressed through psuedostatic slope analysis assuming a horizontal seismic coefficient of 0.15g
- All slope stability analysis should be undertaken with water table or potentiometric surfaces for the highest groundwater conditions
- Circular failure surfaces should be sought using methods such as Spencer's (Spencer 1967; 1973) or Morgenstern-Price (Morgenstern and Price, 1965)

To evaluate the stability of the bluff under both static and dynamic conditions, LACO performed a quantitative slope stability analysis of the bluff using Slide (version 5.0) slope stability software. The software assesses the stability of the slope using the Spencer Method to compare the forces resisting failure to the forces driving failure. The ratio of the two forces is defined as a "factor of safety" (F). In a stable slope, the forces resisting failure exceed the driving forces and the resultant F is greater than 1.0. When the two forces are equal, the F is equal to 1.0 and slope failure is imminent. The greater the F, the greater the stability of the slope.

The stability analysis for this site used slope geometry obtained from publically available LIDAR data (CCC, 2009-2011) and a simplified 5-layer model of the slope soil materials. The five layers used included the weakly- to moderately-cemented bluff soils (Layers A, B, C, and D) and the loose beach sands/slope colluvium (Layer E).

Although composed of five distinct layers, the cohesion parameter assigned for the bluff is based on the methodology of Collins and Sitar (2011) for assessing slope stability in weakly-cemented sands. The Collins and Sitar methodology is used in this analysis as a basis to provide a representative cohesion value in the weakly-cemented sands. Because the methodology utilizes the geometry of the entire bluff face with a single unit and friction angle value, it is not possible to calculate a cohesion value for specific soil layers within the slope. Unit weight and friction angle values used in the analysis are based on data included in unpublished documents (Busch, 2006, LACO, 2000, LACO, 2002, Hunt, 2005) and professional judgment. The Cohesion Estimation Calculations are included as Appendix B. The following Table 3 summarizes the soil parameters used in the slope instability analysis for the site.

Table 3: Soil Parameters Used in the Factor of Safety Analysis

Description	Weakly Cemented Bluff (SM, SP, SW, GW)	Loose Beach Sand / Colluvium
Layer	**A, B, C, D**	**E**
Dry Unit Weight	126 pounds per cubic foot (pcf)	100 pcf
Saturated Unit Weight	140 pcf	137 pcf
Cohesion	757 pounds per square foot	0 psf
Friction Angle	36°	29°

Groundwater is modeled at a depth of 10 feet below the ground surface to represent winter conditions as documented by PWA (2012). However, the groundwater is modeled as perched on top of Layer B with a separate piezometric surface at a depth of 130 feet below the ground surface (40 feet in elevation) to conservatively represent groundwater conditions as recorded by the Wall domestic well. As such, Layers B and C are modeled as unsaturated.

4.2 Results of Factor of Safety Analysis

Graphic results from the Factor of Safety (F) analysis are included in Appendix A. The model analysis reflecting a slope failure surface with an F equal to 1.5 under static conditions (termed F_S) is located 45 east of the present bluff edge within the profile model. The slope failure surface with an F equal to 1.1 under dynamic conditions (termed F_D) is located 30 feet east on the present bluff edge within the model profile.

5.0 BLUFF RETREAT/EROSION RATES

5.1 Discussion and Methodology

Rapid bluff retreat rates have been well established along the coast in the vicinity of the site (Tuttle, 1981; Hapke et al, 2006). Studies by Tuttle (1981) have documented 40 to 100 feet of retreat between 1930 and 1981. The bluff retreat rates are typically estimated using measurements from historical photographs and maps. Although rates are commonly presented as linear (constant through time), they typically tend to be episodic due to a variety of internal and external factors, including 1) temporary weather patterns (El Nino, heavy rainfall periods), 2) seismic events, 3) climate change, and 4) rise in sea level. Hapke et al (2006) documents a maximum short term erosion rate at Big Lagoon of 8.5 feet per year.

A long-term bluff retreat rate was estimated for this site by reviewing rates presented by previous studies (Busch, 2006; Tuttle, 1981; Hapke et al, 2006) and performing a site specific aerial photographic review covering approximately 64 years from 1948 to 2012. A list of the aerial photographs referenced is included as Appendix C.

The site specific aerial photograph review utilized constant transect through the site to measure changes in distance to the bluff from fixed locations over time. The fixed referenced locations utilized included edges of roadway pavement and road intersections that were identifiable in each photograph examined.

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5.2 Results of Bluff Retreat/Erosion Rates

The bluff edge adjacent to the project site has retreated up to 75 feet between 1948 and 2012, which results in a bluff retreat rate of approximately 1.25 feet per year. The long-term historic retreat rates were determined by dividing the total amount of coastal retreat measured by the total length of time spanned by the aerial photographs reviewed (64 years). Graph A below presents the results and interpretations of the bluff retreat rate as determined by historic aerial photographs.

Graph A: Historic Bluff Retreat Rate

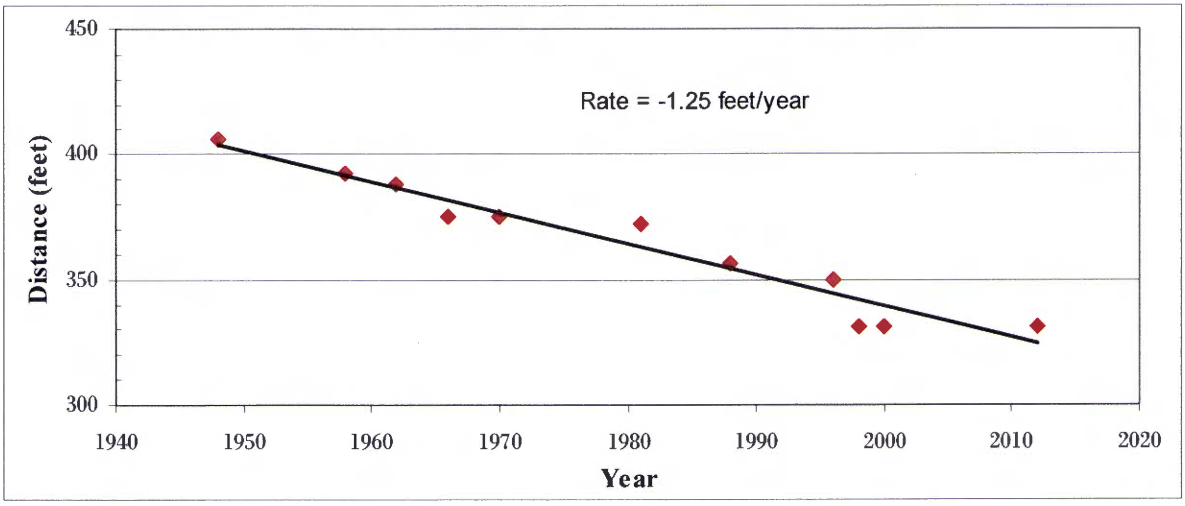

Table 4 below presents a comparison of bluff erosion rates estimated by other studies in the vicinity.

Table 4: Comparison of Bluff Retreat Rate Estimations for Big Lagoon Area

Source	Distance from site	Time Span (years)	Estimated Retreat Rate (foot per year)
Tuttle, 1981	200 feet North and South	34	1.5 to 2.7
Busch, 2003	300 feet North	61	1.0
LACO, 2006	900 feet North	58	1.5
This Study	---	64	1.25

The rates established by the aerial photo review for this study are consistent with results from prior studies. Based on the rates documented in our aerial photographic review and the consistency with results from prior studies, we judge that a long-term average rate of 1.25 feet/year characterizes the bluff retreat rate within the project area.

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6.0 RECOMENDED SETBACK

California Costal Commission Memorandum W11.5 (Johnsson 2003) recommends that the bluff setback be established by combining the distance from the present bluff edge to the most distant F_S =1.5 slope failure surface (or the most distant F_D = 1.1 slope failure surface, which ever is greater) with the estimated erosion distance over a 75-year period and an additional 10-foot buffer.

The results of the qualitative slope stability analysis, included as Appendix A, calculated a distance of 73 feet to the most distant F_S =1.5 slope failure surface. Under seismic conditions, the lowest F_D calculated is F_D = 1.13 with the most distant slope failure surface equal to 64 feet from the bluff edge. Therefore, the most distant slope failure surface for the static condition (F_S =1.5) is the greatest distance to the bluff and is, therefore, considered the more conservative of the two distances.

Estimated bluff retreat over a 75-year period using a recommended rate of 1.25 feet per year is 93.75 (use 94) feet.

Using the results of our bluff retreat study for this project and the methodology suggested by the California Coastal Commission, LACO recommends a minimum bluff edge setback of 177 feet for this project at this time.

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LACO

EUREKA • UKIAH • SANTA ROSA

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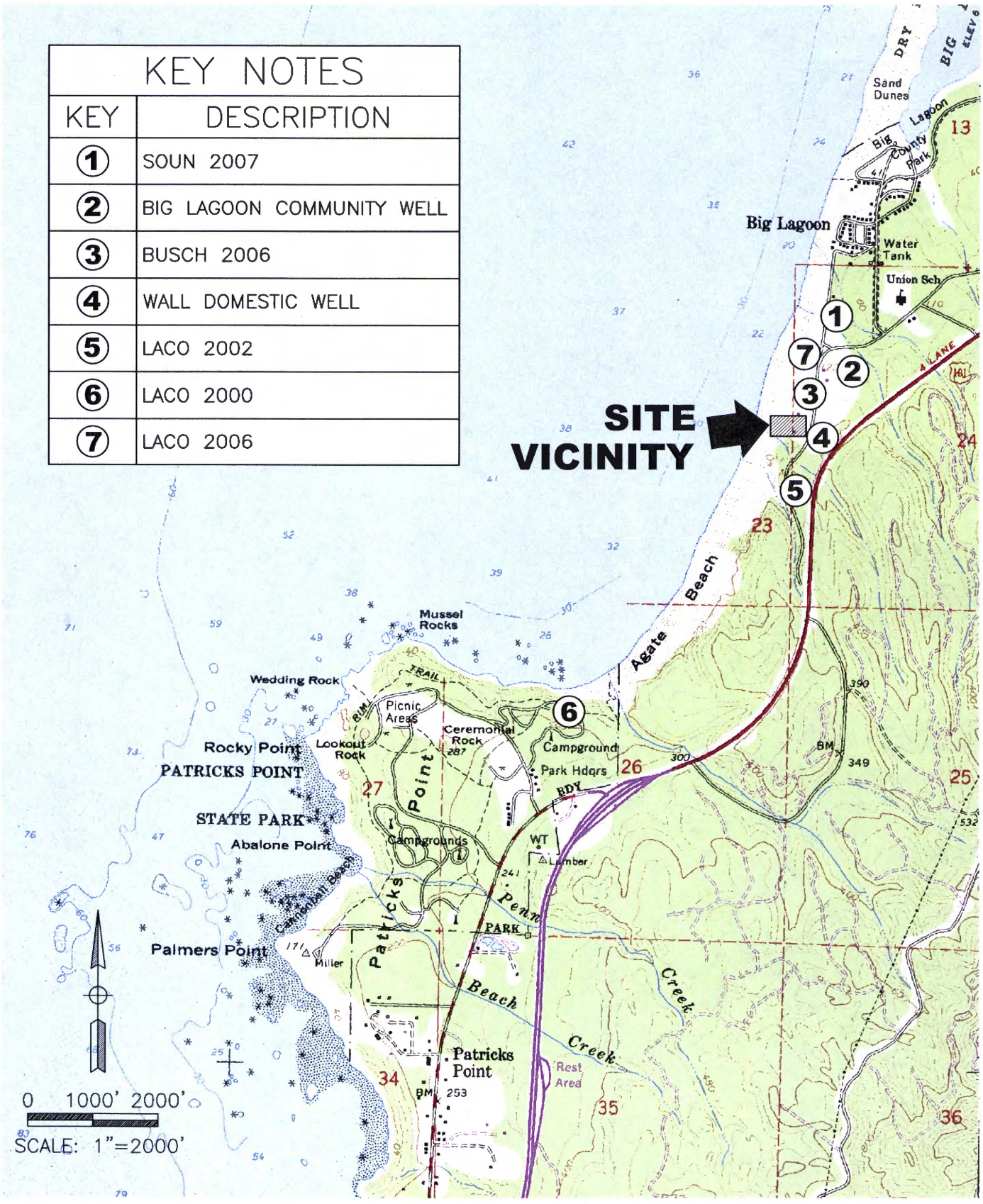
PROJECT	SLOPE SETBACK RECOMMENDATION REPORT	BY JB/JDB	FIGURE 1
CLIENT	TIM ROYER	DATE 7/27/12	
LOCATION	APN 517-251-006	CHECK MRL	JOB NO. 7619.00
	SITE VICINITY MAP	SCALE AS SHOWN	

KEY NOTES	
KEY	DESCRIPTION
1	SOUN 2007
2	BIG LAGOON COMMUNITY WELL
3	BUSCH 2006
4	WALL DOMESTIC WELL
5	LACO 2002
6	LACO 2000
7	LACO 2006



Jul 27,2012-4:15pm T:\Cadfiles\7600\7619.00 ROYER\DWG\ 7619-00 GEO FIGURE 1.dwg

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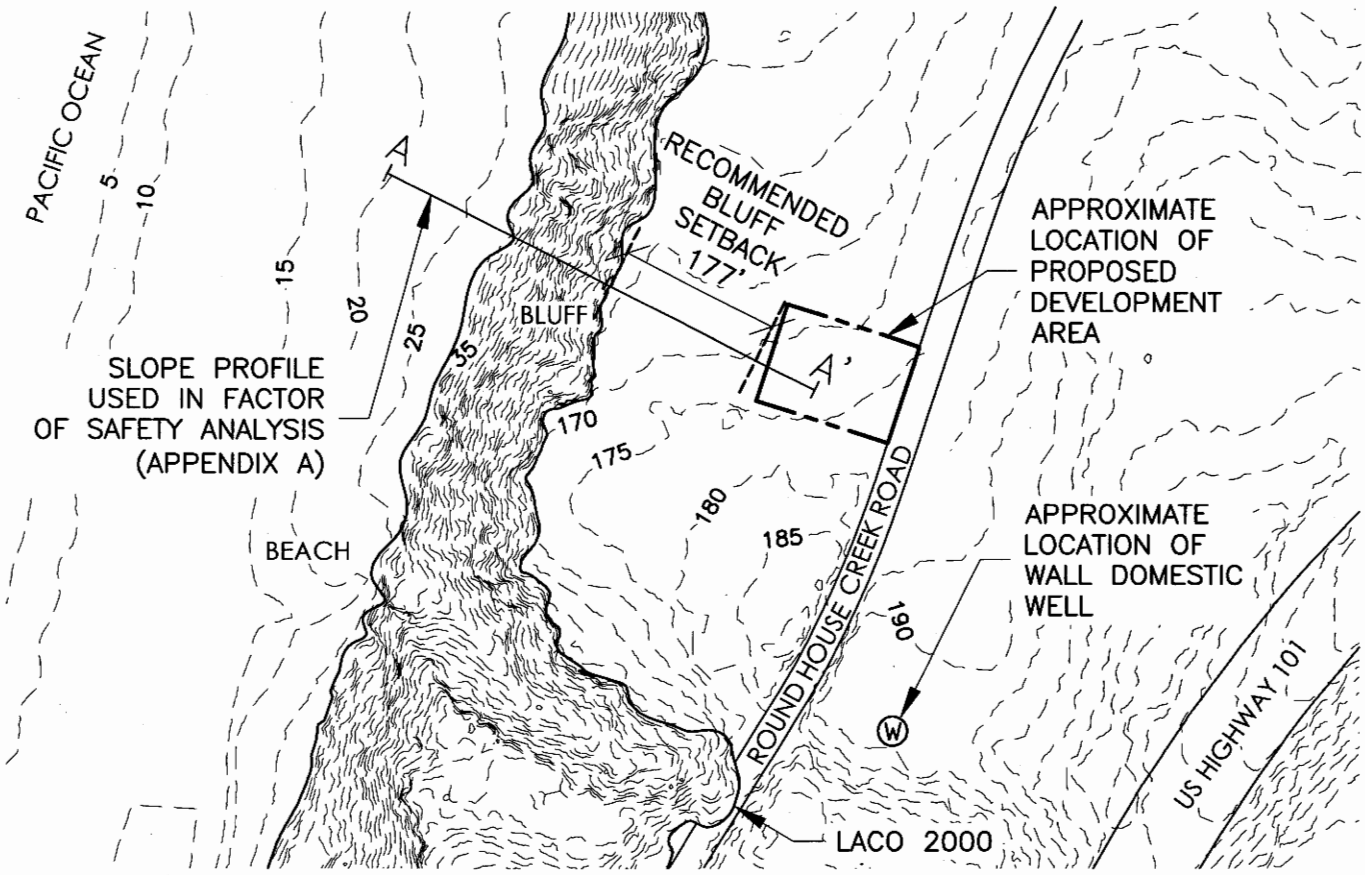
LACO	PROJECT	SLOPE SETBACK RECOMMENDATION REPORT	BY	JB/JDB	FIGURE
EUREKA • UKIAH • SANTA ROSA	CLIENT	TIM ROYER	DATE	7/27/12	2
1-800-515-5054 www.lacoassociates.com	LOCATION	APN 517-251-006	CHECK	BED	JOB NO. 7619.00
		SITE MAP	SCALE	AS SHOWN	



0 100' 200'

SCALE: 1"=200'

NOTES:

1. BASE MAP ADAPTED FROM DATA AVAILABLE THROUGH THE 2009–2011 CALIFORNIA COASTAL CONSERVANCY LiDAR PROJECT.
2. CONTOUR INTERVAL IS 5'.
3. ELEVATION DATUM IS NAVD88.
4. ALL LOCATIONS APPROXIMATE.

Jul 27,2012–4:28pm T:\Cadfiles\7600\7619.00 ROYER\DWG\ 7619-00 GEO FIGURE 2.dwg

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APPENDIX A

Slope Stability Results

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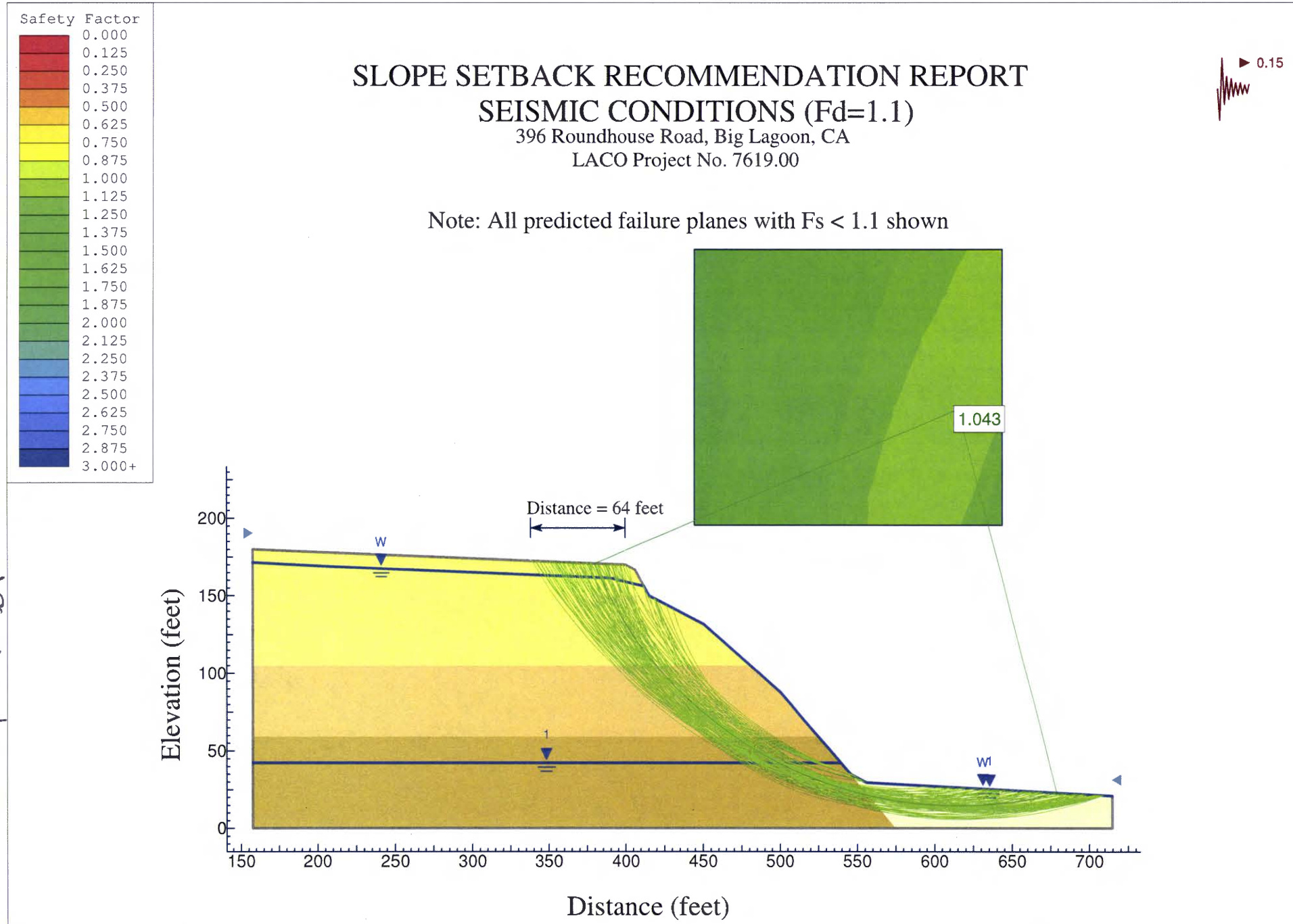
SLOPE SETBACK RECOMMENDATION REPORT
SEISMIC CONDITIONS (Fd=1.1)

396 Roundhouse Road, Big Lagoon, CA

LACO Project No. 7619.00

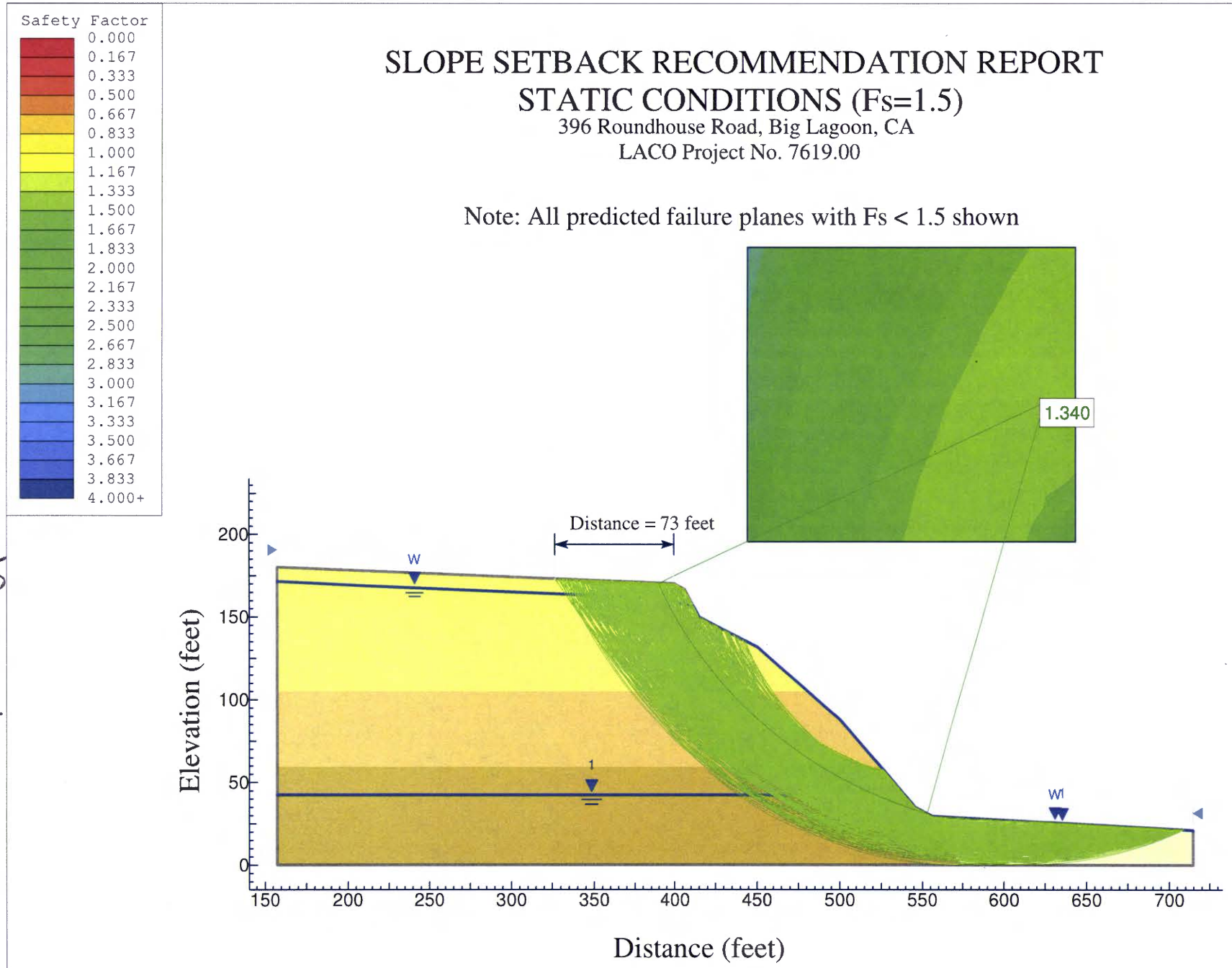
Note: All predicted failure planes with Fs < 1.1 shown



SLOPE SETBACK RECOMMENDATION REPORT
STATIC CONDITIONS (Fs=1.5)

396 Roundhouse Road, Big Lagoon, CA
LACO Project No. 7619.00

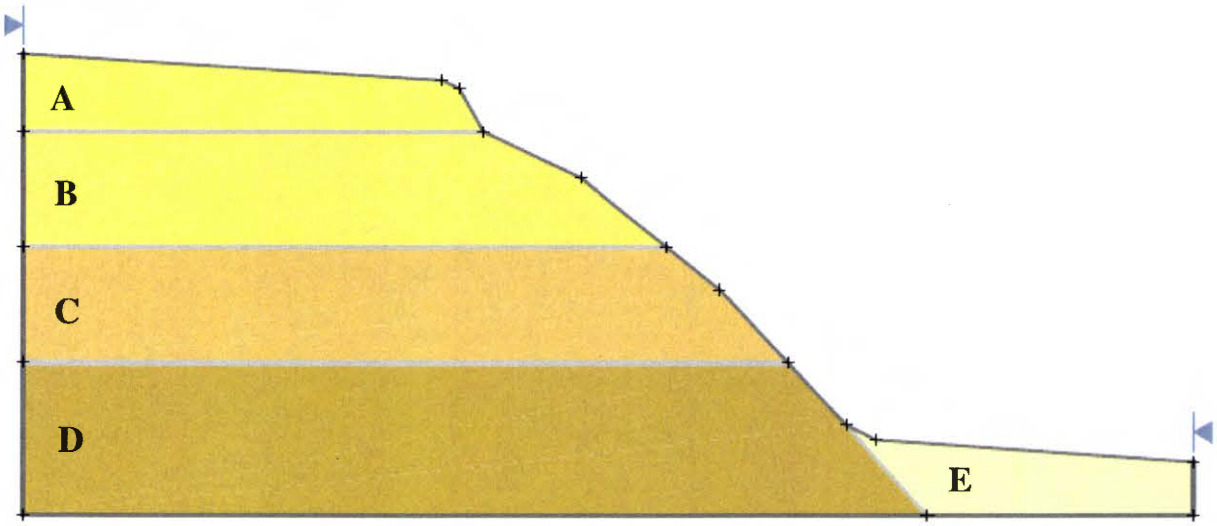
Note: All predicted failure planes with Fs < 1.5 shown



SLOPE SETBACK RECOMMENDATION REPORT

SLOPE STABILITY - KEY TO SOIL LAYERS AND MATERIAL DESCRIPTIONS

LACO Project No. 7619.00



Layer	Material	Dry Unit Weight (pcf)	Sat. Unit Weight (pcf)	Friction Angle (degrees)	Cohesion (psf)
A	SM: Weakly cemented eolian sand with topsoil	126	140	36	757
B	SW/GW: Weakly cemented interbedded sand and gravel				
C	SP: Weakly cemented cross-bedded sand				
D	SW/GW: Weakly cemented interbedded sand and gravel				
E	Bluff Colluvium	100	137	29	0

Notes:

- Soil layers adapted from Busch (2006)
- Cohesion estimated using methods recommended in "Stability of Steep Slopes in Cemented Sand" (Collins and Sitar, 2010)
- Horizontal seismic coefficient = 0.15
- Unit weight and friction angle assumed based on data from Busch (2006), LACO (2002) and LACO (2006)
- Slope generated from California Coastal Conservancy LIDAR Project (2009-2011)

APPENDIX B

Cohesion from Cementation Estimate Calculations

2/09/24

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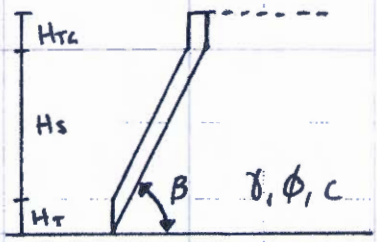
Concord: 5167 Clayton Rd., Ste. D, Concord, CA 94521
Phone 877-733-5777

PROJECT Slope Setback Report	BY MRL	SHEET NO.
LOCATION Big Lagoon	DATE 6/28/12	
CLIENT Tim Royer	CHECKED	JOB NO. 7619.00
Cohesion (cementation) Estimate	DATE	

Collins and Sitar, 2011

Using equation 7b (weakly cemented slopes)



$$F_S = \frac{2c\left[\frac{(H_S+H_T)}{H^2-(H_S+H_{TC})^2}\right] + \gamma\cos^2\beta\tan\phi}{\gamma\sin\beta\cos\beta}$$

$$c = \frac{F_S[\gamma\sin\beta\cos\beta] - \gamma\cos^2\beta\tan\phi}{2\left[\frac{(H_S+H_T)}{H^2-(H_S+H_{TC})^2}\right]}$$

Assumptions:
$\gamma_{AVG} = 126$ pcf
$\phi_{AVG} = 36°$
$F_S = 1.0$ (slope failure conditions)

Slope Geometry:
$H = 140$ feet
$H_T^* = 30$ feet
$H_S = 90$ feet
$H_{TC} = 20$ feet
* As observed during site visit

$$c = \frac{1.0[(126\text{ pcf})\sin 50\cos 50] - (126\text{ pcf})\cos^2 50\tan 36}{2\left[\frac{(90+30\text{ ft})}{140^2-(90+20)^2\text{ ft}^2}\right]}$$

$$c = \underline{756.8\text{ psf}}$$

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APPENDIX C

Historic Aerial Photographs

References

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AERIAL PHOTOGRAPH REFERENCES

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